Filed pursuant to Rule 424(b)(4)
Registration No. 333-257431

Prospectus

7,920,000 shares

Rapid Micro Biosystems, Inc.

Class A Common stock

This is an initial public offering of shares of Class A common stock by Rapid Micro Biosystems, Inc. Prior to this offering, there has been no public market for our shares of Class A common stock. The initial public offering price is $20.00 per share.

Our Class A Common stock has been approved for listing on The Nasdaq Global Select Market under the symbol "RPID."

Following this offering, we will have two classes of common stock: Class A common stock and Class B common stock. The rights of the holders of Class A common stock and Class B common stock are identical, except with respect to voting and conversion. Each share of Class A common stock will be entitled to one vote and shares of Class B common stock will be non-voting, except as may be required by law. Each share of Class B common stock may be converted at any time into one share of Class A common stock at the option of its holder, subject to the ownership limitations provided for in our restated certificate of incorporation to become effective upon the closing of this offering.

We are an "emerging growth company" under the federal securities laws and are subject to reduced public company reporting requirements. See "Prospectus Summary — Implications of Being an Emerging Growth Company and a Smaller Reporting Company."

	Per share	Total
Initial public offering price	$20.00	$158,400,000
Underwriting discounts and commissions[(1)]	$ 1.40	$ 11,088,000
Proceeds, before expenses, to us	$18.60	$147,312,000

(1) See "Underwriting" for additional disclosure regarding underwriting discounts and commissions and estimated offering expenses.

We have granted the underwriters a 30-day option to purchase up to 1,188,000 additional shares of Class A common stock from us at the initial public offering price less the underwriting discounts and commissions.

Investing in our Class A common stock involves a high degree of risk. See the section entitled "Risk Factors" beginning on page 18 to read about factors you should consider before buying shares of our Class A common stock.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the accuracy or adequacy of this prospectus. Any representation to the contrary is a criminal offense.

The underwriters expect to deliver the shares of Class A common stock to purchasers on or about July 19, 2021.

Joint Book-Running Managers

J.P. Morgan **Morgan Stanley** **Cowen** **Stifel**

July 14, 2021

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Neither we nor the underwriters have authorized anyone to provide any information or to make any representations other than those contained in this prospectus or in any free writing prospectuses prepared by or on behalf of us or to which we have referred you. We take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may give you. This prospectus is an offer to sell only the shares of Class A common stock offered hereby, but only under circumstances and in jurisdictions where it is lawful to do so. The information contained in this prospectus or in any applicable free writing prospectus is current only as of its date, regardless of its time of delivery or any sale of shares of our Class A common stock. Our business, financial condition, results of operations and prospects may have changed since that date.

Through and including August 8, 2021 (25 days after the commencement of this offering), all dealers effecting transactions in these securities, whether or not participating in this offering, may be required to deliver a prospectus. This delivery requirement is in addition to the obligation of dealers to deliver a prospectus when acting as underwriters and with respect to their unsold allotments or subscriptions.

We have proprietary rights to trademarks, trade names and service marks appearing in this prospectus that are important to our business. Solely for convenience, the trademarks, trade names and service marks may appear in this prospectus without the ® and TM symbols, but any such references are not intended to indicate, in any way, that we forgo or will not assert, to the fullest extent under applicable law, our rights or the rights of the applicable licensors to these trademarks, trade names and service marks. All trademarks, trade names and service marks appearing in this prospectus are the property of their respective owners.

For investors outside the United States: Neither we nor the underwriters have done anything that would permit this offering or possession or distribution of this prospectus in any jurisdiction where action for that purpose is required, other than in the United States. Persons outside the United States who come into possession of this prospectus must inform themselves about, and observe any restrictions relating to, the offering of the shares of Class A common stock and the distribution of this prospectus outside the United States.

Prospectus summary

This prospectus summary highlights, and is qualified in its entirety by, the more detailed information and financial statements included elsewhere in this prospectus. This summary does not contain all of the information that may be important to you in making your investment decision. You should read this entire prospectus carefully, including the sections titled "Risk Factors," "Special Note Regarding Forward-Looking Statements" and "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our consolidated financial statements and the related notes included elsewhere in this prospectus before deciding to invest in our Class A common stock.

Defining the future of pharmaceutical quality control

We are leading a global transformation toward fully automated microbial quality control within pharmaceutical manufacturing. Our products safeguard the most complex and critical bioprocessing workflows in the industry, enabling faster, safer, and higher capacity drug production. Through our unique expertise at the intersection of microbiology, robotic systems, and advanced vision algorithms, we are setting the foundation for end-to-end quality control automation to enable the future of advanced pharmaceutical manufacturing.

Overview

We are an innovative life sciences technology company providing mission critical automation solutions to facilitate the efficient manufacturing and fast, safe release of healthcare products such as biologics, vaccines, cell and gene therapies, and sterile injectables. Our flagship Growth Direct platform automates and modernizes the antiquated, manual microbial quality control, or MQC, testing workflows used in the largest and most complex pharmaceutical manufacturing operations across the globe. The Growth Direct platform brings the quality control lab to the manufacturing floor, unlocking the power of in-line/at-the-line MQC automation to deliver faster results, greater accuracy, increased operational efficiency, better compliance with data integrity regulations, and quicker decision making that our customers rely on to ensure safe and consistent supply of important healthcare products.

The only fully automated, high-throughput and secure MQC solution


Broad application suite & easy sample collection


High capacity & high throughput testing


Fully automated handling & traceability of samples


Rapid detection & enumeration


Robust security & data integrity


>99% uptime to support mission critical MQC testing applications

Our Growth Direct platform is the only fully automated, high-throughput and secure MQC solution. Developed with over 15 years of active feedback from our customers, the Growth Direct system was purpose-built to meet the MQC challenges posed by the increasing scale, complexity, and regulatory scrutiny confronting global

pharmaceutical manufacturers. Our platform delivers the robust and scalable MQC automation necessary to support rapidly expanding demand for novel and complex therapeutic modalities, such as biologics, vaccines, cell and gene therapies, and sterile injectables. Our systems are designed to absorb and automate the vast majority of daily MQC test volume in any pharmaceutical manufacturing facility and can be operated in networked fleets of multiple systems per facility or campus to scale up with high-volume manufacturing.

MQC is a ubiquitous and critical testing process, executed daily at massive scale globally, that ensures pharmaceutical manufacturing facilities and products are free of microbial contamination from exogenous microorganisms such as bacteria, mold, and other foreign substances. MQC ensures the safety of final drug products released for patient use, via the constant testing for microbial contamination of raw materials, production environments, personnel, and in-process and final sterility testing for drug products. A single drug production facility may conduct anywhere from tens of thousands to over one million MQC tests per year to ensure product quality. This testing is mandated and closely monitored by the U.S. Food and Drug Administration, or FDA, and other global regulatory agencies to ensure the safety of all pharmaceutical products, with serious regulatory and financial consequences for lack of compliance. Companies that have failed to pass FDA MQC audits have been subject to repeat FDA Form 483s, warning letters, complete response letters, extended plant shutdowns, and substantial product scrap and remediation costs. An FDA Form 483 is issued by the FDA at the conclusion of an inspection for conditions that may constitute violations of the Federal Food, Drug, and Cosmetic Act or other laws and regulations enforced by the FDA.

The traditional method to conduct MQC testing is “growth promotion” in which samples are manually collected on media plates by MQC specialists, manually processed and incubated at various temperature conditions, and visually inspected for growing colonies, which indicate the presence of microorganisms. The benefit of this long-standing method is that it is trusted — a colony growing on media strongly implies the existence of viable, potentially contaminating organisms growing in the location or sample from which the assay was collected. However, the traditional method presents substantial cost and risk to manufacturers, principally because the process is slow to deliver results, entirely dependent on human labor, subject to technician fallibility and error, unsecured, and non-compliant with data integrity regulations. For these reasons, manual traditional MQC has become antiquated and is unable to match the growing scale of complex bioprocessing.

Our Growth Direct platform improves the traditional MQC process, maintaining the fundamental trusted method of growth promotion, but applying advanced robotic automation, powerful optical imaging, algorithmic vision analysis, and data management to render it more scalable and efficient for the future of advanced pharmaceutical manufacturing. Our proprietary technology works by replacing human counting of growing colonies with software and algorithm detection and counting based on image analysis. We exploit the natural autofluorescent properties of microbial organisms to count microcolonies by detecting minute changes to their brightness over time using proprietary vision algorithms, without any new reagents or additional sample prep. Our system wraps this core detection technology with fully automated, high-volume, walk-away robotic sample handling and incubation, locked behind a secured interface that enables compliance with data integrity regulations.

Growth Direct 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 85% of the manual steps of traditional MQC, generating significant time, operational, and cost savings for our customers. Moreover, our platform increases accuracy and efficiency through full automation of the MQC process. Customers depend on Growth Direct’s robust security, connectivity, and data integrity capabilities, reinforced by its high reliability with >99% uptime.

We believe the MQC market is poised for disruption and modernization via the widespread deployment of our Growth Direct platform, and we have embarked on the mission of transforming the MQC test market to standardize on our fully automated MQC solution.

On a global scale, we estimate nearly 350 million MQC tests are conducted annually in thousands of dedicated pharmaceutical manufacturing facilities responsible for producing billions of doses of therapeutics every year. We estimate our total addressable market, or TAM, to be approximately $10 billion in 2021, which we expect to grow to over $14 billion by 2026. We based our estimated TAM on total potential demand for our products derived

from research we commissioned conducted by Health Advances LLC and our current pricing. Our TAM includes both a system sales opportunity and a recurring opportunity from sales of consumables and service contracts, the latter of which is estimated to be approximately $5 billion in 2021. As we embed our products within global pharmaceutical manufacturing operations and begin to automate and digitize their workflows, we believe our platform is exceptionally well-positioned to enable the future of quality control automation and unlock further significant TAM expansion opportunities.

We employ direct commercial and service teams that drive the adoption of our products globally. We create a superior user experience from pre-sales, to onboarding, consultative validation services, onsite technical training, and continued customer support throughout our relationship. We have a scalable commercial infrastructure including a direct sales force in North America and Europe. This is supplemented with an extensive and highly specialized customer service and validation infrastructure. This infrastructure ensures successful on-boarding of the Growth Direct system through both initial validation and follow-on purchases throughout the entire customer site network, where the highest volume sites may require dozens of Growth Direct systems. We currently have customers across approximately 70 sites in 14 countries and the majority of our customers have multiple Growth Direct systems and have deployed the Growth Direct platform across multiple facility locations.

We launched the latest generation of the Growth Direct system in 2017 and have placed over 100 systems and sold over 1 million consumables globally. Our customer base includes over half of the top 20 pharmaceutical companies as measured by revenue and 30% of globally approved cell and gene therapies. Once installed and validated in our customers' facilities, the Growth Direct system provides for recurring revenues through ongoing consumables and service contracts. Based on the significant value that our Growth Direct platform provides to our customers, we have experienced strong organic growth over the last two fiscal years, despite the impact of the COVID-19 pandemic, resulting in combined product and service revenue of $11.5 million and $14.1 million for the fiscal years ended December 31, 2019 and 2020, respectively, representing an annual growth rate of 22.9%. We generated net losses of $21.2 million and $37.1 million for 2019 and 2020, respectively.

We seek to establish the Growth Direct platform as the trusted global standard in automated MQC by delivering the speed, accuracy, security, data integrity and regulatory compliance that our customers depend on to ensure patient safety and consistent drug supply.

Our strengths

The following competitive strengths allow us to capitalize on our first-mover advantage and further establish our leadership position in automating the MQC testing market:

- *Proprietary technology platform offering best-in-class automated and secure MQC testing, built on investment and patent-protected innovation across multiple technology disciplines.*
- *Top-tier customer collaborators validating and establishing the Growth Direct platform as an industry standard globally.*
- *Deep integration within heavily regulated pharmaceutical manufacturing processes.*
- *Highly attractive business model that leverages our growing installed base of systems to generate persistent recurring revenues through consumables and service contracts.*
- *Ability to leverage our extensive regulatory expertise to better serve our customers' needs.*
- *Experienced management team and workforce with deep domain knowledge.*

Our industry background

MQC is the principal method by which pharmaceutical manufacturers ensure the ongoing sterility of their facilities and finished products by detecting and stopping contamination from any outside microorganisms, such as bacteria, mold, and other foreign substances. MQC is a critical component of the bioprocess and pharmaceutical production process and is regulated and mandated by the FDA under current good manufacturing practice, or

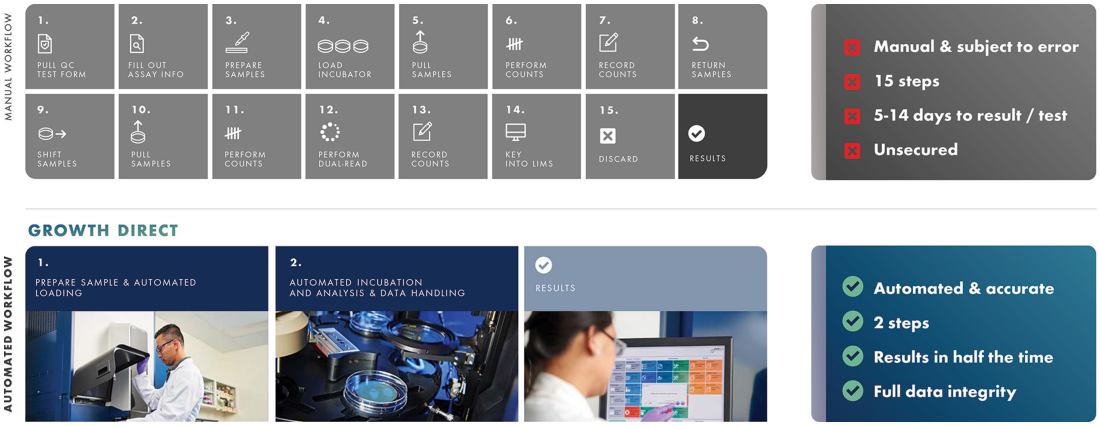
cGMP, and by other international regulatory agencies. MQC testing occurs across the entire manufacturing workflow, with increasingly stringent controls as the process nears final product release.

Current MQC methods are extremely laborious and time consuming, suffering from lack of any meaningful innovation for decades. A typical traditional MQC workflow can require 15 individual manual processing steps, including hand labeling and inventory, multiple rounds of sample handling and transport, multiple human visual reads, and hand transcription of data between paper and electronic recording systems — all nodes that generate operational inefficiencies and increase risk. As a result, the traditional method of MQC poses several operational challenges, including:

- Slow time to results, ranging from 5-14 days, which delays response to contaminations.
- Result subjectivity stemming from variability between MQC specialists.
- Vulnerability to human errors and falsification in handling of samples and recording data.
- Lack of data integrity and audit controls.
- Lack of scalability due to intensive labor needs.

In time-sensitive, highly regulated pharmaceutical manufacturing operations, these process vulnerabilities can expose organizations to significant operational, financial, and reputational risks, including loss of valuable product batches, reduced manufacturing capacity, lengthy regulatory investigations, costly enforcement actions, and delayed release of life-saving products.

Traditional MQC method vs. Growth Direct platform



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 85% of the manual steps of traditional MQC, generating significant time, operational, and cost savings for our customers.

Our core technology and approach

To date, prior technology products have not succeeded in automating MQC workflows at scale as a consequence of being too slow, too small, or too difficult to validate. We pioneered our Growth Direct platform to fully automate and digitize the proven growth promotion MQC method.

The first key component of the core Growth Direct technology is our vision-based detection and enumeration. The Growth Direct system relies on a fundamental property of all microorganisms — they contain cellular components required for growth, called flavins and flavoproteins, that autofluoresce, or glow, under certain light wavelengths without the addition of extraneous reagents. Our proprietary system detects the autofluorescence

of bacterial or fungal microcolonies by illuminating them with blue-spectrum light and directing the resulting green-spectrum signal onto a Charged-Coupled Device, or CCD, chip — an array of independent photosensitive pixel elements. Our image analysis software uses vision algorithms to interpret these light signals and counts the clusters of illuminated pixels representing each microcolony. As a result, our system detects microorganism growth at the microcolony stage (~100 cells), which typically occurs in half the time required for detection of visible colonies by eye (~10 million cells).

This method is non-destructive which ensures that detected colonies represent actual viable microbial contaminations and allows the organisms to be grown into visible colonies for subsequent microbial identification for root cause investigation and remediation follow-up.

The second key component of our Growth Direct technology is our walk-away high-throughput automation capability. The Growth Direct system fully handles samples from start to finish without human intervention, automatically managing sample intake, incubation, imaging, secure paperless data management and disposal. This substantially reduces labor associated with MQC and virtually eliminates the risk of human operator error.

Integrated in the Growth Direct system, our technologies result in an automated method that is faster, more efficient, more secure, and more reliable than the traditional method. We believe several factors differentiate our Growth Direct technology as the leader in full MQC automation:

- *Faster results in half the time at higher testing throughputs and capacity;*
- *Ability to absorb the vast majority of daily MQC testing in any facility;*
- *Increased accuracy through full automation;*
- *Increased process efficiency;*
- *Robust security, connectivity and data integrity;*
- *High reliability with >99% uptime; and*
- *Regulatory acceptance with a clear path to validation.*

Our products and services

Our Growth Direct platform automates the growth promotion method of MQC and enables customers to perform this critical testing process more efficiently, accurately, and securely. Our platform comprises the Growth Direct system, proprietary consumables, laboratory information management system, or LIMS, connection software, and comprehensive customer support and validation services.

Growth Direct System

Environmental Monitoring Consumable

Water / Bioburden Consumable

Our Growth Direct system is a fully automated, high throughput instrument for daily processing of MQC samples on our consumables — a microbiology quality control lab in a box. The Growth Direct system contains two high-capacity incubators, an advanced imaging system and internal robotics for sample handling. The system enables walk-away bulk sample loading, holding 700 of our consumables per instrument. Its dual, independently controlled incubators automatically manage multi-temperature incubation protocols. Onboard imaging and vision software detects and counts microbial growth, delivering test results in half the time of the manual method.

Our proprietary consumables are designed to facilitate high-throughput automated handling and image processing with our Growth Direct system. Our consumables cover the majority of the daily high volume routine tests to include environmental monitoring (EM), water (W), and bioburden (BB) testing and incorporate multiple standard growth media. Our consumables enable microbial growth using the same growth promotion method as conventional MQC plates, but incorporate specific mechanical, optical, and tracking management features to facilitate automated handling, image processing within our Growth Direct system, and data integrity compliance.

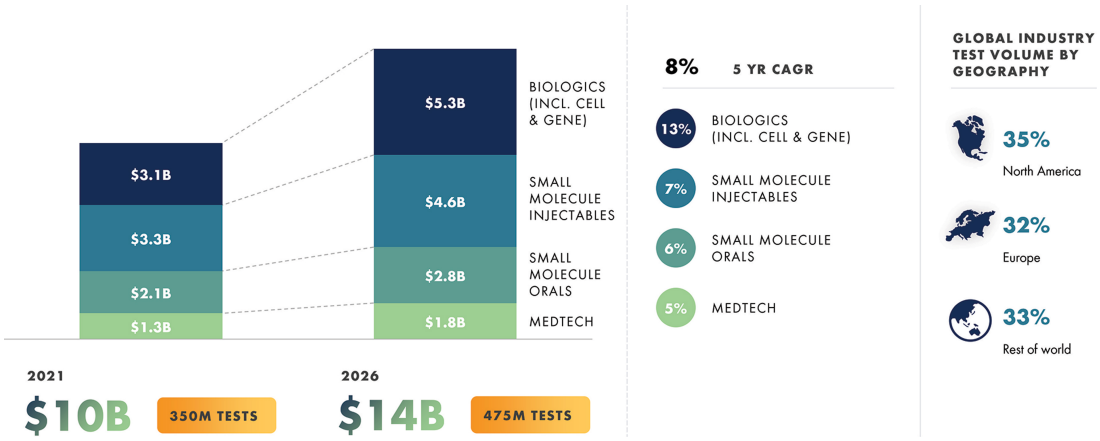
In addition, we are developing a growth-based rapid automated sterility test for use on the Growth Direct system. Rapid sterility tests are utilized for final release testing in any facility that manufactures sterile products such as biologics and sterile injectables, and are especially valuable in vaccine manufacturing to enable faster release and greater capacity, and in cell and gene therapy manufacturing environments given the challenging balance of purity, contamination control, and speed required in the manufacturing of those products. The traditional method of sterility testing requires at least 14 days for results, causing delays or requiring releasing product at risk. When commercialized, we expect our rapid sterility test will reduce the traditional method's 14-day time to results by at least 50%, permitting faster final release, with the goal of speeding critical drugs and vaccines to market, accelerating customer revenue recognition, and reducing inventory costs. Our development program is supported by contract funding from the U.S. Department of Health and Human Services Biomedical Advanced Research & Development Authority, which is supporting the development of improvements in vaccine production methods that accelerate the availability of vaccines against viruses with pandemic potential.

Our LIMS connection software offers two-way integration with LIMS, enabling a paperless workflow. This eliminates the risk of human error that could arise from manually entering results and improves efficiency. Our LIMS connection software delivers information to stakeholders in a secure manner, designed to enable compliance with data integrity regulations. Moreover, each system is fully enabled with remote management that allows our customer service teams to interact with our system fleet globally based on customer permission levels to ensure maximum system availability and lower cost of service. This capability enables the potential to expand the Growth Direct platform into data storage, information analysis, and related products and services.

Our products are backed by world-class customer service, validation, field service (including installation) and service contracts. Our comprehensive value-added services help our customers get online faster, deliver the reliable uptime they expect for this critical function, and produce the operational value and benefits that they seek. In doing so, we keep our customers' manufacturing facilities online longer, reduce labor costs, prevent quality control errors, and help them make faster decisions.

Our market

We estimate our TAM to be approximately $10 billion in 2021, which we expect to grow to over $14 billion by 2026, representing a 5-year compound annual growth rate, or CAGR, of approximately 8%. We based our estimated TAM on total potential demand for our products derived from research we commissioned conducted by Health Advances LLC and our current pricing. As shown below, we broadly target all companies that manufacture regulated healthcare products, including biologics, cell and gene therapies, vaccines, small molecule injectable dosages, small molecule oral dosages, and medical devices, which in aggregate perform approximately 350 million MQC tests annually. Our TAM includes both a system sales opportunity and a recurring opportunity from sales of consumables and service contracts, the latter of which is estimated to be approximately $5 billion in 2021.



We are particularly focused on serving the high-growth biologics, cell, and gene therapy markets, which have the highest MQC testing intensity per batch of manufactured product. MQC testing for these complex therapeutic modalities is forecasted to grow at a 10-30% CAGR through 2026. These advanced modalities require automation to support the scale-up of their complex multi-step manufacturing processes. This is particularly true for the emerging cell and gene therapy category, which is driving the need for faster, more efficient manufacturing and an associated expansion in global bioprocessing capacity. Thirty percent of globally approved cell and gene therapy products use the Growth Direct platform to automate MQC, and the remaining 1,000+ cell and gene therapies in Phase 1 to 3 clinical trials represent a significant opportunity for our business. We seek to drive substantial growth by establishing the Growth Direct platform as the global standard for MQC automation in advanced bioprocessing for biologics, cell, and gene therapies.

Our business is further well-positioned to execute on several TAM expansion opportunities. We believe there is an opportunity to expand our existing automated MQC testing solution in adjacent markets such as personal care product manufacturing, where our Growth Direct platform is currently in use and which we estimate presents an approximately $8 billion opportunity with an estimated 270 million MQC tests annually. We based this estimated TAM on total potential demand for our products derived from research we commissioned conducted by Health Advances LLC and our current pricing. We also intend to develop services and products to allow us to deliver integrated QC workflows not currently addressed by our Growth Direct platform, which we estimate represents an approximately $10 billion opportunity. We based this estimated TAM on potential demand derived from our own market research and current pricing of comparable integrated products in other markets. Combined with our core TAM, we believe these expansion opportunities could increase our potential TAM to $32 billion.

Our growth strategy

We are focused on the near-term goal of standardizing the MQC test market on our fully automated Growth Direct platform and the long-term mission of delivering MQC lab automation across the healthcare product manufacturing industry. Our growth strategy in pursuit of this vision includes the following elements:

- *Leverage our first-mover advantage and our industry leadership to cement the Growth Direct platform as the new standard of MQC automation in the rapidly growing bioprocessing market, including biologics, cell, and gene therapy manufacturing.*
- *Drive new customer adoption of the Growth Direct platform by converting the leading manufacturers in our core markets, including but not limited to the top 50 pharmaceutical companies and leading contract development and manufacturing organizations, or CDMOs.*
- *Expand implementation of the Growth Direct platform within our existing customer base by deploying additional systems across their global manufacturing site network and driving increased application utilization and consumable pull through on a system-by-system basis.*

- *Increase the value of our platform by innovating and launching new applications, hardware, and software products that deliver the power of integrated automation across our customers' MQC workflows*.
- *Expand the Growth Direct platform into adjacent end markets with high volumes of manual MQC testing.*
- *Pursue opportunistic strategic investments, partnerships, and acquisitions to strengthen our product platform, allow us to enter new markets, and enhance our growth profile.*

Preliminary financial results for the second quarter ended June 30, 2021

We are currently finalizing our financial quarterly closing process for the three months ended June 30, 2021. While complete financial information and operating data are not yet available, set forth below are certain preliminary estimates of the results of operations that we expect to report for our second quarter of 2021. However, our actual results may differ materially from these estimates due to the completion of our financial closing procedures, final adjustments and other developments that may arise between now and the time the financial results for the three months ended June 30, 2021 are finalized. The estimates below represent the most current information available to management and do not present all necessary information indicative of our results of operations and financial condition for the quarter ended June 30, 2021. We have provided a range for the preliminary results described below primarily because our financial closing procedures for the quarter ended June 30, 2021 are not yet complete. As a result, there is a possibility that our final results will vary from these preliminary estimates. We currently expect that our final results will be within the ranges described below. It is possible, however, that our final results will not be within the ranges we currently estimate. The estimates for the three months ended June 30, 2021 are not necessarily indicative of any future period and should be read together with "Risk Factors," "Special Note Regarding Forward-Looking Statements," "Management's Discussion and Analysis of Financial Condition and Results of Operations," and our financial statements and related notes included elsewhere in this prospectus.

The preliminary financial data included in this registration statement has been prepared by, and is the responsibility of, our management. Our independent registered public accountants, PricewaterhouseCoopers LLP, have not audited, reviewed, compiled or applied agreed-upon procedures with respect to this preliminary financial data. Accordingly, PricewaterhouseCoopers LLP does not express an opinion or any other form of assurance with respect thereto.

The following are our preliminary estimates for the three months ended June 30, 2021:

- Total revenue is expected to be between $5.8 million and $6.1 million, representing growth of 124% to 135% compared to $2.6 million in the corresponding prior-year period.
- Commercial revenue is expected to be between $5.4 million and $5.7 million, representing growth of 123% to 136% compared to $2.4 million in the corresponding prior-year period.
- Loss from operations is expected to be between $9.5 million and $11.5 million, an increase of 58% to 91% compared to $6.0 million in the corresponding prior-year period.
- Cash and cash equivalents are expected to be $100.0 million.
- We expect to have an aggregate of approximately $26.2 million outstanding under our term loan facility, including payment-in-kind interest but excluding debt discounts.

We expect our closing procedures with respect to the three months ended June 30, 2021 to be completed in August 2021. Accordingly, our financial statements as of and for the three months ended June 30, 2021 will not be available until after this offering is completed.

Summary risk factors

Our business is subject to a number of risks of which you should be aware before making an investment decision. These risks are discussed more fully in the "Risk Factors" section of this prospectus immediately following this prospectus summary. These risks, among others, include the following:

- The COVID-19 pandemic has impacted, and may continue to impact, our operations and may materially and adversely affect our business and financial results;
- We have incurred significant losses since inception, we expect to incur losses in the future and we may not be able to generate sufficient revenue to achieve and maintain profitability;
- We may need to raise additional capital to fund our existing operations, improve our platform or develop and commercialize new products or expand our operations;
- Our revenue has been primarily generated from sales of our Growth Direct system, proprietary consumables and LIMS connection software, which require a substantial period of time to generate recurring revenue;
- We may be unable to manage our future growth effectively, which could make it difficult to execute our business strategy;
- We have limited experience in marketing and sales, and if we are unable to expand our marketing and sales organization to adequately address our customers' needs or to expand our customer base, our business may be adversely affected;
- We must develop new products, adapt to rapid and significant technological change and respond to introductions of new products by competitors to remain competitive;
- The continued success of our business relies heavily on establishing and maintaining our position in the market as a leading provider of automated MQC testing;
- If our sole manufacturing and development facility becomes damaged or inoperable or we are required to vacate our existing facility, our ability to conduct and pursue our manufacturing and development efforts will be jeopardized;
- Our manufacturing operations are dependent upon third-party suppliers, including single-source suppliers, making us vulnerable to supply shortages and price fluctuations, which could harm our business;
- 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 may acquire businesses or form joint ventures or make investments in other companies or technologies that could negatively affect our operating results, dilute our stockholders' ownership, increase our debt or cause us to incur significant expense;
- Our customers use our Growth Direct platform as part of their quality-control workflow, which is subject to regulation by the FDA and other comparable regulatory authorities;
- If we fail to maintain effective internal control over financial reporting and effective disclosure controls and procedures, we may not be able to accurately report our financial results in a timely manner or prevent fraud, which may adversely affect investor confidence in our company;
- If we are unable to obtain and maintain sufficient intellectual property protection for our technology, including the Growth Direct platform, or if the scope of the intellectual property protection obtained is not sufficiently broad, our competitors could develop and commercialize products similar or identical to ours, and our ability to successfully commercialize our products may be impaired;
- Because we do not anticipate paying any cash dividends on our Class A common stock in the foreseeable future, capital appreciation, if any, would be your sole source of gain;
- 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;
- The market price of our Class A common stock may be volatile and fluctuate substantially, which could result in substantial losses for purchasers of our Class A common stock in this offering; and

- Sales of a substantial number of shares of our Class A common stock in the public market, or the perception in the market that the holders of a large number of shares intend to sell shares, could reduce the market price of our Class A common stock.

Implications of being an emerging growth company and a smaller reporting company

We qualify as an "emerging growth company" as defined in the Jumpstart Our Business Startups Act of 2012, as amended, or JOBS Act. As an "emerging growth company," we may take advantage of reduced reporting requirements that are generally otherwise applicable to public companies. These provisions include, but are not limited to:

- the option to present only two years of audited financial statements and only two years of related "Management's Discussion and Analysis of Financial Condition and Results of Operations" in this prospectus;
- not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, as amended;
- not being required to comply with any requirement that may be adopted by the Public Company Accounting Oversight Board regarding mandatory audit firm rotation or a supplement to the auditor's report providing additional information about the audit and the financial statements (i.e., an auditor discussion and analysis);
- reduced disclosure obligations regarding executive compensation in our periodic reports, proxy statements and registration statements; and
- exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved.

We may take advantage of these provisions until the last day of our fiscal year following the fifth anniversary of the completion of this offering. However, if any of the following events occur prior to the end of such five-year period, (i) our annual gross revenue are $1.07 billion or more, (ii) we issue more than $1.0 billion of non-convertible debt in any three-year period or (iii) we become a "large accelerated filer" (as defined in Rule 12b-2 under the Securities Exchange Act of 1934, as amended, or the Exchange Act), we will cease to be an emerging growth company prior to the end of such five-year period. We will be deemed to be a "large accelerated filer" at such time that we (a) have an aggregate worldwide market value of common equity securities held by non-affiliates of $700 million or more as of the last business day of our most recently completed second fiscal quarter, (b) have been required to file annual and quarterly reports under the Exchange Act, for a period of at least 12 months and (c) have filed at least one annual report pursuant to the Exchange Act. 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 this prospectus and our periodic reports and proxy statements.

We have elected to take advantage of certain of the reduced disclosure obligations in the registration statement of which this prospectus is a part and may elect to take advantage of other reduced reporting requirements in future filings. As a result, the information that we provide to our stockholders may be different than you might receive from other public reporting companies in which you hold equity interests.

In addition, the JOBS Act provides that an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards.

We are also a "smaller reporting company" as defined under the Securities Act and Exchange Act. We may continue to be a smaller reporting company so long as either (i) the public float of our Class A common stock and Class B common stock held by non-affiliates is less than $250 million or (ii) our annual revenue was less than $100 million during the most recently completed fiscal year and the public float of our Class A common stock and Class B common stock held by non-affiliates is less than $700 million. If we are a smaller reporting company at the time we cease to be an emerging growth company, we may continue to rely on exemptions from certain disclosure requirements that are available to smaller reporting companies. Specifically, as a smaller reporting company, we may choose to present only the two most recent fiscal years of audited financial statements in our Annual Report on Form 10-K and have reduced disclosure obligations regarding executive compensation, and, similar to emerging growth companies, if we are a smaller reporting company under the requirements of (ii) above, we would not be required to obtain an attestation report on internal control over financial reporting issued by our independent registered public accounting firm.

As a result of these elections, some investors may find our Class A common stock less attractive than they would have otherwise. The result may be a less active trading market for our Class A common stock, and the price of our Class A common stock may become more volatile.

Corporate information

We were incorporated under the laws of the state of Delaware in 2006 under the name Rapid Micro Biosystems, Inc. Our principal executive offices are located at 1001 Pawtucket Boulevard West, Suite 280, Lowell, Massachusetts 01854 and our telephone number is 978-349-3200. Our website address is *www.rapidmicrobio.com*. The information contained in, or accessible through, our website does not constitute a part of this prospectus. We have included our website address in this prospectus solely as an inactive textual reference.

The offering

Class A common stock offered by us	7,920,000 shares.
Underwriters' option to purchase additional shares	We have granted the underwriters an option to purchase up to 1,188,000 additional shares of Class A common stock from us. The underwriters can exercise this option at any time within 30 days from the date of this prospectus.
Class A common stock to be outstanding after this offering	33,087,232 shares (or 34,275,232 shares if the underwriters exercise their option to purchase additional shares of Class A common stock in full).
Class B common stock to be outstanding after this offering	6,903,379 shares.
Total shares of common stock to be outstanding after this offering	39,990,611 shares (or 41,178,611 shares if the underwriters exercise their option to purchase additional shares of Class A common stock in full).
Use of proceeds	We estimate that the net proceeds from this offering will be approximately $143.6 million (or approximately $165.7 million if the underwriters exercise in full their option to purchase additional shares of Class A common stock), at a public offering price of $20.00 per share, after deducting the underwriting discounts and commissions and the estimated offering expenses payable by us. We anticipate that we will use the net proceeds of this offering for expansion of our commercial resources and capabilities, including sales and marketing, for research and development of our current products and new products, including the exploitation of new pipeline opportunities, to expand our operations globally and for working capital and general corporate purposes. See "Use of Proceeds" beginning on page 58 for additional information.
Voting rights	Following this offering, we will have two classes of common stock: Class A common stock and Class B common stock. The rights of the holders of Class A common stock and Class B common stock are identical, except with respect to voting and conversion. Each share of Class A common stock will be entitled to one vote and shares of Class B common stock will be non-voting, except as may be required by law. Each share of Class B common stock may be converted into one share of Class A common stock at the option of its holder, subject to the ownership limitations provided for in our restated certificate of incorporation to become effective upon the closing of this offering. See ''Description of Capital Stock'' for additional information.

Risk factors	See "Risk Factors" beginning on page 18 and other information included in this prospectus for a discussion of factors that you should consider carefully before deciding to invest in our Class A common stock.
Nasdaq Global Select Market symbol	"RPID"

The total number of shares of our common stock to be outstanding after this offering is based on 966,312 shares of our Class A common stock and no shares of Class B common stock outstanding as of June 30, 2021, which includes 266,069 shares of unvested restricted stock subject to repurchase and excludes:

- 4,518,884 shares of Class A common stock issuable upon exercise of stock options outstanding under our 2010 Stock Option and Grant Plan, or the 2010 Plan, as of June 30, 2021, at a weighted-average exercise price of $3.30 per share;
- 55,835 shares of our Class A common stock issuable upon the exercise of certain warrants to purchase Class A common stock outstanding as of June 30, 2021, at a weighted average exercise price of $137.08 per share;
- 764,703 shares of our Class A common stock issuable upon the conversion of shares of our Series A1 preferred stock issuable upon the exercise of warrants to purchase our Series A1 preferred stock outstanding as of June 30, 2021 at an exercise price (on an as-converted basis) of $0.05 per share;
- 239,994 shares of our Class A common stock issuable upon the conversion of shares of our Series B1 preferred stock issuable upon the exercise of warrants to purchase our Series B1 preferred stock outstanding as of June 30, 2021 at an exercise price (on an as-converted basis) of $0.05 per share;
- 239,130 shares of our Class A common stock issuable upon the conversion of shares of our Series C1 preferred stock issuable upon the exercise of warrants to purchase our Series C1 preferred stock outstanding as of June 30, 2021 at an exercise price (on an as-converted basis) of $5.75 per share;
- 4,200,000 additional shares of our Class A common stock reserved for future issuance under our 2021 Incentive Award Plan, or the 2021 Plan, which will become effective in connection with this offering, including 150,000 shares of Class A common stock issuable upon exercise of stock options granted subject to the effectiveness of the registration statement of which this prospectus forms a part under the 2021 Plan at an exercise price per share equal to the initial public offering price of our Class A common stock, as well as any automatic increases in the number of shares of our Class A common stock reserved for future issuance under our 2021 Plan; and
- 400,000 shares of our Class A common stock that will become available for future issuance under our 2021 Employee Stock Purchase Plan, or the 2021 ESPP, which will become effective in connection with this offering, and shares of our Class A common stock that become available pursuant to provisions in the 2021 ESPP that automatically increase the share reserve under the 2021 ESPP.

Unless otherwise indicated, this prospectus reflects and assumes the following:

- a one-for-five reverse stock split of our Class A common stock and Class B common stock effected on July 9, 2021;
- the automatic conversion of all outstanding shares of our Series A1, B1, C1 and D1 preferred stock into an aggregate of 24,200,920 shares of our Class A common stock and all outstanding shares of our Series C2 and D2 preferred stock into 6,903,379 shares of our Class B common stock, which will occur in connection with the closing of this offering;
- the conversion of all outstanding warrants to purchase shares of our preferred stock to warrants to purchase shares of our Class A common stock, which will occur upon the closing of this offering;
- no exercise of outstanding options or warrants after June 30, 2021;

- no exercise by the underwriters of their option to purchase additional shares of our Class A common stock;
- the filing and effectiveness of our current certificate of incorporation effecting a reclassification of our then outstanding common stock to Class A common stock and authorizing our Class B common stock and the issuance to ABG WTT-Rapid Limited, or ABG WTT, of 11,437,301 shares of Series C2 preferred stock in exchange for an equal number of shares of Series C1 preferred stock and to Ally Bridge MedAlpha Master Fund L.P., or Ally Bridge MedAlpha, of 2,364,509 shares of Series D2 preferred stock in exchange for an equal number of shares of Series D1 preferred stock pursuant to an exchange agreement, in each case, in June 2021; and
- the filing of our restated certificate of incorporation, which will occur upon the closing of this offering.

Summary consolidated financial data

The following tables set forth our summary consolidated financial data as of, and for the periods ended on, the dates indicated. We have derived the consolidated statement of operations data for the years ended December 31, 2019 and 2020 from our audited consolidated financial statements included elsewhere in this prospectus. We have derived the consolidated statement of operations data for the three months ended March 31, 2021 and 2020 and the consolidated balance sheet data as of March 31, 2021 from our unaudited condensed consolidated financial statements included elsewhere in this prospectus, which have been prepared on the same basis as the audited consolidated financial statements. In the opinion of management, the unaudited data reflects all adjustments, consisting only of normal recurring adjustments, necessary for a fair statement of the financial information in those statements. Our historical results are not necessarily indicative of the results that should be expected for any future period and our results for any interim period are not necessarily indicative of results that may be expected for any full year. You should read the following summary consolidated financial data together with the more detailed information contained in “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and our consolidated financial statements and the related notes included elsewhere in this prospectus.

	Years Ended December 31,		Three Months Ended March 31,	
	2019	2020	2020	2021
	(in thousands, except share and per share data)			
Consolidated Statement of Operations Data:				
Revenue:				
Product revenue	$ 9,328	$ 10,992	$ 1,188	$ 3,718
Service revenue	2,128	3,091	410	1,067
Non-commercial revenue	5,056	1,994	1,401	210
Total revenue	16,512	16,077	2,999	4,995
Costs and operating expenses:				
Cost of product revenue	10,627	18,642	3,212	5,510
Cost of service revenue	3,021	3,386	951	1,137
Cost of non-commercial revenue	3,098	2,120	797	414
Research and development	5,429	6,531	1,438	2,147
Sales and marketing	4,047	5,962	1,466	2,275
General and administrative	8,924	9,976	2,371	3,203
Total costs and operating expenses	35,146	46,617	10,235	14,686
Loss from operations	(18,634)	(30,540)	(7,236)	(9,691)
Total other income (expense), net	(2,110)	(6,404)	(751)	(12,391)
Loss before income taxes	(20,744)	(36,944)	(7,987)	(22,082)
Income tax expense	427	134	20	19
Net loss	$ (21,171)	$ (37,078)	$ (8,007)	$ (22,101)
Accretion of redeemable convertible preferred stock to redemption value	(2,745)	(3,745)	(818)	(787)
Cumulative redeemable convertible preferred stock dividends	(2,704)	(4,398)	(788)	(1,411)
Net loss attributable to common stockholders – basic and diluted(1)	$ (26,620)	$ (45,221)	$ (9,613)	$ (24,299)
Net loss per share attributable to common stockholders – basic and diluted(1)	$ (76.72)	$ (126.11)	$ (27.20)	$ (37.89)
Weighted-average common shares outstanding – basic and diluted(1)	346,978	358,582	353,465	641,371
Pro forma net loss per share attributable to common stockholders – basic and diluted (unaudited)(2)		$ (1.37)		$ (0.34)
Pro forma weighted-average common shares outstanding – basic and diluted (unaudited)(2)		26,962,888		31,745,670

(1) See Note 15 to our audited consolidated financial statements and Note 15 to our unaudited condensed consolidated financial statements, included elsewhere in this prospectus, for an explanation of the method used to calculate historical basic and diluted net loss per share attributable to common stockholders and the weighted-average common shares outstanding used in the computation of the per share amount.

(2) The unaudited pro forma basic and diluted net loss per share attributable to common stockholders for the year ended December 31, 2020 and the three months ended March 31, 2021 have been prepared to give effect to adjustments arising upon the completion of a qualified initial public offering. The unaudited pro forma net loss attributable to common stockholders used in the calculation of unaudited pro forma basic and diluted net loss per share attributable to common stockholders does not include the effect of accretion of redeemable convertible preferred stock to redemption value or the cumulative redeemable convertible preferred stock dividends and the change in the fair value of preferred stock warrant liability, because the calculation gives effect to (i) the filing and effectiveness of our current certificate of incorporation effecting a reclassification of our then outstanding common stock to Class A common stock and authorizing our Class B common stock and the issuance to ABG WTT of 11,437,301 shares of Series C2 preferred stock in exchange for an equal number of shares of Series C1 preferred stock and to Ally Bridge MedAlpha of 2,364,509 shares of Series D2 preferred stock in exchange for an equal number of shares of Series D1 preferred stock pursuant to an exchange agreement, in each case, in June 2021; (ii) the automatic conversion of all outstanding shares of Series A1, B1, C1 and D1 redeemable convertible preferred stock into 24,200,920 shares of Class A common stock, (iii) the automatic conversion of all outstanding shares of Series C2 and D2 redeemable convertible preferred stock into 6,903,379 shares of Class B common stock, and (iv) all warrants to purchase redeemable convertible preferred stock becoming warrants to purchase Class A common stock, as if the proposed initial public offering had occurred on the later of January 1, 2020 or the issuance dates of the redeemable convertible preferred stock or preferred stock warrants.

The unaudited pro forma basic and diluted weighted-average common shares outstanding used in the calculation of unaudited pro forma basic and diluted net loss per share attributable to common stockholders for the year ended December 31, 2020 and the three months ended March 31, 2021 have been prepared to give effect, upon a qualified initial public offering, (i) to the automatic conversion of all outstanding shares of Series A1, B1, C1 and D1 redeemable convertible preferred stock into 24,200,920 shares of Class A common stock and (ii) the automatic conversion of all outstanding shares of Series C2 and D2 redeemable convertible preferred stock into 6,903,379 shares of Class B common stock as if the proposed initial public offering had occurred on January 1, 2020.

Unaudited pro forma basic and diluted net loss per share attributable to common stockholders was calculated as follows (in thousands, except share and per share amounts):

	Years Ended December 31, 2020	Three Months Ended March 31, 2021
	(in thousands, except share and per share data)	
Numerator:		
Net loss attributable to common stockholders	$ (45,221)	$ (24,299)
Plus: Change in fair value of preferred stock warrant liability	69	11,448
Plus: Accretion of redeemable convertible preferred stock to redemption value	3,745	787
Plus: Cumulative redeemable convertible preferred stock dividends	4,398	1,411
Pro forma net loss attributable to common stockholders	$ (37,009)	$ (10,653)
Denominator:		
Weighted-average common shares outstanding — basic and diluted	358,582	641,371
Pro forma adjustment to reflect the automatic conversion of redeemable convertible preferred stock into common stock	26,604,306	31,104,299
Pro forma weighted-average common shares outstanding — basic and diluted	26,962,888	31,745,670
Pro forma net loss per share attributable to common stockholders — basic and diluted	$ (1.37)	$ (0.34)

	As of March 31, 2021		
	Actual	Pro Forma(2)	Pro Forma As Adjusted(3)
	(in thousands)		
Consolidated Balance Sheet Data:			
Cash and cash equivalents	$ 108,635	$ 108,635	$ 252,586
Working capital(1)	115,384	115,384	260,312
Total assets	138,916	138,916	281,561
Preferred stock warrant liability	15,565	—	—
Total liabilities	56,131	40,566	39,589
Redeemable convertible preferred stock	233,832	—	—
Additional paid-in capital	112,632	361,718	505,261
Accumulated deficit	(263,689)	(263,689)	(263,689)
Total stockholders' (deficit) equity	(151,047)	98,350	241,972

(1) We define working capital as current assets less current liabilities. See our consolidated financial statements for further details regarding our current assets and current liabilities.

(2) The unaudited pro forma consolidated balance sheet data gives effect to (i) the automatic conversion of all outstanding shares of our Series A1, B1, C1, and D1 preferred stock into an aggregate of 24,200,920 shares of Class A common stock, (ii) the automatic conversion of all outstanding shares

of our Series C2 and D2 preferred stock into an aggregate of 6,903,379 shares of Class B common stock, and (iii) all warrants to purchase redeemable convertible preferred stock becoming warrants to purchase Class A common stock, which will occur upon the closing of this offering.

(3) Reflects the pro forma adjustments described in footnote (2) and the issuance and sale of shares of Class A common stock in this offering at an initial public offering price of $20.00 per share, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us.

Risk factors

You should carefully consider the risks and uncertainties described below and the other information in this prospectus before making an investment in our Class A common stock. Our business, financial condition, results of operations, or prospects could be materially and adversely affected if any of these risks occurs, and as a result, the market price of our Class A common stock could decline and you could lose all or part of your investment. This prospectus also contains forward-looking statements that involve risks and uncertainties. See "Special Note Regarding Forward-Looking Statements." Our actual results could differ materially and adversely from those anticipated in these forward-looking statements as a result of certain factors, including those set forth below.

Risks related to our financial position and need for capital

We have incurred significant losses since inception, we expect to incur losses in the future and we may not be able to generate sufficient revenue to achieve and maintain profitability.

We have incurred significant losses since our inception. For the years ended December 31, 2019 and 2020 and the three months ended March 31, 2021, we incurred net losses of $21.2 million, $37.1 million and $22.1 million, respectively. As of March 31, 2021, we had an accumulated deficit of $263.7 million. We expect that our operating expenses will continue to increase as we grow our business and will also increase as a result of our becoming a public company. Since our inception, we have financed our operations primarily from private placements of our convertible preferred stock, the incurrence of indebtedness, and to a lesser extent, revenue derived from our Growth Direct platform and non-commercial contracts. We have devoted substantially all of our resources to the development and commercialization of our Growth Direct platform and to development activities related to advancing and expanding our technological capabilities. We will need to generate significant additional revenue to achieve and sustain profitability, and even if we achieve profitability, we cannot be sure that we will remain profitable for any substantial period of time. We may never be able to generate sufficient revenue to achieve or sustain profitability and our recent and historical growth should not be considered indicative of our future performance.

Our limited operating history makes it difficult to evaluate our future prospects and the risks and challenges we may encounter.

We were established in 2006 and launched our current second-generation Growth Direct platform in 2017 for which we are continuing to grow our manufacturing and sales and marketing capabilities. Consequently, predictions about our future success or viability may not be as accurate as they could be if we had a longer operating history. While our product and services revenue has increased, if our growth strategy is not successful, we may not be able to continue to grow our revenue or operations. Our limited operating history, evolving business and rapid growth make it difficult to evaluate our future prospects and the risks and challenges we may encounter, and we may not continue to grow at or near historical rates.

In addition, as a business with a limited operating history, we may encounter unforeseen expenses, difficulties, complications, delays and other known and unknown challenges. We are transitioning to a company capable of supporting commercial manufacturing, sales and marketing at scale. We may not be successful in such a transition and, as a result, our business may be adversely affected.

Our success depends on the success of our Growth Direct platform, which may not be achieved or maintained.

Our ability to achieve and maintain commercial market acceptance of our Growth Direct platform will depend on a number of factors, including:

- significant acceptance by drug manufacturers of automated MQC testing;
- our ability to increase awareness of the capabilities of automated MQC testing and our technology and solutions;

- our customers' willingness to adopt new technologies and workflows;
- our ability to integrate our platform with our customers' existing workflows, including related to regulatory validation processes;
- whether our platform reliably provides advantages over the conventional, manual method of MQC testing and other automated technologies and is perceived by customers to be cost effective;
- the continued growth of the pharmaceutical and biopharmaceutical industry, in particular biologics, cell and gene therapies;
- our ability to execute on our business strategy, including continuing to expand in the market for cell and gene therapies;
- the rate of adoption of our platform and solutions by drug manufacturers;
- prices we charge for our systems and consumables;
- the relative reliability and robustness of our platform as a whole and the components of our platform;
- our ability to develop new products for existing customers and to expand our capabilities within the MQC testing workflow;
- our ability to expand the use of our platform with existing customers;
- other competitive automated MQC testing platforms; and
- the impact of our investments in product innovation and commercial growth.

We cannot assure you that we will be successful in addressing each of these criteria or other criteria that might affect the market acceptance of our products. If we are unsuccessful in achieving and maintaining commercial market acceptance of our Growth Direct platform, our business, financial condition, results of operations and prospects could be adversely affected.

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;
- 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; 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. 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.

Our revenue has been primarily generated from sales of our Growth Direct system, proprietary consumables and LIMS connection software, which require a substantial period of time to generate recurring revenue.

Product revenue, comprised of sales of our Growth Direct system, proprietary consumables and LIMS connection software, accounted for 56.5% and 68.4% of our revenue for the years ended December 31, 2019 and 2020, respectively. We expect that sales of these products will continue to account for a substantial portion of our revenue and will increase as we grow our customer base and expand our business with existing customers. The Growth Direct system is fully functional for use by the customer upon delivery, as such we recognize revenue for sales of our Growth Direct system upon transfer of control of the system to the customer. After a system is placed with a customer and installed, validation services start to be provided, which typically can take anywhere from three to nine months. Once a system is validated, we generally expect our customers to transition from the traditional manual method of MQC testing to our automated method and begin regular utilization of consumables over a period of up to three months. Therefore, there can be a period of up to 12 months or more between installation of a system and revenue being generated from the regular sale of consumables for that system. As a result, it can be difficult for us to forecast our product revenue and there may be an extended period of time before we receive recurring revenue from sales of consumables. We may also experience fluctuations in our product revenue, which could have an adverse effect on our financial position.

If we cannot maintain the level of sales of our Growth Direct systems or the sales of our consumables and service contracts to existing customers declines, our future operating results would be adversely affected.

In the years ended December 31, 2019 and 2020, 45.8% of our revenue was generated from two customers and 46.1% of our revenue was generated from three customers, respectively. The revenue generated from these customers was primarily derived from sales of our Growth Direct system. Our customers generally purchase our Growth Direct system at one time and we expect them to use these systems for many years before needing to purchase new systems. Our ability to generate revenue depends on our ability to sell our Growth Direct system to new customers or expand the use of our system by existing customers. As a result, in the near term, we expect a significant portion of our revenue to primarily be generated from a small number of different customers each year. We also rely on consumables and service contracts as a source of recurring revenue from our existing customers. These consumables and service contracts are purchased on an as-needed basis and, as a result, revenue from these sources may be subject to change, as customers' purchasing practices and policies change or their demand for our consumables and service contracts change. If we are unable to sell our Growth Direct system to new customers, if our existing customers don't expand their use of our system, or if our existing customers decide to purchase fewer of our consumables and service contracts or terminate their relationships with us, our revenue could significantly decrease, which would have an adverse effect on our financial condition and results of operations and could adversely impact our ability to execute on our growth strategy.

Repair or replacement costs due to warranties we provide on our Growth Direct system could have a material adverse effect on our business, financial condition and results of operations.

We provide a one-year limited assurance warranty on Growth Direct systems, which is included in the sales price. Existing and future warranties place us at the risk of incurring future repair or replacement costs. We establish

our accrual for estimated warranty expenses based on historical information, current cost data and future forecasts. We exercise judgment in determining the expected product warranty costs, using estimated material, labor and other costs. While we believe that historical experience provides a reliable basis for estimating such warranty cost, unforeseen quality issues or component failure rates could result in future costs in excess of such estimates. As of March 31, 2021, we had an amount reserved for warranty costs of $0.6 million. Substantial amounts of warranty claims could have a material adverse effect on our business, financial condition and results of operations.

We may need to raise additional capital to fund our existing operations, improve our platform or develop and commercialize new products or expand our operations.

We expect to spend significant amounts to expand our existing operations, to continue to improve our Growth Direct platform and to develop new products and consumables. Based upon our current operating plan, we believe that the net proceeds from this offering and our existing cash and cash equivalents, and anticipated cash flow from operations, will enable us to fund our operating expenses and capital expenditure requirements through at least 2023. This estimate and our expectation regarding the sufficiency of the net proceeds from this offering are based on assumptions that may prove to be wrong, and we could use our available capital resources sooner than we currently expect. Until such time, if ever, as we can generate sufficient revenues, we may finance our cash needs through a combination of equity offerings and debt financings or other sources. We do not currently have any committed external source of funds. In addition, we may seek additional capital due to favorable market conditions or strategic considerations, even if we believe that we have sufficient funds for our current or future operating plans.

Our present and future funding requirements will depend on many factors, including:

- our ability to achieve revenue growth;
- the cost of expanding our operations, including our manufacturing facilities, and our offerings, including our sales and marketing efforts;
- our rate of progress in launching and commercializing new products, and the cost of the sales and marketing activities associated with, establishing adoption of our Growth Direct system;
- our rate of progress in, and cost of research and development activities associated with, products in research and development;
- the effect of competing technological and market developments;
- the costs involved in preparing, filing, prosecuting, maintaining, defending and enforcing patent claims; and
- costs related to domestic and international expansion.

To the extent that we raise additional capital through the sale of equity or convertible debt securities, your ownership interest will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect your rights as a common stockholder. In addition, debt financing and preferred equity financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional funds through collaborations, strategic alliances or marketing, distribution or licensing arrangements with third parties, we may be required to relinquish valuable rights to our technologies, intellectual property, future revenue streams or products or grant licenses on terms that may not be favorable to us. Furthermore, any capital raising efforts may divert our management from their day-to-day activities, which may adversely affect our ability to advance product development activities. If we are unable to raise additional funds when needed, we may be required to delay, limit, reduce or terminate product development or commercialization efforts.

Risks related to our business and strategy

The 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 office and manufacturing facility is located. The COVID-19 pandemic is evolving, 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 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. While Massachusetts is engaged in a phased re-opening of businesses, in the event that government authorities were to halt the re-opening or 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 COVID-19 outbreak, 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 verification, training and service and support;
- delays in customers' purchasing decisions and negotiations with customers 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. These and other factors arising from the COVID-19 pandemic could worsen in countries that are already afflicted with COVID-19, could continue to spread to additional countries, 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 geographic spread of the disease, the duration of the outbreak, travel restrictions, additional or modified government actions, new information that emerges concerning the severity and impact of COVID-19 and actions to contain the outbreak or treat its impact, such as social distancing, quarantines, lock-downs or business closures.

The continued success of our business relies heavily on establishing and maintaining our position in the market as a leading provider of automated MQC testing.

Our future profitability will depend on our ability to successfully execute and maintain a sustainable business model and generate continuous streams of revenue. Our business model is premised on the fact that we are and will continue to be a leader in automated MQC testing and the competitive advantages our position creates. Our Growth Direct platform, among other things, is designed to reduce the amount of time for MQC testing and the

opportunity for human error in what we believe is a more cost-effective manner than traditional MQC testing. However, if competitors develop and commercialize an automated MQC testing platform that is comparable to ours and are able to obtain traction with customers, we may not be able to maintain our lead position and execute our business strategy, which could adversely affect our financial position and prospects. If we are unable to expand or continue to expand our customers in new areas of drug manufacturing, such as cell and gene therapies, continue to grow market adoption of our Growth Direct platform, and maintain our position as the industry leader in automated MQC testing, our business, prospects, financial condition and results of operation could be adversely affected.

It may be difficult for us to implement our strategies for improving growth.

Our success will depend on our ability to expand our business with existing customers and to target new drug manufacturing customers to capture a greater share of the MQC testing value chain. Our ability to grow our business with existing customers will depend on our ability to broaden the application of our automated MQC testing to a larger portion of the MQC testing workflow and to increase the number of Growth Direct systems in their manufacturing facilities. Our ability to expand our business will also depend on our ability to attract new customers and to integrate our platform with new methods of manufacturing, such as cell and gene therapies. Future revenue growth will also depend on our ability to develop and market new products, technologies and solutions to meet our customers' evolving needs, as well as our ability to identify new applications and customers for our technology in additional industries beyond the drug manufacturing industry.

As we continue to scale our business, we may find that certain of our products, certain customers or certain industries may require a dedicated sales force or sales personnel with different experience than those we currently employ. Identifying, recruiting and training additional qualified personnel would require significant time, expense and attention. If we are unable to drive new customer conversion to automated MQC and our Growth Direct platform, expand adoption of our Growth Direct platform into new industries and markets, or increase the usage and value of our platform to our customers, then our business, financial condition, results of operations and prospects could be adversely affected.

We may not successfully implement our strategy to expand our Growth Direct platform to customers who manufacture cell and gene therapies.

Our ability to execute our growth strategy to expand our Growth Direct platform to customers who manufacture cell and gene therapies depends upon our ability to integrate our platform with the novel manufacturing processes being developed for these therapies. Companies that manufacture cell and gene therapies are developing new approaches to handle this manufacturing method, including novel facility layouts, new processes and workflows, and new quality and risk management frameworks. Unlike traditional "small molecule" drug manufacturing, the manufacture of biologics, such as cell and gene therapies, is more time sensitive and subject to increased risk of contamination due to material handling and process change-over. There are also currently a small number of cell and gene therapies approved by the FDA. While we have experience providing automated MQC testing for customers that manufacture a number of these approved therapies, we may encounter challenges or unexpected issues as we apply our Growth Direct platform to testing a greater number of therapies as they are approved in future. We cannot be certain that we will be able to successfully or consistently integrate our platform with this novel manufacturing process. If we are unable to successfully expand our Growth Direct platform into this growing segment of therapeutic manufacturing, our business and financial position may be adversely affected.

The size of the markets and forecasts of market growth for automated MQC testing and other of our key performance indicators are based on a number of complex assumptions and estimates, and may be inaccurate.

We estimate annual total addressable markets and forecasts of market growth for our Growth Direct platform. We have also developed a standard set of key performance indicators in order to enable us to assess the performance of our business in and across multiple markets, and to forecast future revenue. These estimates, forecasts and key performance indicators are based on a number of complex assumptions, internal and third-party estimates and market studies, and other business data, including assumptions and estimates relating to our

ability to generate revenue from the expansion of our platform into new drug manufacturing areas and new industries. While we believe our assumptions and the data underlying our estimates and key performance indicators are reasonable, there are inherent challenges in measuring or forecasting such information. As a result, these assumptions and estimates may not be correct and the conditions supporting our assumptions or estimates may change at any time, thereby reducing the predictive accuracy of these underlying factors and indicators. As a result, our estimates of the total addressable market and our forecasts of market growth for our current or future products may prove to be incorrect, and our key performance indicators may not reflect our actual performance. If the total addressable market or the potential market growth for our platform is smaller than we have estimated or if the key performance indicators we utilize to forecast revenue are inaccurate, it may impair our sales growth and have an adverse impact on our business, financial condition, results of operations and prospects.

New product development involves a lengthy and complex process and we may be unable to develop or commercialize products on a timely basis, or at all.

Products from our development programs will take time and considerable resources to develop, and may include improvements or changes to our systems, software and consumables. We may not be able to complete development and commercialize them on a timely basis, or at all. There can be no assurance that our development programs will produce commercial products and solutions and before we can commercialize any new products, we will need to expend significant funds in order to:

- conduct substantial research and development, which may include validation studies;
- further develop and scale our engineering and manufacturing processes to accommodate different products;
- further develop and scale our infrastructure to be able to analyze increasingly large amounts of data; and
- utilize data and analytical insights generated from existing Growth Direct platform in our research and development programs in order to advance these programs.

Our product development processes involve a high degree of risk, and these efforts may be delayed or fail for many reasons, including:

- failure of the product to perform as expected;
- higher costs than anticipated; and
- failure to reliably demonstrate the advantages of our products.

In addition, if we are unable to generate additional data and insights from our existing Growth Direct platforms, then we may not be able to advance these programs as quickly, or at all, or without significant additional investment, all of which could have a material adverse effect on our product development efforts.

Even if we are successful in developing new products, it will require us to make significant additional investments in marketing and selling resources in order to commercialize any such products. As a result, we may be unsuccessful in commercializing new products that we develop, which could adversely affect our business, financial condition, results of operations and prospects.

Our customers use our Growth Direct platform as part of their quality-control workflow, which is subject to regulation by the FDA and other comparable regulatory authorities.

We provide products and services used for quality-control testing in pharmaceutical product manufacturing. Our customers are subject to extensive regulations by the FDA and similar regulatory authorities in other countries, including, for example, cGMP regulations and associated requirements to validate the methods used to manufacture their products. To meet their regulatory compliance requirements, our customers have implemented quality-control workflows to monitor for microbial growth and contamination. While our Growth Direct platform is not regulated directly by the FDA or other comparable authorities and we have not verified our Growth Direct platform for compliance with such regulations, we have designed our platform to be integrated as part of a compliant quality-control workflow. If our Growth Direct platform is unable to meet regulatory standards for

compliance or we are unable to update our platform to meet new regulatory requirements, we will lose customers and our business will be adversely affected. While under our agreements with our customers we are not liable for non-compliance of our Growth Direct platform, if a customer experienced a compliance failure due to our Growth Direct platform, our reputation could be harmed and our business prospects adversely affected.

If we are unable to support demand for the Growth Direct platform, and for our future product offerings, including ensuring that we have adequate capacity to meet increased demand, our business could suffer.

As the number of customers using the Growth Direct platform grows and our volume of installed systems increases, we will need to continue to increase our capacity for customer service and support, including maintenance services of our systems, and expand our manufacturing capabilities. As a result, we will also need to purchase additional equipment, some of which can take several months or more to procure, setup and validate, and increase our personnel levels to meet increased demand. There is no assurance that any of these increases in scale, expansion of personnel, equipment, manufacturing or services will be successfully implemented, or that we will have adequate space, including in our manufacturing facility, to accommodate such required expansion.

As we commercialize additional products, we will need to incorporate new equipment, implement new technology systems and processes, and hire new personnel, possibly with supplemental or different qualifications as compared to our current personnel. Failure to manage this growth or transition could result in product delays, higher cost of product revenue, declining product quality, deteriorating customer service and slower responses to competitive challenges. A failure in any one of these areas could make it difficult for us to meet market expectations for our products and could damage our reputation and the prospects for our business.

We have limited experience in marketing and sales, and if we are unable to expand our marketing and sales organization to adequately address our customers' needs or to expand our customer base, 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. In order to support our planned growth, we will need to rapidly 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.

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.

We may be unable to manage our future growth effectively, which could make it difficult to execute our business strategy.

We have experienced rapid growth in our product and service revenue and anticipate further growth in our business operations. Our growth has required significant time and attention from our management, and placed strains on our operational and manufacturing systems and processes, financial systems and internal controls and

other aspects of our business. We expect to continue to increase headcount and to hire more specialized personnel in the future as we grow our business. We will need to continue to hire, train and manage additional qualified engineers, client and account services personnel and sales and marketing staff and improve and maintain our technology to properly manage our growth. We may also need to hire, train and manage individuals with expertise that is separate, supplemental or different from expertise that we currently have, and accordingly we may not be successful in hiring, training and managing such individuals. If our new hires perform poorly, if we are unsuccessful in hiring, training, managing and integrating these new employees, or if we are not successful in retaining our existing employees, our business may be harmed.

Developing and launching new products and innovating and improving our existing products have required us to hire and retain additional engineering, sales and marketing, software, manufacturing, distribution and quality assurance personnel. As a result, we have experienced rapid headcount growth. As we have grown, our employees have become more geographically dispersed. We serve customers located in multiple countries and plan to continue to expand to new countries as part of our growth strategy, which will lead to increased dispersion of our employees, including sales employees and employees who are in our service and support groups. Moreover, we expect that we will need to hire additional accounting, finance, legal and other personnel in connection with our becoming, and our efforts to comply with the requirements of being, a public company. Once public, our management and other personnel will need to devote a substantial amount of time towards maintaining compliance with these requirements. We may face challenges integrating, developing and motivating our rapidly growing and increasingly dispersed employee base.

We may not be able to maintain the quality, reliability or robustness of our platform, or the expected turnaround times of our services and support, or to satisfy customer demand as it grows. Our ability to manage our growth properly will require us to continue to improve our operational, financial and management controls, as well as our reporting systems and procedures. To effectively manage our growth, we must continue to improve our operational and manufacturing systems and processes, our financial systems and internal controls and other aspects of our business and continue to effectively expand, train and manage our personnel. The time and resources required to improve our existing systems and procedures, implement new systems and procedures and to adequately staff such existing and new systems and procedures is uncertain, and failure to complete such activities in a timely and efficient manner could adversely affect our operations and negatively impact our business and financial results.

If we cannot compete successfully, we may be unable to increase or sustain our revenue, or achieve and sustain profitability.

We currently primarily compete with established companies that provide consumables for MQC testing and with a limited number of established and early-stage companies that have automated MQC testing systems. In addition, our customers may also elect to continue to use the traditional MQC testing method rather than our platform and may decide to stop using our platform.

Our competitors and potential competitors may enjoy a number of competitive advantages over us, including:

- longer operating histories;
- larger customer bases;
- greater brand recognition and market penetration;
- greater financial resources;
- greater technological and research and development resources;
- better system reliability and robustness;
- greater selling and marketing capabilities; and
- better established, larger scale and lower cost manufacturing capabilities.

As a result, our competitors and potential competitors may be able to respond more quickly to changes in customer requirements, devote greater resources to the development, promotion and sale of their platforms or instruments than we can or sell their platforms or instruments, or offer services competitive with our platform and services at prices designed to win significant levels of market share. We may not be able to compete effectively against these organizations.

In addition, competitors may be acquired by, receive investments from or enter into other commercial relationships with larger, well-established and well-financed companies. Certain of our competitors may be able to secure key inputs from vendors on more favorable terms, devote greater resources to marketing and promotional campaigns, adopt more aggressive pricing policies and devote substantially more resources to product development than we can. Further, competition in the automated MQC testing market, while currently limited, may increase in future, and we may not be able to maintain our leading position in the industry as a result. If we are unable to compete successfully, we may be unable to increase market adoption and sales of our platform, which could prevent us from increasing our revenue or achieving profitability.

We must develop new products, adapt to rapid and significant technological change and respond to introductions of new products by competitors to remain competitive.

We sell our products in industries that are characterized by significant enhancements and evolving industry standards. As a result, our customers' needs are rapidly evolving. If we do not appropriately innovate and invest in new technologies, our products and services may become less desirable in the markets we serve, and our customers could move to new technologies offered by our competitors or decide to revert to the traditional MQC testing method. Though we believe customers in our markets display a significant amount of loyalty to their supplier of a particular product, we also believe that because of the initial time investment required by many of our customers to reach a purchasing decision for a new product, it may be difficult to regain that customer once the customer purchases a product from a competitor. Without the timely introduction of new products, services and enhancements, our offerings will likely become less competitive over time, in which case our competitive position and operating results could suffer. Accordingly, we focus significant efforts and resources on the development and identification of new technologies, products and markets to further broaden our offerings. To the extent we fail to timely introduce new and innovative products or services, adequately predict our customers' needs or fail to obtain desired levels of market acceptance, our business may suffer and our operating results could be adversely affected.

Due to the significant resources required to enable access in new markets, we must make strategic and operational decisions to prioritize certain markets, products and services. We may expend our resources to access markets and develop products and services that do not yield meaningful revenue or we may fail to capitalize on markets, products or services that may be more profitable or with a greater potential for success.

We believe our platform has potential applications across a wide range of markets and we have targeted certain markets in which we believe our technology has significant advantages or a higher probability of success or greater revenue opportunity, such as the manufacture of cell and gene therapies. We seek to maintain a process of prioritization and resource allocation among our programs to maintain a balance between advancing near-term opportunities and exploring additional markets for our platform. However, due to the significant resources required for the development of products and services for new markets, we must make decisions on which markets to pursue and the amount of resources to allocate to each. Our decisions concerning the allocation of research, development, collaboration, management and financial resources toward particular markets, products or services may not lead to the development of any viable product or service and may divert resources away from better opportunities. Similarly, we may choose to pursue certain markets, which may not be as profitable as other markets that we did not pursue due to our limited resources. As a result, our business, financial condition, results of operations and prospects could be adversely impacted.

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 work flow 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.

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.

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

The use of any product we may develop and the sale of any products exposes us to the risk of product liability claims. Product liability claims might be brought against us by pharmaceutical companies, CMOs or others selling or otherwise coming into contact with our products. If we cannot successfully defend against product liability claims, we could incur substantial liability and costs. In addition, regardless of merit or eventual outcome, product liability claims may result in:

- impairment of our business reputation and significant negative media attention;
- withdrawal of customers;
- significant costs to defend the litigation;
- distraction of management's attention from our primary business;
- substantial monetary awards to claimants;
- inability to commercialize a product;
- product recalls or withdrawals;
- decreased market demand for any product; and
- loss of revenue.

The product liability insurance we currently carry, and any additional product liability insurance coverage we acquire in the future, may not be sufficient to reimburse us for any expenses or losses we may suffer. Moreover, insurance coverage is becoming increasingly expensive and, in the future, we may not be able to maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against losses due to liability. A successful product liability claim, or series of claims, brought against us could cause our share price to decline and, if judgments exceed our insurance coverage, could adversely affect our results of operation and business, including preventing or limiting the commercialization of any products we develop.

We depend on our information technology systems, and any failure of these systems could harm our business.

We depend on information technology and telecommunications systems for significant elements of our operations, including our knowledge management system, our customer reporting, our platform, advanced automation systems, and advanced application and LIMS connection software. We have installed, and expect to expand, a number of enterprise software systems that affect a broad range of business processes and functional areas, including for example, systems handling human resources, financial controls and reporting, contract management, compliance and other infrastructure operations. These implementations can be expensive and require significant time and effort. These information technology and telecommunications systems support a variety of functions, including manufacturing operations, data analysis, quality control, customer service and support, billing, research and development activities, and general administrative activities.

Information technology and telecommunications systems are vulnerable to damage from a variety of sources, including telecommunications or network failures, malicious software, bugs or viruses, human acts and natural disasters. Moreover, despite network security and back-up measures, some of our servers are potentially vulnerable to physical or electronic break-ins, computer viruses and similar disruptive problems. Any disruption or loss of information technology or telecommunications systems on which critical aspects of our operations depend could have an adverse effect on our business and our reputation.

Security breaches, loss of data and other disruptions could compromise sensitive information related to our business or prevent us from accessing critical information and expose us to liability, which could adversely affect our business and our reputation.

In the ordinary course of our business, we collect and store sensitive data, including personally identifiable information, intellectual property and proprietary business information owned or controlled by ourselves or our employees, customers and other parties. We manage and maintain our applications and data utilizing a combination of on-site systems and cloud-based data centers. We utilize external security and infrastructure vendors to manage parts of our data centers. These applications and data encompass a wide variety of business-critical information, including research and development information, customer information, commercial information and business and financial information. We face a number of risks relative to protecting this critical information, including loss of access risk, inappropriate use or disclosure, unauthorized access, inappropriate modification and the risk of our being unable to adequately monitor and audit and modify our controls over our critical information. This risk extends to the third-party vendors and subcontractors we use to manage this sensitive data or otherwise process it on our behalf. The secure processing, storage, maintenance and transmission of this critical information are vital to our operations and business strategy, and we devote significant resources to protecting such information. Although we take reasonable measures to protect sensitive data from unauthorized access, use or disclosure, our information technology and infrastructure may still be vulnerable to, and we have in the past experienced, attacks by hackers or viruses or breaches due to employee error, malfeasance or other malicious or inadvertent disruptions. Further, attacks upon information technology systems are increasing in their frequency, levels of persistence, sophistication and intensity, and are being conducted by sophisticated and organized groups and individuals with a wide range of motives and expertise. As a result of the COVID-19 pandemic, we may also face increased cybersecurity risks due to our reliance on internet technology and the number of our employees who are working remotely, which may create additional opportunities for cybercriminals to exploit vulnerabilities. Furthermore, because the techniques used to obtain unauthorized access to, or to sabotage, systems change frequently and often are not recognized until launched against a target, we may be unable to anticipate these techniques or implement adequate preventative measures. We may also experience security breaches that

may remain undetected for an extended period. Any such breach or interruption could compromise our networks and the information stored there could be accessed by unauthorized parties, publicly disclosed, lost or stolen. Any such access, breach, or other loss of information could result in legal claims or proceedings, and liability under federal or state laws that protect the privacy of personal information, and regulatory penalties. Notice of breaches may be required to affected individuals or other state, federal or foreign regulators, and for extensive breaches, notice may need to be made to the media or State Attorneys General. Such a notice could harm our reputation and our ability to compete. Although we have implemented security measures to prevent unauthorized access, such data is currently accessible through multiple channels, and there is no guarantee we can protect our data from breach. Unauthorized access, loss or dissemination could also disrupt our operations and damage our reputation, any of which could adversely affect our business.

We are currently subject to, and may in the future become subject to additional, U.S., state and foreign laws and regulations imposing obligations on how we collect, store and process personal information. Our actual or perceived failure to comply with such obligations could harm our business. Ensuring compliance with such laws could also impair our efforts to maintain and expand our customer base, and thereby decrease our revenue.

We are, and may increasingly become, subject to various laws and regulations, as well as contractual obligations, relating to data privacy and security in the jurisdictions in which we operate. The regulatory environment related to data privacy and security is increasingly rigorous, with new and constantly changing requirements applicable to our business, and enforcement practices are likely to remain uncertain for the foreseeable future. These laws and regulations may be interpreted and applied differently over time and from jurisdiction to jurisdiction, and it is possible that they will be interpreted and applied in ways that may have a material adverse effect on our business, financial condition, results of operations and prospects.

In the United States, various federal and state regulators, including governmental agencies like the Consumer Financial Protection Bureau and the Federal Trade Commission, have adopted, or are considering adopting, laws and regulations concerning personal information and data security. Certain state laws may be more stringent or broader in scope, or offer greater individual rights, with respect to personal information than federal, international or other state laws, and such laws may differ from each other, all of which may complicate compliance efforts. For example, the California Consumer Privacy Act, or CCPA, which increases privacy rights for California residents and imposes obligations on companies that process their personal information, came into effect on January 1, 2020. Among other things, the CCPA requires covered companies to provide new disclosures to California consumers and provide such consumers new data protection and privacy rights, including the ability to opt-out of certain sales of personal information. The CCPA provides for civil penalties for violations, as well as a private right of action for certain data breaches that result in the loss of personal information. This private right of action may increase the likelihood of, and risks associated with, data breach litigation. In addition, laws in all 50 U.S. states require businesses to provide notice to consumers whose personal information has been disclosed as a result of a data breach. State laws are changing rapidly and there is discussion in the U.S. Congress of a new comprehensive federal data privacy law to which we would become subject if it is enacted.

Internationally, laws, regulations and standards in many jurisdictions apply broadly to the collection, use, retention, security, disclosure, transfer and other processing of personal information. For example, the EU General Data Protection Regulation, or GDPR, which became effective in May 2018, greatly increased the European Commission's jurisdictional reach of its laws and adds a broad array of requirements for handling personal data. EU and the European Economic Area, or EEA, member states are tasked under the GDPR to enact, and have enacted, certain implementing legislation that adds to and/or further interprets the GDPR requirements and potentially extends our obligations and potential liability for failing to meet such obligations. The GDPR, together with national legislation, regulations and guidelines of the EU and EEA member states governing the processing of personal data, impose strict obligations and restrictions on the ability to collect, use, retain, protect, disclose, transfer and otherwise process personal data. In particular, the GDPR includes obligations and restrictions concerning the consent and rights of individuals to whom the personal data relates, the transfer of personal data out of the European Economic Area, security breach notifications and the security and confidentiality of personal data. The GDPR authorizes fines for certain violations of up to 4% of global annual revenue or €20 million, whichever is greater. Among other requirements, the GDPR regulates transfers of personal data subject to the GDPR to third

countries that have not been found to provide adequate protection to such personal data, including the United States, and the efficacy and longevity of current transfer mechanisms between the EU and the United States remains uncertain. For example, in 2016, the EU and United States agreed to a transfer framework for data transferred from the EU to the United States, called the Privacy Shield, but the Privacy Shield was invalidated in July 2020 by the Court of Justice of the European Union. Further, from January 1, 2021, companies have to comply with the GDPR and also the United Kingdom GDPR, or the UK GDPR, which, together with the amended UK Data Protection Act 2018, retains the GDPR in UK national law. The UK GDPR mirrors the fines under the GDPR, i.e., fines up to the greater of €20 million (£17.5 million) or 4% of global turnover. The relationship between the United Kingdom and the European Union in relation to certain aspects of data protection law remains unclear, and it is unclear how United Kingdom data protection laws and regulations will develop in the medium to longer term, and how data transfers to and from the United Kingdom will be regulated in the long term. These changes will lead to additional costs and increase our overall risk exposure. Currently there is a four to six-month grace period agreed in the EU and United Kingdom Trade and Cooperation Agreement, ending June 30, 2021 at the latest, whilst the parties discuss an adequacy decision. The European Commission published a draft adequacy decision on February 19, 2021. If adopted, the decision will enable data transfers from EU member states to the United Kingdom for a four-year period, subject to subsequent extensions.

All of these evolving compliance and operational requirements impose significant costs, such as costs related to organizational changes, implementing additional protection technologies, training employees and engaging consultants, which are likely to increase over time. In addition, such requirements may require us to modify our data processing practices and policies, distract management or divert resources from other initiatives and projects, all of which could have a material adverse effect on our business, financial condition, results of operations and prospects. Any failure or perceived failure by us to comply with any applicable federal, state or similar foreign laws and regulations relating to data privacy and security could result in damage to our reputation, as well as proceedings or litigation by governmental agencies or other third parties, including class action privacy litigation in certain jurisdictions, which would subject us to significant fines, sanctions, awards, penalties or judgments, all of which could have a material adverse effect on 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. If we are unable to continue to attract and retain qualified personnel, our ability to develop and commercialize products will be limited.

We may acquire businesses or form joint ventures or make investments in other companies or technologies that could negatively affect our operating results, dilute our stockholders' ownership, increase our debt or cause us to incur significant expense.

We may pursue acquisitions of businesses and assets. We also may pursue strategic alliances and joint ventures that leverage our technology and industry experience to expand our offerings or distribution. We have no experience with acquiring other companies and limited experience with forming strategic partnerships. We may not be able to find suitable collaborators or acquisition candidates, and we may not be able to complete such transactions on favorable terms, if at all. The competition for collaborators or acquisition candidates may be intense, and the negotiation process will be time consuming and complex. If we make any acquisitions, we may not be able to integrate these acquisitions successfully into our existing business, these acquisitions may not strengthen our competitive position, the transactions may be viewed negatively by customers or investors, we may be unable to retain key employees of any acquired business, relationships with key suppliers, manufacturers or customers of any acquired business may be impaired due to changes in management and ownership, and we could assume unknown or contingent liabilities. Any future acquisitions also could result in the incurrence of debt, contingent liabilities or future write-offs of intangible assets or goodwill, any of which could have a material adverse effect on our business, financial condition, results of operations and prospects. We cannot guarantee that we will be able to fully recover the costs of any acquisition. Integration of an acquired company also may disrupt ongoing operations and require management resources that we would otherwise focus on developing our existing business. We may not realize the anticipated benefits of any acquisition, technology license, strategic alliance or joint venture. We also may experience losses related to investments in other companies, which could have a material adverse effect on our business, financial condition, results of operations and prospects.

To finance any acquisitions or joint ventures, we may choose to issue shares of our common stock as consideration, which would dilute the ownership of our stockholders. Additional funds may not be available on terms that are favorable to us, or at all. If the price of our Class A common stock is low or volatile, we may not be able to acquire companies or fund a joint venture project using our stock as consideration.

Our insurance policies are expensive and protect us only from some business risks, which leaves us exposed to significant uninsured liabilities.

We do not carry insurance for all categories of risk that our business may encounter and our policies have limits and significant deductibles. Some of the policies we currently maintain include general liability, property, umbrella and directors' and officers' insurance.

Any additional product liability insurance coverage we acquire in the future, may not be sufficient to reimburse us for any expenses or losses we may suffer. Moreover, insurance coverage is becoming increasingly expensive and in the future we may not be able to maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against losses. A successful product liability claim or series of claims in which judgments exceed our insurance coverage could adversely affect our business, financial condition, results of operations and prospects, including preventing or limiting the commercialization of any products we develop.

We also expect that operating as a public company will make it more difficult and more expensive for us to obtain director and officer liability insurance, and we may be required to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. As a result, it may be more difficult for us to attract and retain qualified people to serve on our board of directors, our board committees or as executive officers. We do not know, however, if we will be able to maintain existing insurance with adequate levels of coverage. Any significant uninsured liability may require us to pay substantial amounts, which would adversely affect our business, financial condition, results of operations and prospects.

Our loan and security agreement contains covenants, which restrict our operating activities, and we may be required to repay the outstanding indebtedness in an event of default, which could have a material adverse effect on our business, financial condition, results of operations and prospects.

In May 2020, we entered into a loan and security agreement with Kennedy Lewis Management LP, or the Lender, pursuant to which the Lender agreed to provide us certain term loans up to an aggregate principal amount of

$60.0 million of which we've borrowed $25.0 million. Until we have repaid such indebtedness, the loan and security agreement subjects us to various customary covenants, including requirements as to financial reporting, minimum liquidity and insurance and restrictions on our ability to dispose of our business or property, to change our line of business, to merge or consolidate with any other entity or to acquire all or substantially all of the capital stock or property of another entity, to incur additional indebtedness, to incur liens on our property, to pay any dividends or make other distributions on capital stock other than dividends payable solely in capital stock, to redeem capital stock, to make investments other than certain permitted investments, to engage in transactions with affiliates, to make payments on subordinated debt, to fail to comply with certain compliance requirements, and to amend our operating documents without the Lender's prior written consent. Our business may be adversely affected by these restrictions on our ability to operate our business.

We may be required to repay the outstanding indebtedness under the loan facility if an event of default occurs under the loan and security agreement. An event of default will occur if, among other things, we fail to make required payments under the loan and security agreement; we breach any of our covenants under the loan and security agreement, subject to specified cure periods with respect to certain breaches; the Lender determines that a material adverse change (as defined in the loan and security agreement) has occurred; we or our assets become subject to certain legal proceedings, such as bankruptcy proceedings; we are unable to pay our debts as they become due; or we default on contracts with third parties which would permit the third party to accelerate the maturity of such indebtedness or that could have a material adverse change on us. We may not have enough available cash or be able to raise additional funds through equity or debt financings to repay such indebtedness at the time any such event of default occurs. In such a case, we may be required to delay, limit, reduce or terminate our product development or operations or grant to others rights to develop and market products that we would otherwise prefer to develop and market ourselves. The Lender could also exercise its rights as secured lender to take possession of and to dispose of the collateral securing the term loan, which collateral includes substantially all of our property (excluding intellectual property, which is subject to a negative pledge). Our business, financial condition, results of operations and prospects could be materially adversely affected as a result of any of these events.

International expansion of our business exposes us to business, regulatory, political, operational, financial and economic risks associated with doing business outside of the United States.

We currently have limited international operations, but our business strategy incorporates potentially significant international expansion. We currently maintain a small sales force internationally and engage one distributor. We also have relationships with customers outside of the United States and may in the future expand our international customer base. Doing business internationally involves a number of risks, including:

- multiple, conflicting and changing laws and regulations such as privacy regulations, tax laws, export and import restrictions, tariffs, economic sanctions and embargoes, employment laws, regulatory requirements and other governmental approvals, permits and licenses;
- failure by us or our distributors to obtain approvals to conduct our business in various countries;
- differing intellectual property rights;
- complexities and difficulties in obtaining intellectual property protection, enforcing our intellectual property and defending against third-party intellectual property claims;
- difficulties in staffing and managing foreign operations;
- logistics and regulations associated with shipping systems and parts and components for systems and consumables, as well as transportation delays;
- travel restrictions that limit the ability of marketing, presales, sales, services and support teams to service customers;
- financial risks, such as longer payment cycles, difficulty collecting accounts receivable, the impact of local and regional financial crises on demand and payment for our products and exposure to foreign currency exchange rate fluctuations;

- international trade disputes that could result in tariffs and other protective measures;
- natural disasters, political and economic instability, including wars, terrorism and political unrest, outbreak of disease, boycotts, curtailment of trade and other business restrictions; and
- regulatory and compliance risks, including severe penalties such as criminal and civil penalties, disgorgement and other remedial measures, that relate to the U.S. Foreign Corrupt Practices Act, the U.K. Bribery Act 2010 and similar anti-bribery and anticorruption laws in other jurisdictions.

Any of these factors could significantly harm our future international expansion and operations and, consequently, our business, financial condition, results of operations and prospects. In addition, certain international markets are subject to significant political and economic uncertainty, including for example the effect of the withdrawal of the United Kingdom from the European Union. Significant political and economic developments in international markets for which we intend to operate, or the perception that any of them could occur, creates further challenges for operating in these markets in addition to creating instability in global economic conditions.

Certain legal and political risks are also inherent in foreign operations. There is a risk that foreign governments may nationalize private enterprises in certain countries where we may operate. In certain countries or regions, terrorist activities and the response to such activities may threaten our operations more than in the United States. Social and cultural norms in certain countries may not support compliance with our corporate policies, including those that require compliance with substantive laws and regulations. Also, changes in general economic and political conditions in countries where we may operate are a risk to our financial performance and future growth. Additionally, the need to identify financially and commercially strong collaborators and customers for operations outside the United States who will comply with the high legal and regulatory standards we require is a risk to our financial performance. As we operate our business globally, our success will depend, in part, on our ability to anticipate and effectively manage these and other related risks. There can be no assurance that the consequences of these and other factors relating to our international operations will not have an adverse effect on our business, financial condition or results of operations.

Our employees, consultants and collaborators may engage in misconduct or other improper activities.

We are exposed to the risk of fraud or other misconduct by our employees, consultants and collaborators. Misconduct by these parties could include intentional failures to comply with the applicable laws and regulations in the United States and abroad, report financial information or data accurately or disclose unauthorized activities to us. These laws and regulations may restrict or prohibit a wide range of pricing, discounting and other business arrangements. Such misconduct could result in legal or regulatory sanctions and cause serious harm to our reputation. It is not always possible to identify and deter misconduct, and any precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses, or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to comply with these laws or regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, we could be subject to significant civil, criminal and administrative penalties, which could have a material adverse impact on our business. Whether or not we are successful in defending against such actions or investigations, we could incur substantial costs, including legal fees and divert the attention of management in defending ourselves against any of these claims or investigations, which could have a material adverse impact on our business.

We and our employees are increasingly utilizing social media tools as a means of communication both internally and externally.

Despite our efforts to monitor evolving social media communication guidelines and comply with applicable rules, there is risk that the use of social media by us or our employees to communicate about our products or business may cause us to be found in violation of applicable requirements. In addition, our employees may knowingly or inadvertently make use of social media in ways that may not comply with applicable laws and regulations, our policies and other legal or contractual requirements, which may give rise to regulatory enforcement action, liability, lead to the loss of trade secrets or other intellectual property or result in public exposure of personal

information of our employees, customers and others. Furthermore, negative posts or comments about us or our products in social media could seriously damage our reputation, brand image and goodwill. Any of these events could have a material adverse effect on our business, prospects, operating results and financial condition and could adversely affect the price of our Class A common stock.

Risks related to manufacturing and supply

If our sole manufacturing and development facility becomes damaged or inoperable or we are required to vacate our existing facility, our ability to conduct and pursue our manufacturing and development efforts will be jeopardized.

We currently conduct our development and manufacturing at a single facility located in Lowell, Massachusetts. Our facility and equipment could be harmed or rendered inoperable or inaccessible by natural or man-made disasters or other circumstances beyond our control, including fire, power loss, communications failure, war or terrorism, or another catastrophic event, such as a pandemic or similar outbreak or public health crisis, which may render it difficult or impossible for us to support our customers and develop products. The inability to manufacture our systems and consumables could develop if our facility is inoperable or suffers a loss of utilization for even a short period of time and may result in the loss of customers or harm to our reputation. Furthermore, our facility and the equipment we use to perform our manufacturing and development could be unavailable or costly and time consuming to repair or replace. It would be difficult, time consuming and expensive to rebuild our facility, to locate and qualify a new facility or license or transfer our proprietary technology to a third party. Even in the event we are able to find a third party to assist in manufacturing and development efforts, we may be unable to negotiate commercially reasonable terms to engage with the third party.

We also store a certain amount of inventory of components of our products at our Lowell, Massachusetts facility.

We carry insurance for damage to our property and the disruption of our business, but this insurance may not cover all of the risks associated with damage or disruption to our business, may not provide coverage in amounts sufficient to cover our potential losses and may not continue to be available to us on acceptable terms, if at all.

Our manufacturing operations are dependent upon third-party suppliers, including single-source suppliers, making us vulnerable to supply shortages and price fluctuations, which could harm our business.

We source the components of our Growth Direct system and consumables from third-party suppliers. We do not have supply agreements with most of our suppliers beyond purchase orders and, although we maintain an inventory of components, forecasted amounts may be inaccurate and we may experience shortages as a result of serious supply problems with these suppliers. There can be no assurance that our supply of components will not be limited, interrupted, or of satisfactory quality or continue to be available at acceptable prices. For example, we have experienced disruptions to our supply chain as a result of the COVID-19 pandemic and may experience additional disruptions in the future.

Certain critical components of our Growth Direct system and consumables we obtain from single suppliers and the loss of supply from any of these suppliers could materially adversely affect our business. To protect against such loss, we maintain, or are working to obtain, sufficient inventory of these components to allow us to continue to manufacture our systems and consumables during the period required to qualify a new supplier. For example, the manufacturer of the camera used in our Growth Direct system intends to discontinue production of the camera, and we have obtained a supply we believe is sufficient to allow us to qualify a new camera supplier. While we believe we have, or will have, sufficient inventory to provide protection against changes in our sole suppliers, our estimates of the length of time required to qualify a new supplier or inventory level required to manufacture our systems and consumables during that time may be incorrect, and we may run out of inventory sooner than we anticipate. In addition, we have not obtained sufficient inventory for all of our single-source components and we may not be able to do so in the amounts we predict will be required. In addition, any change to a new supplier will require us to devote substantial time and resources, result in additional costs, and could involve a period in which our products might not be produced in a timely or consistent manner. We may also be unable to enter into agreements with new suppliers on commercially reasonable terms or at all. The occurrence of any of these

events could adversely affect our business and customer relationships. In addition, loss of any critical component provided by a single-source supplier could require us to change the design of our manufacturing process based on the functions, limitations, features and specifications of the replacement components.

Several other non-critical components and materials that comprise our Growth Direct platform are currently manufactured by a single supplier or a limited number of suppliers. In many of these cases, we have not yet qualified alternate suppliers and rely upon purchase orders, rather than long-term supply agreements. A supply interruption or an increase in demand beyond our current suppliers' capabilities could harm our ability to manufacture our products unless and until new sources of supply are identified and qualified. Our reliance on these suppliers subjects us to a number of risks that could harm our business, including:

- interruption of supply resulting from modifications to or discontinuation of a supplier's operations;
- delays in product shipments resulting from uncorrected defects, reliability issues, or a supplier's variation in a component;
- a lack of long-term supply arrangements for key components with our suppliers;
- inability to obtain adequate supply in a timely manner, or to obtain adequate supply on commercially reasonable terms;
- difficulty and cost associated with locating and qualifying alternative suppliers for our components in a timely manner;
- a modification or change in a manufacturing process or part that unknowingly or unintentionally negatively impacts the operation of our products;
- production delays related to the evaluation and testing of products from alternative suppliers, and corresponding regulatory qualifications;
- delay in delivery due to our suppliers prioritizing other customer orders over ours;
- damage to our brand reputation caused by defective components produced by our suppliers;
- increased cost of our warranty program due to product repair or replacement based upon defects in components produced by our suppliers; and
- fluctuation in delivery by our suppliers due to changes in demand from us or their other customers.

Any interruption in the supply of components or materials, or our inability to obtain substitute components or materials from alternate sources at acceptable prices in a timely manner, could impair our ability to meet the demand of our customers, which would have an adverse effect on our business.

We forecast sales to determine requirements for components and materials used in our products, and if our forecasts are incorrect, we may experience delays in shipments or increased inventory costs.

To manage our operations with our third-party suppliers, we forecast anticipated product orders and material requirements to predict our inventory needs and enter into purchase orders on the basis of these requirements. Our limited historical commercial experience and recent growth may not provide us with enough data to consistently and accurately predict future demand. If our business expands and our demand for components and materials increases beyond our estimates, we or our suppliers may be unable to meet our demand. In addition, if we underestimate our component and material requirements, we may have inadequate inventory, which could interrupt, delay, or prevent delivery of our products to our customers. By contrast, if we overestimate our component and material requirements, we may have excess inventory, which would increase our expenses. Any of these occurrences would negatively affect our financial performance and business results.

Shipping is a critical part of our business and any changes in our shipping arrangements or damages or losses sustained during shipping could adversely affect our business, financial condition, results of operations and prospects.

Shipments of our products are subject to various regulations in the various countries in which we provide our products. For example, shipments of our growth media consumables may be required to comply with the shipping

requirements promulgated by the U.S. Department of Transportation, or DOT, and the U.S. Federal Aviation Administration, as well as shipment rules established by the International Air Transport Association. If we are unable to comply with any of these rules or regulations, our ability to deliver our products in a timely manner may be adversely affected. In addition, even if we are able to comply with these rules and regulations, compliance can result in increased costs. In either event, our financial results and condition may be adversely affected.

We also currently rely on third-party vendors for our shipping. If we are not able to negotiate acceptable pricing and other terms with these entities or they experience performance problems or other difficulties, it could negatively impact our operating results and our customers' experience. Our products could sustain serious damage or be lost in transit. If a product is damaged in transit, it may result in a substantial delay in the fulfillment of the customer's order, and depending on the type and extent of the damage and whether the incident is covered by insurance, it may result in a substantial financial loss. If our products are not delivered in a timely fashion or are damaged or lost during the delivery process, our customers could become dissatisfied and cease using our products or services, which would adversely affect our business, financial condition, results of operations and prospects.

We use biological and hazardous materials that require considerable expertise and expense for handling, storage and disposal and may result in claims against us.

We work with materials, including chemicals, biological agents and compounds that could be hazardous to human health and safety or the environment. Our operations also produce hazardous and biological waste products. Federal, state and local laws and regulations govern the use, generation, manufacture, storage, handling and disposal of these materials and wastes. We are subject to periodic inspections by federal, state and local authorities to ensure compliance with applicable laws. Compliance with applicable environmental laws and regulations is expensive, and current or future environmental laws and regulations may restrict our operations. If we do not comply with applicable regulations, we may be subject to fines and penalties. In addition, we cannot eliminate the risk of accidental injury or contamination from these materials or wastes, which could cause an interruption of our commercialization efforts, research and development programs and business operations, as well as environmental damage resulting in costly clean-up and liabilities under applicable laws and regulations. In the event of contamination or injury, we could be liable for damages or penalized with fines in an amount exceeding our resources and our operations could be suspended or otherwise adversely affected. Furthermore, environmental laws and regulations are complex, change frequently and have tended to become more stringent. We cannot predict the impact of such changes and cannot be certain of our future compliance.

Risks related to our intellectual property

If we are unable to obtain and maintain sufficient intellectual property protection for our technology, including the Growth Direct platform, or if the scope of the intellectual property protection obtained is not sufficiently broad, our competitors could develop and commercialize products similar or identical to ours, and our ability to successfully commercialize our products may be impaired.

We rely on patent protection as well as trademark, copyright, trade secret and other intellectual property rights protection and contractual restrictions to protect our proprietary technologies, all of which provide limited protection and may not adequately protect our rights or permit us to gain or keep any competitive advantage. If we fail to maintain, protect or enforce our intellectual property, third parties may be able to compete more effectively against us. In addition, we may incur substantial litigation costs in our attempts to recover or restrict use of our intellectual property.

To the extent our intellectual property offers inadequate protection, or is found to be invalid or unenforceable, we would be exposed to a greater risk of direct competition. If our intellectual property does not provide adequate coverage of our competitors' products, our competitive position could be adversely affected, as could our business. Both the patent application process and the process of managing patent disputes can be time consuming and expensive.

As is the case with other technology companies, our success depends in large part on our ability to obtain and maintain protection of the intellectual property we may own solely and jointly with others, particularly patents, in the United States and other countries with respect to our products and technologies. We apply for patents covering our products and technologies and their uses, as we deem appropriate. However, obtaining and enforcing patents in our industry is costly, time consuming and complex, and we may fail to apply for patents on important products, services and technologies in a timely fashion or at all, or we may fail to apply for patents in potentially relevant jurisdictions. We may not be able to file and prosecute all necessary or desirable patent applications, or maintain, enforce and license any patents that may issue from such patent applications, at a reasonable cost or in a timely manner. If we delay in filing a patent application, and a competitor files a patent application on the same or a similar technology before we do, we may face a limited ability to secure patent rights. We may not be able to patent the technology at all. Even if we can patent the technology, we may be able to patent only a limited scope of the technology, and the limited scope may be inadequate to protect our products, or to block competitor products that are similar or adjacent to ours. Our earliest patent filings have been published. A competitor may review our published patents and arrive at the same or similar technology advances for our products as we developed. If the competitor files a patent application on such an advance before we do, then we may no longer be able to protect the technology, we may require a license from the competitor, and if the license is not available on commercially-viable terms, then we may not be able to launch our product. It is also possible that we will fail to identify patentable aspects of our research and development output before it is too late to obtain patent protection. We may not have the right to control the preparation, filing and prosecution of patent applications, or to maintain the rights to patents licensed to third parties. Therefore, these patents and applications may not be prosecuted and enforced in a manner consistent with the best interests of our business.

It is possible that none of our pending patent applications will result in issued patents in a timely fashion or at all, and even if patents are granted, they may not provide a basis for intellectual property protection of commercially viable products or services, may not provide us with any competitive advantages, or may be challenged and invalidated by third parties. It is possible that others will design around our current or future patented technologies. It is possible that in the future some of our patents, licensed patents and patent applications may be challenged at the United States Patent and Trademark Office, or USPTO, or in proceedings before the patent offices of other jurisdictions. We may not be successful in defending any such challenges made against our patents or patent applications. Any successful third-party challenge to our patents could result in our patents being narrowed, invalidated or held unenforceable which could result in increased competition to our business. We may have to challenge the patents or patent applications of third parties. The outcome of patent litigation or other proceeding can be uncertain, and any attempt by us to enforce our patent rights against others or to challenge the patent rights of others may not be successful, or, if successful, may take substantial time and result in substantial cost, and may divert our efforts and attention from other aspects of our business.

The patent positions of technology companies can be highly uncertain and involve complex legal and factual questions for which important legal principles remain unresolved. No consistent policy regarding the breadth of claims allowed in such companies' patents has emerged to date in the United States or elsewhere. Courts frequently render opinions that may affect the patentability of certain inventions or discoveries. If the breadth or strength of protection provided by the patents and patent applications we hold with respect to our products is threatened, it could dissuade companies from collaborating with us to develop, and threaten our ability to commercialize, our products.

Our current and future licensors may retain certain rights under their agreements with us, including the right to use the underlying technology for noncommercial academic and research use, to publish general scientific findings from research related to the technology and to make customary scientific and scholarly disclosures of information relating to the technology. It is difficult to monitor whether our licensors limit their use of the technology to these uses, and we could incur substantial expenses to enforce our rights in the event of misuse.

Patent terms may be inadequate to protect our competitive position on our products for an adequate amount of time.

Patents have a limited lifespan. In the United States, if all maintenance fees are timely paid, the natural expiration of a patent is generally 20 years from its earliest U.S. non-provisional filing date. Various extensions may be

available, but the life of a patent, and the protection it affords, is limited. Even if patents covering our products are obtained, once the patent life has expired, we may be open to competition from competitive products. If one of our products requires extended development or testing, patents protecting such products might expire before or shortly after such products are commercialized. For example, while our patents and, if issued, our patent applications have terms that will expire through 2039, certain of our U.S. patents covering the Growth Direct system and its use are scheduled to expire in 2024, and the corresponding foreign patents are scheduled to expire in 2022. Although we own other patents with later expiration dates that cover various improvements and consumables for the Growth Direct platform, these other patents may not provide the same protection as the earliest-filed patents As a result, our patent portfolio may not provide us with sufficient rights to exclude others from commercializing products similar or identical to ours, which would have a material adverse effect on our business.

The United States government may exercise certain rights with regard to certain of our inventions developed using government funding.

The United States federal government retains certain rights in inventions produced with its financial assistance under the Patent and Trademark Law Amendments Act, or the Bayh-Dole Act. Certain of our inventions for which we have pursued, and in some cases obtained, patent protection were developed using federal funding from the U.S. Department of Health and Human Services Biomedical Advanced Research & Development Authority, or BARDA. As a result, the U.S. government may have certain rights, including so-called march-in rights, to any patent rights that were funded in party by the U.S. government and any products or technology developed from such patent rights. When new technologies are developed with U.S. government funding, the U.S. government generally obtains certain rights in any resulting patents, including a nonexclusive license authorizing the U.S. government to use the invention for non-commercial purposes. These rights may permit the U.S. government to disclose our confidential information to third parties and to exercise march-in rights to use or to allow third parties to use our licensed technology. The U.S. government can exercise its march-in rights if it determines that action is necessary because we fail to achieve the practical application of government-funded technology, because action is necessary to alleviate health or safety needs, to meet requirements of federal regulations, or to give preference to U.S. industry. In addition, our rights in such inventions may be subject to certain requirements to manufacture products embodying such inventions in the United States. Any exercise by the U.S. government of such rights could harm our business, financial condition, results of operations and prospects.

In addition to our current inventions developed using BARDA funds, we also sometimes collaborate with academic institutions to accelerate our research or development. While it is our policy to avoid engaging our university partners in projects in which there is a risk that federal funds may be commingled, we cannot be sure that any co-developed intellectual property will be free from government rights pursuant to the Bayh-Dole Act. If, in the future, we co-own or in-license in technology which is critical to our business that is developed in whole or in part with federal funds subject to the Bayh-Dole Act, our ability to enforce or otherwise exploit patents covering such technology may be adversely affected.

If we are unable to protect the confidentiality of our trade secrets, the value of our technology could be materially adversely affected and our business could be harmed.

We rely heavily on trade secrets and confidentiality agreements to protect our unpatented know-how, technology and other proprietary information, including parts of our technology platform, and to maintain our competitive position and we expect our reliance to increase in the near term as the terms for certain of our patents expire. For example, while our patents and, if issued, our patent applications have terms that will expire through 2039, some of our U.S. patents covering the Growth Direct system and its use are expected to expire in 2024, and the corresponding foreign patents are scheduled to expire in 2022. Once these patents expire, we may have to rely more heavily on trade secrets to maintain our competitive advantage. Any disclosure, either intentional or unintentional, by our employees, consultants and vendors that we engage to perform research or manufacturing activities, or misappropriation by third parties (such as through a cybersecurity breach) of our trade secrets or proprietary information could enable competitors to duplicate or surpass our technological achievements, thus eroding our competitive position in our market. Because we expect to rely on third parties in the development and

manufacture of our products, we must, at times, share trade secrets with them. Our reliance on third parties requires us to share our trade secrets, which increases the possibility that a competitor will discover them or that our trade secrets will be misappropriated or disclosed.

Trade secrets and know-how can be difficult to protect. In addition to pursuing patents on our technology, we take steps to protect our intellectual property and proprietary technology by entering into agreements, including confidentiality agreements, non-disclosure agreements and intellectual property assignment agreements, with our employees, consultants, advisors, collaborators and customers. However, we cannot be certain that such agreements have been entered into with all relevant parties, and we cannot be certain that our trade secrets and other confidential proprietary information will not be disclosed or that competitors will not otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques. For example, any of these parties may breach the agreements and disclose our proprietary information, including our trade secrets, and we may not be able to obtain adequate remedies for such breaches. Such agreements may not be enforceable or may not provide meaningful protection for our trade secrets or other proprietary information in the event of unauthorized use or disclosure or other breaches of the agreements, and we may not be able to prevent such unauthorized disclosure, which could materially adversely impact our business and financial position. If we are required to assert our rights against such a party, it could result in significant cost and distraction.

Monitoring unauthorized disclosure is difficult, and we do not know whether the steps we have taken to prevent such disclosure are, or will be, adequate. If we were to enforce a claim that a third party had illegally obtained and was using our trade secrets, it would be expensive and time consuming, and the outcome would be unpredictable. In addition, if we choose to go to court to stop a third party from using any of our trade secrets, it may result in a public disclosure of our trade secrets and corresponding loss of rights, which could have a material adverse effect on our business. In addition, courts outside the United States may be less willing to protect trade secrets. We may need to share our proprietary information, including trade secrets, with future business partners, collaborators, contractors and others located in countries at heightened risk of theft of trade secrets, including through direct intrusion by private parties or foreign actors, and those affiliated with or controlled by state actors.

We also seek to preserve the integrity and confidentiality of our confidential proprietary information by maintaining physical security of our premises and physical and electronic security of our information technology systems, but it is possible that these security measures could be breached. If any of our confidential proprietary information were to be lawfully obtained or independently developed by a competitor or other third party, absent patent protection, we would have no right to prevent such competitor from using that technology or information to compete with us, which could harm our competitive position. If any of our trade secrets were to be disclosed to, or independently discovered by, a competitor or other third party, it could harm our business, financial condition, results of operations and prospects.

We rely on in-licenses from third parties. If we lose these rights, our business may be materially adversely affected, our ability to develop improvements to our Growth Direct platform and to develop new technologies may be negatively and substantially impacted, and if disputes arise, we may be subjected to future litigation as well as the potential loss of or limitations on our ability to develop and commercialize products and technology covered by these license agreements.

We are party to a royalty-bearing license agreement with Thermo CRS, Ltd., or Thermo Fisher, that grants us rights to exploit certain patent rights that are related to our Growth Direct platform. We may need to obtain additional licenses from others to advance our research, development and commercialization activities. These and other intellectual property license agreements that we enter into with third parties may impose various development, regulatory and/or commercial diligence obligations, payment of milestones and/or royalties and other obligations on us. Our rights to use the technology we license are subject to the continuation of and compliance with the terms of these agreements. If we fail to comply with our obligations under these agreements (including as a result of COVID-19 impacting our operations), we use the licensed intellectual property in an unauthorized manner or we are subject to bankruptcy-related proceedings, the terms of the licenses may be materially modified, such as by rendering currently exclusive licenses non-exclusive, or it may give our licensors

the right to terminate their respective agreement with us, which could limit our ability to implement our current business plan and materially adversely affect our business, financial condition, results of operations and prospects.

In some cases, we may not control the prosecution, maintenance or filing of the patents to which we hold licenses, or the enforcement of those patents against third parties. Our licensors may not successfully prosecute the patent applications to which we are licensed. Even if patents are issued in respect of these patent applications, our licensors may fail to maintain these patents, may determine not to pursue litigation against other companies that are infringing these patents, or may pursue such litigation less aggressively than we would. Without protection for the intellectual property we license, other companies might be able to offer substantially identical products for sale, which could adversely affect our competitive business position and harm our business prospects. Further, we may have limited control over these activities or any other intellectual property that may be in-licensed. For example, we cannot be certain that such activities by licensors have been or will be conducted in compliance with applicable laws and regulations or will result in valid and enforceable patents and other intellectual property rights. We may have limited control over the manner in which our licensors initiate an infringement proceeding against a third-party infringer of the intellectual property rights, or defend certain of the intellectual property that is licensed to us. It is possible that the licensors' infringement proceeding or defense activities may be less vigorous than had we conducted them ourselves. In the event our licensors fail to adequately pursue and maintain patent protection for patents and applications they control, and to timely cede control of such prosecution to us, our competitors might be able to enter the market, which would have a material adverse effect on our business.

Moreover, disputes may arise with respect to our licensing or other agreements, including:

- the scope of rights granted under the agreements and other interpretation-related issues;
- the extent to which our systems and consumables, technology and processes infringe on the intellectual property of the licensor that is not subject to the licensing agreement;
- our diligence obligations under the license agreements and what activities satisfy those diligence obligations;
- the inventorship and ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our licensors and us; and
- the priority of invention of patented technology.

In spite of our efforts to comply with our obligations under our in-license agreements, our licensors might conclude that we have materially breached our obligations under our license agreements and might therefore, terminate the relevant license agreement, thereby removing or limiting our ability to develop and commercialize products and technology covered by these license agreements. If any such in-license agreement is terminated, or if the licensed patents fail to provide the intended exclusivity, competitors or other third parties might have the freedom to market or develop products similar to ours. In addition, absent the rights granted to us under such license agreements, we may infringe the intellectual property rights that are the subject of those agreements, we may be subject to litigation by the licensor, and if such litigation by the licensor is successful we may be required to pay damages to the licensor, or we may be required to cease our development and commercialization activities that are deemed infringing, and in such event we may ultimately need to modify our activities or products to design around such infringement, which will consume time and resources and may not be ultimately successful. Any of the foregoing could have a material adverse effect on our business, financial condition, results of operations and prospects. In particular, if our license with Thermo Fischer is terminated, we may suffer the foregoing consequences with respect to our business.

In addition, our rights to certain technologies are licensed to us on a non-exclusive basis. The owners of these non-exclusively licensed technologies are therefore free to license them to third parties, including our competitors, on terms that may be superior to those offered to us, which could place us at a competitive disadvantage. Moreover, our licensors may own or control intellectual property that has not been licensed to us and, as a result, we may be subject to claims, regardless of their merit, that we are infringing or otherwise violating the licensor's rights. In addition, certain of our agreements with third parties may provide that intellectual property arising

under these agreements, such as data that could be valuable to our business, will be owned by the counterparty, in which case, we may not have adequate rights to use such data or have exclusivity with respect to the use of such data, which could result in third parties, including our competitors, being able to use such data to compete with us.

Changes in patent law in the United States and other jurisdictions could diminish the value of patents in general, thereby impairing our ability to protect our products.

Changes in either the patent laws or in interpretations of patent laws in the United States or other countries or regions may diminish the value of our intellectual property. We cannot predict the breadth of claims that may be allowed or enforced in our patents or in third party patents. We may not develop additional proprietary products, methods and technologies that are patentable.

Generally, jurisdictions outside the United States have a "first to file" patent system. In the United States, prior to March 2013, the "first to invent" a claimed invention was entitled to the patent (assuming that all other requirements were met). After March 2013, following the passage of the Leahy-Smith America Invents Act, or the America Invents Act, the United States transitioned to a "first inventor to file" system, under which the first inventor to file a patent application on an invention is entitled to the patent (assuming that all other requirements are met) even if another party was the first to invent the claimed invention. The America Invents Act also included a number of significant changes that affect the way patent applications are prosecuted and that also may affect patent litigation. These include the introduction of derivation proceedings; expansion of the permitted content of third-party submissions to the USPTO during patent prosecution; and additional procedures to challenge the validity of a patent after issuance, including post-grant review and *inter partes* review. Because of a lower evidentiary standard in USPTO proceedings compared to the evidentiary standard in United States federal courts necessary to invalidate a patent claim, a third party could potentially provide evidence in a USPTO proceeding sufficient for the USPTO to hold a claim invalid even though the same evidence would be insufficient to invalidate the claim if first presented in a district court action. Accordingly, a third party may attempt to use the USPTO procedures to invalidate our patent claims that would not have been invalidated if first challenged by the third party as a defendant in a district court action. The America Invents Act and its continued implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, all of which could have a material adverse effect on our business, financial condition, results of operations, and prospects.

In addition, the patent position of companies like us is particularly uncertain. Depending on future actions by the U.S. Congress, the U.S. courts, the USPTO and the relevant law-making bodies in other countries, the laws and regulations governing patents could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future. For example, various courts, including the United States Supreme Court have rendered decisions that affect the scope of patentability of certain inventions or discoveries. These decisions state, among other things, that a patent claim that recites an abstract idea, natural phenomenon or law of nature are not themselves patentable. Precisely what constitutes a law of nature or abstract idea is uncertain, and it is possible that certain aspects of our technology could be considered to be or apply laws of nature. Accordingly, the evolving case law in the United States may adversely affect our ability to obtain patents and may facilitate third party challenges to any owned or licensed patents.

Issued patents covering our products could be found invalid or unenforceable if challenged in court or before administrative bodies in the United States or abroad, including the USPTO.

The issuance of a patent is not conclusive as to its inventorship, scope, validity or enforceability. Some of our patents or patent applications (including licensed patents) may be challenged in opposition, derivation, reexamination, *inter partes* review, post-grant review or interference. Any successful third-party challenge to our patents in this or any other proceeding could result in the unenforceability or invalidity of such patents, which could harm our business. In addition, in patent litigation in the United States, defendant counterclaims alleging invalidity or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, for example, lack of novelty, obviousness or non-enablement. Grounds

for an unenforceability assertion could be an allegation that someone connected with prosecution of the patent withheld material information from the USPTO or the applicable foreign counterpart, or made a misleading statement, during prosecution. A litigant or the USPTO itself could challenge our patents on this basis even if we believe that we have conducted our patent prosecution in accordance with the duty of candor and in good faith. Further, with respect to challenges to the validity of our patents, there might be invalidating prior art, of which we and the patent examiner were unaware during prosecution. The outcome following legal assertions of invalidity and unenforceability during patent litigation is unpredictable. If a defendant were to prevail on a legal assertion of invalidity or unenforceability, we would lose at least part, and perhaps all, of the patent protection on certain aspects of our platform technologies. The cost of defending such a challenge, particularly in a foreign jurisdiction, and any resulting loss of patent protection could have a material adverse impact on one or more of our products and our business. In addition, if the breadth or strength of protection provided by our patents and patent applications is threatened, regardless of the outcome, it could dissuade companies from collaborating with us to license, develop or commercialize current or future products. Enforcing our intellectual property rights against third parties may also cause such third parties to file other counterclaims against us, which could be costly to defend, particularly in a foreign jurisdiction, and could require us to pay substantial damages, cease the sale of certain products or enter into a license agreement and pay royalties (which may not be possible on commercially reasonable terms or at all). Any efforts to enforce our intellectual property rights are also likely to be costly and may divert the efforts of our scientific and management personnel.

We may not be aware of all third-party intellectual property rights potentially relating to our products. Publications of discoveries often lag behind the actual discoveries, and patent applications in the United States and other jurisdictions are typically not published until approximately 18 months after filing or, in some cases, not until such patent applications issue as patents. We might not have been the first to make the inventions covered by each of our pending patent applications and we might not have been the first to file patent applications for these inventions. To determine the priority of these inventions, we may have to participate in interference proceedings, derivation proceedings or other post-grant proceedings declared by the USPTO that could result in substantial cost to us. The outcome of such proceedings is uncertain. No assurance can be given that other patent applications will not have priority over our patent applications.

If we cannot acquire or license rights to use technologies on reasonable terms, we may not be able to commercialize new products in the future.

In the future, we may identify third-party intellectual property and technology we may need to license in order to engage in our business, including to develop or commercialize new products or services, and the growth of our business may depend in part on our ability to acquire, in-license or use this technology. However, such licenses may not be available to us on acceptable terms or at all. The licensing or acquisition of third-party intellectual property rights is a competitive area, and several more established companies may pursue strategies to license or acquire third-party intellectual property rights that we may consider attractive or necessary. These established companies may have a competitive advantage over us due to their size, capital resources and greater development or commercialization capabilities. In addition, companies that perceive us to be a competitor may be unwilling to assign or license rights to us. Even if such licenses are available, we may be required to pay the licensor in return for the use of such licensor's technology, lump-sum payments, payments based on certain milestones such as sales volumes, or royalties based on sales of our platform. In addition, such licenses may be non-exclusive, which could give our competitors access to the same intellectual property licensed to us. Our business, financial condition, results of operations and prospects could be materially and adversely affected if we are unable to enter into necessary agreements on acceptable terms or at all, if any necessary licenses are subsequently terminated, if the licensors fail to abide by the terms of the licenses or fail to prevent infringement by third parties, or if the acquired or licensed patents or other rights are found to be invalid or unenforceable. Moreover, we could encounter delays in the introduction of products or services while we attempt to develop alternatives.

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

Filing, prosecuting and defending patents on our products in all countries throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the United States can be

less extensive than those in the United States. In addition, the laws of some foreign countries do not protect intellectual property rights to the same extent as the laws of the United States, and we may encounter difficulties in protecting and defending such rights in foreign jurisdictions. Consequently, we may not be able to prevent third parties from practicing our inventions in some or all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and may also export infringing products to territories where we have patent protection, but enforcement is not as strong as that in the United States. These products may compete with our products. Our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing. In addition, certain countries have compulsory licensing laws under which a patent owner may be compelled to grant licenses to other parties. Furthermore, many countries limit the enforceability of patents against other parties, including government agencies or government contractors. In these countries, the patent owner may have limited remedies, which could materially diminish the value of any patents.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of many other countries do not favor the enforcement of patents and other intellectual property protection, which could make it difficult for us to stop the misappropriation or other violations of our intellectual property rights including infringement of our patents in such countries. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial cost and divert our efforts and attention from other aspects of our business, could put our patents at risk of being invalidated or interpreted narrowly and our patent applications at risk of not issuing, and could provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate, or that are initiated against us, and the damages or other remedies awarded, if any, may not be commercially meaningful. In addition, changes in the law and legal decisions by courts in the United States and foreign countries may affect our ability to obtain adequate protection for our products, services and other technologies and the enforcement of intellectual property. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license.

We may be subject to claims that our employees, consultants or independent contractors have wrongfully used or disclosed confidential information of third parties or that our employees have wrongfully used or disclosed alleged trade secrets of their former employers.

As is common in an industry like ours, we have employed and expect to employ individuals who were previously employed at other companies, including our competitors or potential competitors. Although we try to ensure that our employees, consultants, advisors and independent contractors do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that our employees, advisors, consultants or independent contractors have inadvertently or otherwise used or disclosed intellectual property, including trade secrets or other proprietary information of their former employers or other third parties, or to claims that we have improperly used or obtained such trade secrets. Litigation may be necessary to defend against these claims. If we fail in defending such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights and face increased competition to our business. A loss of key research personnel work product could hamper or prevent our ability to commercialize potential products, which could harm our business. Even if we are successful in defending against these claims, litigation could result in substantial costs and be a distraction to management.

We may not be able to protect and enforce our trademarks and trade names, or build name recognition in our markets of interest thereby harming our competitive position.

Our trademarks or trade names may be challenged, infringed, diluted, circumvented, declared generic or determined to be infringing on other marks. We may not be able to protect our rights in these trademarks or trade names or may be forced to stop using these names, which we need for name recognition by potential partners or customers in our markets of interest. We have not yet registered certain of our trademarks in all of our potential markets. During the trademark registration process, we may receive Office Actions from the USPTO objecting to the registration of our trademarks. Although we would be given an opportunity to respond to those

objections, we may be unable to overcome such objections. In addition, at the USPTO and at comparable agencies in many foreign jurisdictions, third parties are given an opportunity to oppose pending trademark applications and/or to seek the cancellation of registered trademarks. Opposition or cancellation proceedings may be filed against our trademarks, and our trademarks may not survive such proceedings. If we are unable to obtain a registered trademark or establish name recognition based on our trademarks and trade names, we may not be able to compete effectively and our business may be adversely affected.

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

We or our licensors may be subject to claims that former employees, collaborators or other third parties have an interest in our owned or in-licensed patents, trade secrets or other intellectual property as an inventor or co-inventor. The failure to name the proper inventors on a patent application can impact the validity and enforceability of patents issuing thereon. Inventorship disputes may arise from conflicting views regarding the contributions of different individuals named as inventors, the effects of foreign laws where foreign nationals are involved in the development of the subject matter of the patent, conflicting obligations of third parties involved in developing our product candidates or as a result of questions regarding co-ownership of potential joint inventions. Litigation may be necessary to defend against these and other claims challenging inventorship of our or our licensors' ownership of our owned or in-licensed patents, trade secrets or other intellectual property. Alternatively, or additionally, we may enter into agreements to clarify the scope of our rights in such intellectual property. If we or our licensors fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights, such as exclusive ownership of, or right to use, intellectual property that is important to our products. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management and other employees, and certain customers or partners may defer engaging with us until the particular dispute is resolved. Any of the foregoing could have a material adverse effect on our business, financial condition, results of operations and prospects.

In addition, while it is our policy to require our employees and contractors who may be involved in the conception or development of intellectual property to execute agreements assigning such intellectual property to us, we may be unsuccessful in executing such an agreement with each party who, in fact, conceives or develops intellectual property that we regard as our own. The assignment of intellectual property rights may not be self-executing, or the assignment agreements may be breached, and we may be forced to bring claims against third parties, or defend claims that they may bring against us, to determine the ownership of what we regard as our intellectual property. Any of the foregoing could harm our business, financial condition, results of operations and prospects.

We may be involved in litigation claiming that we have infringed on a third party's intellectual property, which could be time consuming and costly and may adversely affect our business, financial condition, results of operations and prospects.

In recent years, there has been significant litigation involving intellectual property rights. We may be involved with litigation or actions at the USPTO or foreign patent offices with various third parties that claim we or our collaborators or customers using our solutions and services have misappropriated or misused other parties' intellectual property rights. We expect that the number of such claims may increase as the number of our products grows, we expand our market share and the level of competition in our markets increases. Any infringement claim, regardless of its validity, could harm our business by, among other things, resulting in time consuming and costly litigation, diverting management's time and attention from the development of the business, requiring the payment of monetary damages (including treble damages, attorneys' fees, costs and expenses) or royalty payments, or result in potential or existing customers delaying purchases of our products or entering into engagements with us pending resolution of the dispute.

As we move into new markets and applications for our platform, incumbent participants in such markets may assert their patents and other proprietary rights against us as a means of slowing our entry into such markets or as a means to extract substantial license and royalty payments from us. Our competitors and others have significantly larger and more mature patent portfolios than we currently have. In addition, future litigation may involve patent holding companies or other adverse patent owners who have no relevant product or service revenue

and against whom our own patents may provide little or no deterrence or protection. Therefore, our commercial success may depend in part on our non-infringement of the patents or proprietary rights of third parties, or the invalidity of such patents or proprietary rights.

Our research, development and commercialization activities may in the future be subject to claims that we infringe or otherwise violate patents or other intellectual property rights owned or controlled by third parties. There is a substantial amount of litigation and other patent challenges, both within and outside the United States, involving patent and other intellectual property rights, including patent infringement lawsuits, interferences, oppositions and *inter partes* review proceedings before the USPTO, and corresponding foreign patent offices. Numerous U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we are developing products. As the automated MQC testing industry expands and more patents are issued, the risk increases that our products may be subject to claims of infringement of the patent rights of third parties. Numerous significant intellectual property issues have been litigated, are being litigated and will likely continue to be litigated, between existing and new participants in our existing and targeted markets, and one or more third parties may assert that our products or services infringe their intellectual property rights as part of a business strategy to impede our successful entry into or growth in those markets.

Third parties may assert that we are employing their proprietary technology without authorization. Because patent applications can take many years to issue, there may be currently pending patent applications which may later result in issued patents that our current or future products and services may infringe. In addition, similar to what other companies in our industry have experienced, we are aware of a patent, and there may be patents of which we are not aware or that are issued in future, that may cover our platform or its components. Additionally, pending patent applications that have been published can, subject to certain limitations, be later amended in a manner that could cover our platform or its components. Under the applicable law of certain jurisdictions, the scope of a patent claim is determined by an interpretation of the law, the written disclosure in a patent and the patent's prosecution history. Our interpretation of the relevance or the scope of a patent or a pending application may be incorrect, which may negatively impact our ability to market our products. We may incorrectly determine that our products are not covered by a third-party patent or may incorrectly predict whether a third party's pending application will issue with claims of relevant scope. Our determination of the expiration date of any patent in the United States or abroad that we consider relevant may be incorrect, which may negatively impact our ability to develop and market our products.

There can be no assurance that we will prevail in any suit initiated against us by third parties, successfully settle or otherwise resolve patent infringement claims. Third parties making claims against us may be able to obtain injunctive or other relief, which could block our ability to develop, commercialize and sell products or services, and could result in the award of substantial damages against us, including treble damages, attorneys' fees, costs and expenses, if we are found to have willfully infringed. In the event of a successful claim of infringement against us, we may be required to pay damages and ongoing royalties, and obtain one or more licenses from third parties, or be prohibited from selling certain products or services. We may not be able to obtain these licenses on acceptable or commercially reasonable terms, if at all, or these licenses may be non-exclusive, which could result in our competitors gaining access to the same intellectual property. In addition, we could encounter delays and incur significant costs, in product or service introductions while we attempt to develop alternative products or services, or redesign our products or services, to avoid infringing third party patents or proprietary rights. Defense of any lawsuit or failure to obtain any of these licenses or to develop a workaround could prevent us from commercializing products or services, and the prohibition of sale or the threat of the prohibition of sale of any of our products or services could materially affect our business and our ability to gain market acceptance for our products or services. Some of our competitors may be able to sustain the costs of complex patent litigation more effectively than we can because they have substantially greater resources. Further, even if we were successful in defending against a lawsuit, such a defense would distract our management team from our operations, which could have an adverse effect on our business. In addition, any uncertainties resulting from the initiation and continuation of any litigation could have a material adverse effect on our ability to raise the funds necessary to continue our operations or could otherwise have a material adverse effect on our business, results of operations, financial condition and prospects. Furthermore, because of the substantial amount of discovery required in

connection with intellectual property litigation or other legal proceedings relating to our intellectual property rights, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation or other proceedings.

In addition, our agreements with some of our customers, suppliers or other entities with whom we do business require us to defend or indemnify these parties to the extent they become involved in infringement claims, including the types of claims described above. We could also voluntarily agree to defend or indemnify third parties in instances where we are not obligated to do so if we determine it would be important to our business relationships. If we are required or agree to defend or indemnify third parties in connection with any infringement claims, we could incur significant costs and expenses that could adversely affect our business, financial condition, results of operations and prospects.

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

Third parties, including our competitors, could be infringing, misappropriating or otherwise violating our intellectual property rights. Monitoring unauthorized use of our intellectual property is difficult and costly. From time to time, we seek to analyze our competitors' products and services, and may in the future seek to enforce our rights against potential infringement, misappropriation or violation of our intellectual property. However, the steps we have taken to protect our proprietary rights may not be adequate to enforce our rights against such infringement, misappropriation or violation of our intellectual property. We may not be able to detect unauthorized use of, or take appropriate steps to enforce, our intellectual property rights. Any inability to meaningfully enforce our intellectual property rights could harm our ability to compete and reduce demand for our products and services.

Litigation may be necessary for us to enforce our patent and proprietary rights or to determine the scope, coverage and validity of the proprietary rights of others. If we do not prevail in such legal proceedings, we may be required to pay damages, we may lose significant intellectual property protection for our products or services, such that competitors could copy our products or services and we could be forced to cease commercialization of certain of our products or services. Even if resolved in our favor, any award of monetary damages or other remedy we receive may not be commercially valuable.

Any litigation that may be necessary in the future could result in substantial costs and diversion of resources and could have a material adverse effect on our business, financial condition, results of operations and prospects. In any lawsuit we bring to enforce our intellectual property rights, a court may refuse to the stop the other party from using the technology at issue on grounds that our intellectual property rights do not cover the technology in question. Further, in such proceedings, the defendant could counterclaim that our intellectual property is invalid or unenforceable and the court may agree, in which case we could lose valuable intellectual property rights. The outcome in any such lawsuits are unpredictable. Even if we do prevail in any future litigation related to intellectual property rights, the cost and time requirements of the litigation could negatively impact our financial results. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their greater financial resources. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could compromise our ability to compete in the marketplace.

Intellectual property litigation may lead to unfavorable publicity that harms our reputation and causes the market price of our Class A common stock to decline.

During the course of any intellectual property litigation, there could be public announcements of the initiation of the litigation as well as results of hearings, rulings on motions and other interim proceedings in the litigation. If securities analysts or investors regard these announcements as negative, the perceived value of our existing products, programs or intellectual property could be diminished.

Accordingly, the market price of shares of our Class A common stock may decline. Such announcements could also harm our reputation or the market for our future products, which could have a material adverse effect on our business.

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

Periodic maintenance fees, renewal fees, annuity fees and various other governmental fees on patents and/or applications will be due to be paid to the USPTO and various governmental patent agencies outside of the United States at several stages over the lifetime of the patents and/or applications. We have systems in place to remind us to pay these fees, and we rely on our outside counsel using an outside service to pay these fees due to non-U.S. patent agencies. The USPTO and various non-U.S. governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. In many cases, an inadvertent lapse, including due to the effect of the COVID-19 pandemic on us or our vendors, can be cured by payment of a late fee or by other means in accordance with the applicable rules. However, there are situations in which non-compliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, our competitors may be able to enter the market without infringing our patents and this circumstance would have a material adverse effect on our business.

Our use of open-source software could compromise our ability to offer our services and subject us to possible litigation.

We use open-source software licensed to us by third-party authors under “open source” licenses in connection with our products and services. Use and distribution of open-source software may entail greater risks than use of third-party commercial software, as open-source licensors generally do not provide support, warranties, indemnification or other contractual protections regarding infringement claims or the quality of the code.

Further, some open-source software licenses require users who distribute software containing open-source software to publicly disclose all or part of the source code to the licensee’s software that incorporates, links or uses such open-source software, and make available to third parties for no cost, any derivative works of the open source code created by the licensee, which could include the licensee’s own valuable proprietary code. While we monitor our use of open-source software and try to ensure that none is used in a manner that would require us to disclose our proprietary source code or that would otherwise breach the terms of an open source agreement, such use could inadvertently occur, or could be claimed to have occurred, in part because open source license terms are often ambiguous. Despite our efforts to monitor our use of open-source software to avoid subjecting our platform to conditions we do not intend, there is a risk that open source licenses could be construed in a way that could impose unanticipated conditions or restrictions on our ability to provide or distribute our platform. Additionally, we may from time to time face claims from third parties claiming ownership of, or seeking to enforce the terms of, an open source license, including by demanding release of source code for the open-source software, derivative works or our proprietary source code that was developed using, or that is distributed with, such open-source software. These claims could also result in litigation and could require us to make our proprietary software source code freely available, require us to devote additional research and development resources to change re-engineer our platform, seek costly licenses from third parties or otherwise incur additional costs and expenses, any of which could result in reputational harm and would have a negative effect on our business and operating results. There is little legal precedent in this area and any actual or claimed requirement to disclose our proprietary source code or pay damages for breach of contract could harm our business and could help third parties, including our competitors, develop products and services that are similar to or better than ours.

In addition, if the license terms for the open-source software we utilize change, we may be forced to re-engineer our platform, incur additional costs to comply with the changed license terms or replace the affected open-source software. Although we have implemented policies to regulate the use and incorporation of open-source software into our platform and solutions, we cannot be certain that that such policies will be effective and that we have not incorporated open-source software in our platform and solutions in a manner that is inconsistent with such policies.

Risks related to our common stock and this offering

An active trading market for our Class A common stock may not develop.

Prior to this offering, there has been no public market for our Class A common stock. The initial public offering price for our Class A common stock was determined through negotiations with the underwriters. Although our Class A common stock has been approved for listing on The Nasdaq Global Select Market, an active trading market for our shares may never develop or be sustained following this offering. If an active market for our Class A common stock does not develop, it may be difficult for you to sell shares you purchase in this offering without depressing the market price for the shares, or at all. Further, an inactive market may also impair our ability to raise capital by selling shares of our Class A common stock and may impair our ability to enter into strategic collaborations or acquire companies or products by using our shares of Class A common stock as consideration.

The market price of our Class A common stock may be volatile and fluctuate substantially, which could result in substantial losses for purchasers of our Class A common stock in this offering.

Our stock price is likely to be volatile. The stock market in general and the market for smaller technology companies in particular has experienced extreme volatility that has often been unrelated to the operating performance of particular companies. As a result of this volatility, you may not be able to sell your Class A common stock at or above the initial public offering price. The market price for our Class A common stock may be influenced by many factors, including:

- actual or anticipated fluctuations in our financial condition and operating results, including fluctuations in our quarterly and annual results;
- the introduction of new products or product enhancements by us or others in our industry;
- variances in product and system reliability;
- overall conditions in our industry and the markets in which we operate;
- disputes or other developments with respect to our or others' intellectual property rights;
- actual or anticipated changes in our operating results or growth rate as a result of our competitors' operating results;
- our ability to develop and market new and enhanced products and expand into new markets on a timely basis;
- fluctuations in the valuation of companies perceived by investors to be comparable to us;
- product liability claims or other litigation;
- announcement or expectation of additional financing effort;
- sales of our common stock by us or our stockholders;
- share price and volume fluctuations attributable to inconsistent trading volume levels of our shares;
- media exposure of our products or of those of others in our industry;
- changes in earnings estimates or recommendations by securities analysts;
- general market conditions and other factors, including factors unrelated to our operating performance or the operating performance of our competitors; and
- the other factors described in this "Risk Factors" section and elsewhere in this prospectus.

After this offering, our executive officers, directors and principal stockholders, if they choose to act together, will continue to have the ability to control all matters submitted to stockholders for approval.

Upon the closing of this offering, based on the number of shares of Class A common stock outstanding as of June 30, 2021, our executive officers, directors and stockholders who owned more than 5% of our outstanding

common stock before this offering and their respective affiliates will, in the aggregate, hold shares representing approximately 72.03% of our outstanding voting stock (assuming no exercise of the underwriters' option to purchase additional shares and no conversion of our non-voting Class B common stock into Class A common stock). This percentage may change depending on any conversion of shares of our non-voting Class B common stock into shares of Class A common stock. The holders of shares of our Class B common stock have the ability to convert any portion of their Class B common stock into Class A common stock. Our Class B common stock cannot be converted if, immediately following such conversion, the holder would beneficially own more than 4.9% of the issued and outstanding Class A common stock. Due to this conversion right, holders of our Class B common stock could, at any time, increase their voting control of us. As a result of their combined voting power, if our executive officers, directors and stockholders who own more than 5% of our outstanding common stock choose to act together, they would be able to control all matters submitted to our stockholders for approval, as well as our management and affairs. For example, these persons, if they choose to act together, would control the election of directors, the composition of our management and approval of any merger, consolidation or sale of all or substantially all of our assets.

The dual class structure of our common stock and the option of the holders of shares of our Class B common stock to convert into shares of our Class A common stock may limit your ability to influence corporate matters.

Our Class A common stock, which is the stock we are offering in this initial public offering, has one vote per share, while our Class B common stock is non-voting. Nonetheless, each share of our Class B common stock may be converted at any time into one share of issued and outstanding Class A common stock at the option of its holder, subject to the limitations provided for in our restated certificate of incorporation that prohibit the conversion of our Class B common stock into shares of Class A common stock to the extent that, upon such conversion, such holder would beneficially own in excess of 4.9% of our Class A common stock. Consequently, if holders of Class B common stock following this offering exercise their option to make this conversion, such exercise will have the effect of increasing the relative voting power of those prior holders of our Class B common stock (subject to the ownership limitation described in the previous sentence) and increasing the number of outstanding shares of our voting common stock, and correspondingly decreasing the relative voting power of the current holders of our Class A common stock, which may limit your ability to influence corporate matters.

If you purchase shares of Class A common stock in this offering, you will suffer immediate dilution of your investment.

The initial public offering price of our Class A common stock is substantially higher than the net tangible book value per share of our common stock. Therefore, if you purchase shares of our Class A common stock in this offering, you will pay a price per share that substantially exceeds our net tangible book value per share after this offering. To the extent shares subsequently are issued under outstanding options or warrants, you will incur further dilution. Based on the initial public offering price of $20.00 per share, you will experience immediate dilution of $13.94 per share as of March 31, 2021, representing the difference between our pro forma as adjusted net tangible book value per share, after giving effect to this offering. In addition, purchasers of Class A common stock in this offering will have contributed 30.4% of the aggregate price paid by all purchasers of our stock but will own only 19.8% of our common stock outstanding after this offering.

We have broad discretion in the use of the net proceeds from this offering and may not use them effectively.

Our management will have broad discretion in the application of the net proceeds from this offering and could spend the proceeds in ways that do not improve our results of operations or enhance the value of our common stock. We expect that we will use the net proceeds from this offering, together with our existing cash and cash equivalents and short-term investments to expand our commercial resources and capabilities, for research and development, to expand our operations globally, and for working capital and other general corporate purposes as set forth under the section titled "Use of Proceeds." However, our actual use of these proceeds may differ substantially from our current plans. The failure by our management to apply these funds effectively could result in financial losses that could have a material adverse effect on our business, cause the price of our Class A

common stock to decline and delay the development of our product candidates. Pending their use, we may invest the net proceeds from this offering in a manner that does not produce income or that loses value.

A significant portion of our total outstanding shares are eligible to be sold into the market in the near future, which could cause the market price of our Class A common stock to drop significantly, even if our business is doing well.

Sales of a substantial number of shares of our Class A common stock in the public market, or the perception in the market that the holders of a large number of shares intend to sell shares, could reduce the market price of our Class A common stock.

After this offering, we will have 39,990,611 outstanding shares of Class A common stock and Class B common stock, collectively, based on the number of shares outstanding as of June 30, 2021. This includes the shares that we are selling in this offering, which may be resold in the public market immediately without restriction, unless purchased by our affiliates. The remaining shares are currently restricted as a result of applicable securities laws or lock-up agreements and will become eligible to be sold at various times beginning 180 days after this offering, unless held by one of our affiliates, in which case the resale of those securities will be subject to certain restrictions under the Securities Act of 1933, as amended, and the rules and regulations promulgated thereunder. Moreover, pursuant to an investors' rights agreement entered into with certain of our stockholders, after this offering, holders of an aggregate of 31,524,913 shares of our Class A common stock (including shares issuable upon conversion of our Class B common stock) will have rights, subject to specified conditions, to require us to file registration statements covering their shares or to include their shares in registration statements that we may file for ourselves or other stockholders, until the rights terminate. We also intend to register all shares of Class A common stock that we may issue under our equity compensation plans. Once we register these shares, they can be freely sold in the public market upon issuance, subject to limitations applicable to affiliates and the lock-up agreements described in the "Underwriting" section of this prospectus.

We are an "emerging growth company," and the reduced disclosure requirements applicable to emerging growth companies may make our Class A common stock less attractive to investors.

We are an "emerging growth company," as defined in the JOBS Act, and may remain an emerging growth company until the last day of the fiscal year following the fifth anniversary of the closing of this offering. However, if certain events occur prior to the end of such five-year period, including if we become a "large accelerated filer," our annual gross revenues exceed $1.07 billion or we issue more than $1.0 billion of non-convertible debt in the previous three-year period, we will cease to be an emerging growth company prior to the end of such five-year period. For so long as we remain an emerging growth company, we are permitted and intend to rely on exemptions from certain disclosure requirements that are applicable to other public companies that are not emerging growth companies. These exemptions include:

- being permitted to provide only two years of audited financial statements, in addition to any required unaudited interim financial statements, with correspondingly reduced "Management's Discussion and Analysis of Financial Condition and Results of Operations" disclosure in this prospectus;
- not being required to comply with the auditor attestation requirements in the assessment of our internal control over financial reporting;
- reduced disclosure obligations regarding executive compensation;
- exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved and from providing the pay ratio between our Chief Executive Officer and employees; and
- an exemption from compliance with the requirements of the Public Company Accounting Oversight Board regarding the communication of critical audit matters in the auditor's report on the financial statements.

We have taken advantage of reduced reporting requirements in this prospectus. In particular, in this prospectus, we have provided only two years of audited financial statements and have not included all of the executive

compensation related information that would be required if we were not an emerging growth company. We cannot predict whether investors will find our Class A common stock less attractive if we rely on these exemptions. If some investors find our Class A common stock less attractive as a result, there may be a less active trading market for our Class A common stock and our stock price may be reduced or more volatile. In addition, the JOBS Act provides that an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. This allows an emerging growth company to delay the adoption of these accounting standards until they would otherwise apply to private companies. We intend to utilize the extended transition period and, as a result, we will not be required to comply with new or revised accounting standards on the same time line as other public companies.

We are a "smaller reporting company" and the reduced disclosure requirements applicable to smaller reporting companies may make our Class A common stock less attractive to investors.

We are a "smaller reporting company" and are therefore entitled to rely on certain reduced disclosure requirements for as long as we remain a smaller reporting company, such as reduced disclosure requirements for executive compensation. This reduced disclosure in our Securities and Exchange Commission, or SEC, filings due to our status as a smaller reporting company may make it harder for investors to analyze our results of operations and financial prospects. We cannot predict if investors will find our Class A common stock less attractive because we may rely on these exemptions. If some investors find our Class A common stock less attractive as a result, there may be a less active trading market for our Class A common stock and our stock prices may be more volatile.

If we fail to maintain effective internal control over financial reporting and effective disclosure controls and procedures, we may not be able to accurately report our financial results in a timely manner or prevent fraud, which may adversely affect investor confidence in our company.

We are not currently required to comply with the rules of the SEC implementing Section 404 of the Sarbanes-Oxley Act, or Section 404, and, therefore, we are not required to make a formal assessment of the effectiveness of our internal control over financial reporting. Upon becoming a public company, we will be required to comply with the SEC's rules implementing Sections 302 and 404 of the Sarbanes-Oxley Act, which require management to certify financial and other information in our quarterly and annual reports and provide an annual management report on the effectiveness of controls over financial reporting. Although we will be required to disclose changes made in our internal controls and procedures on a quarterly basis, we are not required to make our first annual assessment of our internal control over financial reporting pursuant to Section 404 until the year following our first annual report required to be filed with the SEC. As an emerging growth company, our independent registered public accounting firm will not be required to attest to the effectiveness of our internal control over financial reporting pursuant to Section 404 until the later of the year following our first annual report required to be filed with the SEC or the date we are no longer an emerging growth company and a "non-accelerated filer." At such time, our independent registered public accounting firm may issue a report that is adverse in the event material weaknesses have been identified in our internal control over financial reporting.

To comply with the requirements of being a public company, we will need to undertake actions, such as implementing new internal controls and procedures and hiring additional accounting or internal audit staff. Testing and maintaining internal control can divert our management's attention from other matters that are important to the operation of our business. In addition, when evaluating our internal control over financial reporting, we may identify material weaknesses that we may not be able to remediate in time to meet the applicable deadline imposed upon us for compliance with the requirements of Section 404. If we identify any material weaknesses in our internal control over financial reporting or we are unable to comply with the requirements of Section 404 in a timely manner or assert that our internal control over financial reporting is effective, investors may lose confidence in the accuracy and completeness of our financial reports. As a result, the market price of our Class A common stock could be materially adversely affected.

Our disclosure controls and procedures may not prevent or detect all errors or acts of fraud.

Upon the closing of this offering, we will become subject to the periodic reporting requirements of the Exchange Act. We are continuing to refine our disclosure controls and procedures to provide reasonable assurance that

information we must disclose in reports we file or submit under the Exchange Act is accumulated and communicated to management, and recorded, processed, summarized and reported within the time periods specified in the rules and forms of the SEC. We believe that any disclosure controls and procedures, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met.

These inherent limitations include the realities that judgments in decision-making can be faulty, and that breakdowns can occur because of simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people or by an unauthorized override of the controls. Accordingly, because of the inherent limitations in our control system, misstatements due to error or fraud may occur and not be detected, which could have a material adverse effect on investors' confidence in our reporting and the price of our Class A 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, which will become effective upon the closing of this offering 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 you might otherwise receive a premium for your 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.

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 restated certificate of incorporation designates specific courts as the exclusive forum for certain litigation that may be initiated by our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us.

Our restated certificate of incorporation, which will become effective upon the closing of this offering, specifies that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for most legal actions involving claims brought against us by stockholders; provided that, the exclusive forum provision will not apply to suits brought to enforce any liability or duty created by the Securities Act, the Exchange Act, the rules and regulations thereunder or any other claim for which the federal courts have exclusive jurisdiction; and provided further that, if and only if the Court of Chancery of the State of Delaware dismisses any such action for lack of subject matter jurisdiction, such action may be brought in another state or federal court sitting in the State of Delaware. Our restated certificate of incorporation further provides that, unless we consent in writing to the selection of an alternative forum, the federal district courts of the United States of America shall, to the fullest extent permitted by law, be the sole and exclusive forum for the resolution of any complaint asserting a cause of action arising under the Securities Act. Any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock shall be deemed to have notice of and to have consented to the provisions of our restated certificate of incorporation described above.

We believe these provisions benefit us by providing increased consistency in the application of Delaware law by chancellors particularly experienced in resolving corporate disputes and in the application of the Securities Act by federal judges, as applicable, efficient administration of cases on a more expedited schedule relative to other forums and protection against the burdens of multi-forum litigation. However, the provision may have the effect of discouraging lawsuits against our directors, officers, employees and agents as it may limit any stockholder's ability to bring a claim in a judicial forum that such stockholder finds favorable for disputes with us or our directors, officers, employees or agents. The enforceability of similar choice of forum provisions in other companies' certificates of incorporation has been challenged in legal proceedings, and it is possible that, in connection with any applicable action brought against us, a court could find the choice of forum provisions contained in our restated certificate of incorporation to be inapplicable or unenforceable in such action. If a court were to find the choice of forum provision contained in our restated certificate of incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could adversely affect our business, financial condition or results of operations.

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

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

Our ability to use our net operating losses and research and development tax credits to offset future taxable income or income tax liabilities may be subject to certain limitations.

As of December 31, 2020, we had U.S. federal and state net operating loss carryforwards, or NOLs, of $212.5 million and $106.7 million, respectively, which may be available to offset future taxable income, if any, that begin to expire in 2027 and 2025, respectively. Additionally, we had federal NOLs of $78.2 million which do not expire but are (for taxable years beginning after December 31, 2020) generally limited in their usage to an annual deduction equal to 80% of taxable income. In addition, we had federal and state research and development tax credits of $3.1 million and $2.0 million, respectively, which may be available to offset future tax liabilities and begin to expire in 2028 and 2024, respectively. In general, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, or the Code, a corporation that undergoes an "ownership change," generally defined as a greater than 50 percentage point change by value in its equity ownership by one or more stockholders or groups of stockholders owning at least 5% of the corporation's stock over a rolling three-year period, is subject to limitations on its ability to utilize its pre-ownership change NOLs and tax credits to offset future taxable income or income tax liabilities for U.S. federal income tax purposes. Similar rules may apply under state tax laws. Our existing NOLs and tax credits may be subject to limitations arising from previous ownership changes. Future changes in our stock ownership, including as a result of this offering, some of which might be beyond our control, could result in ownership changes. For these reasons, we may not be able to utilize a material portion of the NOLs and tax credits even if we attain profitability.

General risk factors

Changes in tax laws, including as a result of the 2020 United States presidential and congressional elections, may impact our future financial position and results of operations.

New income, sales, use or other tax laws, statutes, rules, regulations or ordinances could be enacted at any time, or interpreted, changed, modified or applied adversely to us, any of which could adversely affect our business operations and financial performance. In particular, the recent presidential and congressional elections in the United States could result in significant changes in, and uncertainty with respect to, tax legislation, regulation and government policy directly affecting our business or indirectly affecting us because of impacts on our customers and suppliers. For example, the United States government may enact significant changes to the taxation of business entities including, among others, a permanent increase in the corporate income tax rate, an increase in the tax rate applicable to the global intangible low-taxed income and elimination of certain exemptions, and the imposition of minimum taxes or surtaxes on certain types of income. The likelihood of these changes being enacted or implemented is unclear. We are currently unable to predict whether such changes will occur and, if so, the ultimate impact on our business. To the extent that such changes have a negative impact on us, our suppliers or our customers, including as a result of related uncertainty, these changes may materially and adversely impact our business, financial condition, results of operations and cash flows.

If securities or industry analysts do not publish research or reports about our business, or if they issue an adverse or misleading opinion regarding our stock, our stock price and trading volume could decline, even if our business is doing well.

The trading market for our Class A common stock will be influenced by the research and reports that industry or securities analysts publish about us or our business. We do not currently have, and may never obtain, research coverage by securities and industry analysts. If no or few securities or industry analysts commence coverage of us, the trading price for our stock would be negatively impacted. In the event we obtain securities or industry analyst coverage, if the analysts who cover us issue an adverse or misleading opinion regarding us, our business model, or our stock performance, or if our product development or marketing and sales results fail to meet the expectations of analysts, our stock price would likely decline. If one or more of these analysts ceases coverage of us or fails to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline.

If our estimates or judgments relating to our critical accounting policies are based on assumptions that change or prove to be incorrect, our operating results could fall below our publicly announced guidance or the expectations of securities analysts and investors, resulting in a decline in the market price of our Class A common stock.

The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the amounts reported in our consolidated financial statements and accompanying notes. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets, liabilities, equity, revenue and expenses that are not readily apparent from other sources. If our assumptions change or if actual circumstances differ from our assumptions, our operating results may be adversely affected and could fall below our publicly announced guidance or the expectations of securities analysts and investors, resulting in a decline in the market price of our Class A common stock.

We could be subject to securities class action litigation.

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

We will incur increased costs as a result of operating as a public company, and our management will be required to devote substantial time to new compliance initiatives and corporate governance practices.

As a public company, and particularly after we are no longer an emerging growth company and a non-accelerated filer, we will incur significant legal, accounting and other expenses that we did not incur as a private company. The Sarbanes-Oxley Act of 2002, the Dodd-Frank Wall Street Reform and Consumer Protection Act, the listing requirements of The Nasdaq Global Select Market and other applicable securities rules and regulations impose various requirements on public companies, including establishment and maintenance of effective disclosure and financial controls and corporate governance practices. Our management and other personnel will need to devote a substantial amount of time to these compliance initiatives. Moreover, these rules and regulations will increase our legal and financial compliance costs and will make some activities more time consuming and costly. For example, we expect that these rules and regulations may make it more difficult and more expensive for us to obtain director and officer liability insurance, which in turn could make it more difficult for us to attract and retain qualified members of our board of directors.

We are evaluating these rules and regulations and cannot predict or estimate the amount of additional costs we may incur or the timing of such costs. These rules and regulations are often subject to varying interpretations, in many cases due to their lack of specificity, and, as a result, their application in practice may evolve over time as new guidance is provided by regulatory and governing bodies. This could result in continuing uncertainty regarding compliance matters and higher costs necessitated by ongoing revisions to disclosure and governance practices.

Special note regarding forward-looking statements

This prospectus contains forward-looking statements. All statements other than statements of historical facts contained in this prospectus, including statements regarding our future results of operations and financial position, business strategy, prospective products, product approvals, research and development costs, future revenue, timing and likelihood of success, plans and objectives of management for future operations, future results of anticipated products and prospects, plans and objectives of management, are forward-looking statements. These 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.

In some cases, you can identify forward-looking statements by terms such as “may,” “will,” “should,” “expect,” “plan,” “anticipate,” “could,” “intend,” “target,” “project,” “contemplate,” “believe,” “estimate,” “predict,” “potential,” “would” or “continue” or the negative of these terms or other similar expressions, although not all forward-looking statements contain these words. The forward-looking statements in this prospectus are only predictions and are based 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. These forward-looking statements speak only as of the date of this prospectus and are subject to a number of known and unknown risks, uncertainties and assumptions, including those described under the sections in this prospectus entitled “Risk Factors” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and elsewhere in this prospectus. Because forward-looking statements are inherently subject to risks and uncertainties, some of which cannot be predicted or quantified and some of which are beyond our control, you should not rely on these forward-looking statements as predictions of future events. The events and circumstances reflected in our forward-looking statements may not be achieved or occur and actual results could differ materially from those projected in the forward-looking statements. Moreover, we operate in an evolving environment. New risk factors and uncertainties may emerge from time to time, and it is not possible for management to predict all risk factors and uncertainties. Except as required by applicable law, we do not plan to publicly update or revise any forward-looking statements contained herein, whether as a result of any new information, future events, changed circumstances or otherwise. The forward-looking statements contained in this prospectus are excluded from the safe harbor protection provided by the Private Securities Litigation Reform Act of 1995 and Section 27A of the Securities Act of 1933, as amended.

Market and industry data

We obtained the industry, market and competitive position data in this prospectus from our own internal estimates and research as well as from industry and general publications and research, surveys and studies conducted by third parties. Industry publications, studies and surveys generally state that they have been obtained from sources believed to be reliable, although they do not guarantee the accuracy or completeness of suchinformation. Management’s estimates are derived from publicly available information, their knowledge of our industry and their assumptions based on such information and knowledge, which we believe to be reasonable. This data involves a number of assumptions and limitations which are necessarily subject to a high degree of uncertainty and risk due to a variety of factors, including those described in “Risk Factors.” These and other factors could cause our future performance to differ materially from our assumptions and estimates.

Use of proceeds

We estimate that the net proceeds to us from our issuance and sale of shares of our Class A common stock in this offering will be approximately $143.6 million at an initial public offering price of $20.00 per share, and after deducting the underwriting discounts and commissions and estimated offering expenses payable by us. If the underwriters' option to purchase additional shares from us is exercised in full, we estimate that our net proceeds will be approximately $165.7 million.

We anticipate that we will use the net proceeds of this offering, together with our existing cash and cash equivalents, for the following purposes:

- approximately $30 million to $35 million for the expansion of our commercial resources and capabilities, including sales and marketing;
- approximately $20 million to $25 million for research and development of our current products and new products, including the exploitation of new pipeline opportunities;
- approximately $15 million to $20 million to expand our operations globally; and
- the remainder for working capital and other general corporate purposes.

This expected use of the net proceeds from this offering represents our intentions based upon our current plans and business conditions, which could change in the future as our plans and business conditions evolve. We may also use a portion of the net proceeds to in-license, acquire, or invest in additional businesses, technologies, products or assets, although currently we have no specific agreements, commitments or understandings in this regard. As of the date of this prospectus, we cannot predict with certainty the specific allocations or all of the particular uses for the net proceeds to be received upon completion of this offering or the amounts that we will actually spend on the uses set forth above. Predicting the cost necessary to develop products can be difficult and we anticipate that we will need additional funds to complete the development of any product. The amounts and timing of our actual expenditures and the extent of development may vary significantly depending on numerous factors, including the growth of the market for automated MQC testing, the progress of our development and commercialization efforts, the timing and costs associated with the manufacture and supply of our products, as well as any collaborations that we may enter into with third parties for our products and any unforeseen cash needs As a result, our management will retain broad discretion in the application and specific allocations of the net proceeds from this offering.

Based on our planned use of the net proceeds from this offering and our existing cash and cash equivalents and short-term investments, we estimate that such funds will be sufficient to enable us to fund our operating expenses and capital expenditure requirements through at least 2023. We have based this estimate on assumptions that may prove to be incorrect, and we could use our available capital resources sooner than we currently expect. We may satisfy our future cash needs through the sale of equity securities and debt financings, or a combination of one or more of these sources.

Pending our use of the net proceeds from this offering, we intend to invest the net proceeds in a variety of capital preservation investments, including short-term and intermediate-term, investment-grade, interest-bearing instruments and U.S. government securities.

Dividend policy

We have never declared or paid any cash dividends on our capital stock. We currently intend to retain all available funds and future earnings, if any, for the operation and expansion of our business and do not anticipate declaring or paying any dividends in the foreseeable future. Any future determination related to our dividend policy will be made at the discretion of our board of directors after considering our financial condition, results of operations, capital requirements, contractual requirements, business prospects and other factors the board of directors deems relevant, and subject to the restrictions contained in any future financing instruments. In addition, our ability to pay cash dividends is currently restricted by the terms of the loan and security agreement governing our term loan facility.

Capitalization

The following table sets forth our cash and cash equivalents and capitalization as of March 31, 2021, as follows:

- on an actual basis;
- on a pro forma basis to reflect:
  - the automatic conversion of all outstanding shares of our Series A1, B1, C1 and D1 preferred stock into 24,200,920 shares of Class A common stock upon the closing of this offering;
  - the automatic conversion of all outstanding shares of our Series C2 and D2 preferred stock into 6,903,379 shares of Class B common stock upon the closing of this offering;
  - all warrants to purchase redeemable convertible preferred stock becoming warrants to purchase Class A common stock;
  - the filing and effectiveness of our current certificate of incorporation effecting a reclassification of our then outstanding common stock to Class A common stock and authorizing our Class B common stock and the issuance to ABG WTT of 11,437,301 shares of Series C2 preferred stock in exchange for an equal number of shares of Series C1 preferred stock and to Ally Bridge MedAlpha of 2,364,509 shares of Series D2 preferred stock in exchange for an equal number of shares of Series D1 preferred stock pursuant to an exchange agreement, in each case, in June 2021; and
  - the filing and effectiveness of our restated certificate of incorporation which will occur upon the closing of this offering.
- on a pro forma as adjusted basis to give further effect to (i) the pro forma adjustments described above and (ii) our issuance and sale of 7,920,000 shares of Class A common stock in this offering at an initial public offering price of $20.00 per share, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us.

Our capitalization following the closing of this offering will be adjusted based on the actual initial public offering price and other terms of this offering determined at pricing. You should read this information in conjunction with our consolidated financial statements and the related notes appearing at the end of this prospectus and the “Use of Proceeds” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” sections and other financial information contained in this prospectus.

	As of March 31, 2021 (in thousands, except share data)		
	Actual	Pro Forma (unaudited)	Pro Forma As Adjusted (unaudited)
Cash and cash equivalents and short-term investments	$ 113,635	$ 113,635	$ 257,586
Notes payable, net of unamortized discount	$ 24,884	$ 24,884	$ 24,884
Preferred stock warrant liability	15,565	—	—
Redeemable convertible preferred stock (Series A1, B1, C1, C2, D1 and D2), par value $0.01 per share; 184,368,950 shares authorized, actual; 155,521,633 shares issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	233,832	—	—
Stockholders' equity (deficit):			
Common stock, par value $0.01 per share; 40,000,000 shares authorized, actual; 929,171 shares issued and outstanding, actual; no shares authorized, issued and outstanding, pro forma and pro forma as adjusted	9	—	—
Class A Common stock, par value $0.01 per share; no shares authorized, issued and outstanding, actual; 210,000,000 shares authorized, pro forma and pro forma as adjusted; 25,130,091 shares issued and outstanding, pro forma; 33,050,091 shares issued and outstanding, pro forma as adjusted	—	251	331
Class B Common stock, par value $0.01 per share; no shares authorized, issued and outstanding, actual; 10,000,000 shares authorized, pro forma and pro forma as adjusted; 6,903,379 shares issued and outstanding, pro forma and pro forma as adjusted	—	69	69
Preferred stock, par value $0.01 per share; no shares authorized, issued and outstanding, actual; 10,000,000 shares authorized pro forma and pro forma as adjusted; no shares issued and outstanding, pro forma and pro forma as adjusted	—	—	—
Additional paid in capital	112,632	361,718	505,260
Accumulated deficit	(263,689)	(263,689)	(263,689)
Accumulated other comprehensive income	1	1	1
Total stockholders' equity (deficit)	(151,047)	98,350	241,972
Total capitalization	$ 123,234	$ 123,234	$ 266,856

The number of shares in the table above is based on 929,171 shares of Class A common stock outstanding as of March 31, 2021 (which includes 248,903 shares of unvested restricted stock subject to repurchase) and no shares of our Class B common stock outstanding as of March 31, 2021, and excludes:

- 4,246,685 shares of Class A common stock issuable upon the exercise of stock options outstanding, pursuant to the 2010 Plan, as of March 31, 2021, at a weighted-average exercise price of $2.36 per share;
- 444,080 shares of Class A common stock issuable upon the exercise of stock options granted after March 31, 2021 pursuant to the 2010 Plan at a weighted-average exercise price of $12.11 per share;
- 55,835 shares of our Class A common stock issuable upon the exercise of warrants to purchase Class A common stock outstanding as of March 31, 2021, at a weighted average exercise price of $137.08 per share;

- 764,703 shares of our Class A common stock issuable upon the conversion of shares of our Series A1 preferred stock issuable upon the exercise of warrants to purchase our Series A1 preferred stock outstanding as of March 31, 2021 at an exercise price (on an as-converted basis) of $0.05 per share;
- 239,994 shares of our Class A common stock issuable upon the conversion of shares of our Series B1 preferred stock issuable upon the exercise of warrants to purchase our Series B1 preferred stock outstanding as of March 31, 2021 at an exercise price (on an as-converted basis) of $0.05 per share;
- 239,130 shares of our Class A common stock issuable upon the conversion of shares of our Series C1 preferred stock issuable upon the exercise of warrants to purchase our Series C1 preferred stock outstanding as of March 31, 2021 at an exercise price (on an as-converted basis) of $5.75 per share;
- 4,200,000 additional shares of our Class A common stock reserved for future issuance under our 2021 Plan, which will become effective in connection with this offering, as well as any automatic increases in the number of shares of our Class A common stock reserved for future issuance under the 2021 Plan; and
- 400,000 shares of our Class A common stock that will become available for future issuance under our 2021 ESPP, which will become effective in connection with this offering, and shares of our Class A common stock that become available pursuant to provisions in the 2021 ESPP that automatically increase the share reserve under the 2021 ESPP.

Dilution

If you invest in our Class A common stock in this offering, your ownership interest will be immediately diluted to the extent of the difference between the initial public offering price per share of our Class A common stock and the pro forma as adjusted net tangible book value per share of our common stock after this offering.

As of March 31, 2021, we had a historical net tangible book value (deficit) of $(152.4) million, or $(163.97) per share of common stock. Our historical net tangible book value (deficit) per share represents total tangible assets less total liabilities and less the carrying value of our redeemable convertible preferred stock, which is not included within stockholders' deficit, divided by 929,171 shares of our common stock outstanding as of March 31, 2021.

Our pro forma net tangible book value as of March 31, 2021 was $97.0 million, or $3.03 per share. Pro forma net tangible book value represents the amount of our total tangible assets less total liabilities, after giving effect to (i) the filing and effectiveness of our current certificate of incorporation effecting a reclassification of our then outstanding common stock to Class A common stock and authorizing our Class B common stock and the issuance to ABG WTT of 11,437,301 shares of Series C2 preferred stock in exchange for an equal number of shares of Series C1 preferred stock and to Ally Bridge MedAlpha of 2,364,509 shares of Series D2 preferred stock for an equal number of shares of Series D1 preferred stock pursuant to an exchange agreement, in each case, in June 2021; (ii) the automatic conversion of all shares of our outstanding Series A1, B1, C1 and D1 preferred stock into an aggregate of 24,200,920 shares of our Class A common stock; (iii) the automatic conversion of all shares of our outstanding Series C2 and D2 preferred stock into an aggregate of 6,903,379 shares of our Class B common stock and (iv) all warrants to purchase redeemable convertible preferred stock becoming warrants to purchase Class A common stock, in connection with this offering. Pro forma net tangible book value per share represents our pro forma net tangible book value divided by the total number of shares outstanding as of March 31, 2021, after giving effect to the pro forma adjustment described above.

After giving further effect to receipt of the net proceeds from our issuance and the sale of 7,920,000 shares of Class A common stock in this offering at an initial public offering price of $20.00 per share, and after deducting the underwriting discounts and commissions and estimated offering expenses payable by us, our pro forma as adjusted net tangible book value as of March 31, 2021 would have been approximately $242.0 million, or approximately $6.06 per share. This amount represents an immediate increase in pro forma net tangible book value of $3.03 per share to our existing stockholders and an immediate dilution of approximately $13.94 per share to new investors participating in this offering. We determine dilution by subtracting the pro forma as adjusted net tangible book value per share after this offering from the amount of cash that a new investor paid for a share of Class A common stock. The following table illustrates this dilution:

Initial public offering price per share		$20.00
Historical net tangible book value (deficit) per share as of March 31, 2021	$(163.97)	
Increase in historical net tangible book value per share attributable to the conversion of our preferred stock	167.00	
Pro forma net tangible book value (deficit) per share as of March 31, 2021	3.03	
Increase in pro forma net tangible book value per share attributable to this offering	3.03	
Pro forma as adjusted net tangible book value per share after this offering		$ 6.06
Dilution per share to new investors in this offering		$13.94

If the underwriters exercise their option to purchase additional shares of our Class A common stock in full, the pro forma as adjusted net tangible book value after this offering would be $6.42 per share, the increase in pro forma net tangible book value per share to our existing stockholders would be $3.39 and the dilution per share to new investors would be $13.58 per share, in each case at initial public offering price of $20.00 per share, and after deducting the underwriting discounts and commissions and the estimated offering expenses payable by us.

The following table summarizes on the pro forma as adjusted basis described above, as of March 31, 2021, the differences between the number of shares purchased from us, the total consideration paid to us in cash and the average price per share that existing stockholders and new investors paid. The calculation below is based on an initial public offering price of $20.00 per share, before deducting the underwriting discounts and commissions and estimated offering expenses payable by us.

	Shares Purchased		Total Consideration		Average Price Per Share
	Number	Percent	Amount	Percent	
Existing stockholders	32,033,470	80.2%	$362,084,972	69.6%	$ 11.30
New investors	7,920,000	19.8%	$158,400,000	30.4%	$ 20.00
Total	39,953,470	100.0%	$520,484,972	100.0%	

The table above assumes no exercise of the underwriters' option to purchase 1,188,000 additional shares of Class A common stock in this offering. If the underwriters' option to purchase additional shares of Class A common stock is exercised in full, the number of shares of our common stock held by existing shareholders would be reduced to 77.9% of the total number of shares of our common stock outstanding after this offering, and the number of shares of common stock held by new investors participating in this offering would be increased to 22.1% of the total number of shares outstanding after this offering.

In addition, to the extent any outstanding stock options are exercised, outstanding warrants are exercised or other rights are exercised, or we issue additional equity or convertible securities in the future, investors participating in this offering will experience further dilution.

The foregoing tables and calculations are based on 929,171 shares of our Class A common stock outstanding as of March 31, 2021 (which includes 248,903 shares of unvested restricted stock subject to repurchase) and no shares of our Class B common stock outstanding as of March 31, 2021, and exclude:

- 4,246,685 shares of Class A common stock issuable upon exercise of stock options outstanding, pursuant to the 2010 Plan, as of March 31, 2021, at a weighted-average exercise price of $2.36 per share;
- 444,080 shares of Class A common stock issuable upon the exercise of stock options granted after March 31, 2021 pursuant to the 2010 Plan at a weighted-average exercise price of $12.11 per share;
- 55,835 shares of our Class A common stock issuable upon the exercise of warrants to purchase Class A common stock outstanding as of March 31, 2021, at a weighted average exercise price of $137.08 per share;
- 764,703 shares of our Class A common stock issuable upon the conversion of shares of our Series A1 preferred stock issuable upon the exercise of warrants to purchase our Series A1 preferred stock outstanding as of March 31, 2021 at an exercise price (on an as-converted basis) of $0.05 per share;
- 239,994 shares of our Class A common stock issuable upon the conversion of shares of our Series B1 preferred stock issuable upon the exercise of warrants to purchase our Series B1 preferred stock outstanding as of March 31, 2021 at an exercise price (on an as-converted basis) of $0.05 per share;
- 239,130 shares of our Class A common stock issuable upon the conversion of shares of our Series C1 preferred stock issuable upon the exercise of warrants to purchase our Series C1 preferred stock outstanding as of March 31, 2021 at an exercise price (on an as-converted basis) of $5.75 per share;
- 4,200,000 additional shares of our Class A common stock reserved for future issuance under our 2021 Plan, which will become effective in connection with this offering, as well as any automatic increases in the number of shares of our Class A common stock reserved for future issuance under the 2021 Plan; and
- 400,000 shares of our Class A common stock that will become available for future issuance under our 2021 ESPP, which will become effective in connection with this offering, and shares of our Class A common stock that become available pursuant to provisions in the 2021 ESPP that automatically increase the share reserve under the 2021 ESPP.

Management's discussion and analysis of financial condition and results of operations

You should read the following discussion and analysis of our financial condition and results of operations together with our consolidated financial statements and the related notes appearing at the end of this prospectus. Some of the information contained in this discussion and analysis or set forth elsewhere in this prospectus, including information with respect to our plans and strategy for our business and related financing, includes forward-looking statements that involve risks and uncertainties. As a result of many factors, including those factors set forth in the "Risk Factors" section of this prospectus, 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 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 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, 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.

Since our inception, we have incurred net losses in each year. We generated revenue of $16.5 million and $16.1 million for the years ended December 31, 2019 and 2020, respectively, and incurred net losses of $21.2 million and $37.1 million for those same years. We generated revenue of $5.0 million and incurred a net loss of $22.1 million for the three months ended March 31, 2021. As of March 31, 2021, we had an accumulated deficit of $263.7 million. We expect to continue to incur net losses 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 the net proceeds from this offering, together with our existing cash, cash equivalents and short-term investments will enable us to fund our operating expenses and capital expenditure requirements through at least 2023. 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 COVID-19 pandemic on our business, as well as our customers’ and suppliers’ businesses. Some of the measures we have taken follow:

- During this pandemic, we moved quickly to implement several business continuity initiatives aimed at maintaining uninterrupted manufacturing and supply capabilities while keeping our workforce safe, including instituting a COVID-19 task force, forming multiple manufacturing teams with staggered shifts, increasing inventory safety stock levels, and establishing appropriate protective equipment and distancing policies for essential on-site personnel.
- We have been designated an essential business that can continue operations during the COVID-19 pandemic. In early March 2020, we promptly instituted protocols to have many personnel work remotely. At the same time, because of our continued designation as an essential business, many employees continue to work on-site at our facility in Lowell, MA to undertake manufacturing activities that support essential operations to provide mission-critical MQC testing products to global pharmaceutical customers manufacturing life-saving drugs. We have also restricted business travel and have limited access to our facilities to outside visitors other than vendors, suppliers and partners who are integral to supporting our business. To date, these arrangements have not materially affected our ability to maintain our business operations, including the operation of financial reporting systems, internal control over financial reporting and disclosure controls and procedures.
- 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 ship, install and validate systems, as well as train customers in certain geographies, which negatively impacted our product and service revenues during 2020 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 are actively reviewing and managing costs to navigate the current environment. However, to date, the COVID-19 pandemic has not had a material adverse effect on results of operations.

While the disruption due to COVID-19 is currently expected to be temporary, there is considerable uncertainty around its duration. We expect these disruptions to continue to impact our operating results. However, the related financial impact and duration of these disruptions 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 heading “Risk Factors.”

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, and Asia. We are investing substantially 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 23% in the year ended December 31, 2020 compared to the prior year-end.

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 their purchasing of more systems to convert more of their test volume at existing locations, to support multiple locations, to meet redundancy requirements, or driven by a need to increase capacity. As of March 31, 2021, approximately 50% of our customers have purchased Growth Direct systems for multiple sites, and approximately 60% 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 adjacent end markets that conduct high volumes of MQC testing under regulatory control and derive value from improving operational efficiency via MQC automation and we may opportunistically enter these markets. 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. During the years ended December 31, 2019 and 2020 and the three months ended March 31, 2020 and 2021, Growth Direct system revenue was the single largest component of our revenue. Because 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 continue 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 is generated from long-term contracts with governmental agencies and third parties that are typically fixed in terms of scope and value. As a result, the amount of non-commercial revenue recognized in each period is subject to variability depending on factors such as the number of active contracts as well as the work performed and value remaining under each contract.

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.

	Year Ended December 31,		Change	
	2019	2020	Amount	%
	(dollars in thousands)			
Systems placed:				
Systems placed in period	25	26	1	4.0%
Cumulative systems placed	61	87	26	42.6%
Systems validated:				
Systems validated in period	15	24	9	60.0%
Cumulative systems validated	27	51	24	88.9%
Product and service revenue — total	$11,456	$14,083	$ 2,627	22.9%
Product and service revenue — recurring	$ 2,294	$ 3,908	$ 1,614	70.4%

	Three Months Ended March 31,		Change	
	2020	2021	Amount	%
	(dollars in thousands)			
Systems placed:				
Systems placed in period	2	8	6	300.0%
Cumulative systems placed	63	95	32	50.8%
Systems validated:				
Systems validated in period	4	1	(3)	-75.0%
Cumulative systems validated	31	52	21	67.7%
Product and service revenue — total	$ 1,598	$ 4,785	$ 3,187	199.4%
Product and service revenue — recurring	$ 859	$ 1,606	$ 747	87.0%

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 and delays in 2020 and 2021), 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.

During the year ended December 31, 2020 and the three months ended March 31, 2021, travel restrictions and shelter-in-place orders related to COVID-19 negatively impacted our ability to ship, install and validate Systems, as well as train customers in certain geographies. This negatively impacted our product and service revenue in the year. While we expect these disruptions to continue to impact our operating results, the related financial impact and duration of these disruptions cannot be reasonably estimated at this time.

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 13.9% and 24.3% of our total revenue for the years ended December 31, 2019 and 2020, respectively. Recurring revenue was 28.6% and 32.2% of our total revenue for the three months ended March 31, 2020 and 2021, respectively. Our recurring revenue as a percentage of the total product and service revenue will generally vary based upon the cumulative number of validated Growth Direct systems

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 them 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 generally noncancelable and nonrefundable after ownership passes to the customer.

	Year Ended December 31, 2019	Percentage of total revenue	Year Ended December 31, 2020	Percentage of total revenue
	(in thousands)		(in thousands)	
Product revenue	$ 9,328	56.5%	$ 10,992	68.4%
Service revenue	2,128	12.9%	3,091	19.2%
Non-commercial revenue	5,056	30.6%	1,994	12.4%
Total revenue	$ 16,512	100.0%	$ 16,077	100.0%

	Three Months Ended March 31, 2020	Percentage of total revenue	Three Months Ended March 31, 2021	Percentage of total revenue
	(in thousands)		(in thousands)	
Product revenue	$ 1,188	39.6%	$ 3,718	74.4%
Service revenue	410	13.7%	1,067	21.4%
Non-commercial revenue	1,401	46.7%	210	4.2%
Total revenue	$ 2,999	100.0%	$ 4,995	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 March 31, 2021, we had sold over 100 Growth Direct systems to over thirty customers globally, including over half of the top twenty pharmaceutical companies as measured by revenue and 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, 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 and we are able 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.

Non-commercial revenue

We generate 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. Our current contract with BARDA is a cost-reimbursable, cost-sharing arrangement, whereby BARDA reimburses us for a percentage of the total cost incurred which includes allowable indirect costs. We recognize revenue from non-commercial revenue over time using an input method based on cost incurred to date in relation to total estimated cost.

Since the underlying contracts are typically fixed in terms of scope and value, the amount of non-commercial revenue recognized in each period is subject to variability depending on factors such as the number of active contracts as well as the work performed and value remaining under each contract. Based on our current estimates, the remaining funding under our current contract with BARDA will be fully utilized during the three months ended June 30, 2021. We received additional funding in April 2021 from BARDA.

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 associated with training, and other expenses related to service revenue recognized in the period.

Cost of non-commercial revenue primarily consists 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 is 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.

We expect that our cost of revenue will generally increase or decrease to the extent that our revenue increases or decreases, but that such costs will increase more slowly than the related revenue streams over time.

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 also anticipate that we will incur 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.

Other income (Expense)

Interest expense

Interest expense is comprised of interest cost associated with outstanding borrowings under our loan and security agreements as well as the 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 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 classify all of our warrants to purchase preferred stock as a liability on our consolidated balance sheets because the warrants are 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 is subsequently remeasured to fair value at each reporting date. The resulting change in the fair value of the preferred stock warrant liability is recorded as a component of other income (expense) in our consolidated statements of operations. We will continue to recognize changes in the fair value of this preferred stock warrant liability at each reporting period until each respective warrant is exercised, expires or qualifies for equity classification.

Loss on extinguishment of debt

Loss on extinguishment of debt includes a loss from the conversion of the 2020 Convertible Notes into Series C1 Preferred Stock in April 2020. In addition, the loss on extinguishment of debt includes unamortized issuance costs, back-end fees and early payment fees related to the refinancing of our $18.0 million term loan with a new $25.0 million term loan, in May 2020. We determined the loss on extinguishment of debt to be the difference between the reacquisition price of the debt and net carrying value of the extinguished debt.

Other income

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

Income tax expense

We generated significant taxable losses during the years ended December 31, 2019 and 2020 and during the three months ended March 31, 2020 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.

We have not recorded any U.S. federal or state income tax benefits for the net operating losses we have incurred in each year or for the research and development tax credits we generated in the United States. As of December 31, 2020, we had U.S. federal and state net operating loss, or NOL, carryforwards of $212.5 million and $106.7 million, respectively, which may be available to offset future taxable income and begin to expire in 2027 and 2025, respectively. Additionally, we had a federal NOL carryforward of $78.2 million generated since 2018 that will never expire. As of December 31, 2020, we also had U.S. federal and state research and development tax credit carryforwards of $3.1 million and $2.0 million, respectively, which may be available to

offset future tax liabilities and begin to expire in 2028 and 2024, respectively. Utilization of the U.S. federal and state NOL carryforwards and research and development tax credit carryforwards may be subject to a substantial annual limitation due to ownership changes that have occurred previously or that could occur in the future. We have recorded a full valuation allowance against our net deferred tax assets at each balance sheet date.

Results of operations

Revision of prior period financial statements

The accompanying Management's Discussion and Analysis of Financial Condition and Results of Operations gives effect to the revision of our previously reported consolidated financial statements for fiscal years 2019 and 2020. A description of the impact of the error on our consolidated financial statements is disclosed within Note 1, *Basis of Presentation*, to our consolidated financial statements as of December 31, 2019 and 2020 and for the years then ended, appearing at the end of this prospectus.

Comparison of the years ended December 31, 2019 and 2020

The following table summarizes our results of operations for the years ended December 31, 2019 and 2020:

	Year Ended December 31,		Change	
	2019	2020	Amount	%
	(in thousands)			
Revenue:				
Product revenue	$ 9,328	$ 10,992	$ 1,664	17.8%
Service revenue	2,128	3,091	963	45.3%
Non-commercial revenue	5,056	1,994	(3,062)	(60.6%)
Total revenue	16,512	16,077	(435)	(2.6%)
Costs and operating expenses:				
Cost of product revenue	10,627	18,642	8,015	75.4%
Cost of service revenue	3,021	3,386	365	12.1%
Cost of non-commercial revenue	3,098	2,120	(978)	(31.6%)
Research and development	5,429	6,531	1,102	20.3%
Sales and marketing	4,047	5,962	1,915	47.3%
General and administrative	8,924	9,976	1,052	11.8%
Total costs and operating expenses	35,146	46,617	11,471	32.6%
Loss from operations	(18,634)	(30,540)	(11,906)	63.9%
Other income (expense):				
Interest expense	(2,375)	(3,447)	(1,072)	45.1%
Change in fair value of preferred stock warrant liability	249	(69)	(318)	(127.7%)
Loss on extinguishment of debt	—	(2,910)	(2,910)	100.0%
Other income	16	22	6	37.5%
Total other income (expense), net	(2,110)	(6,404)	(4,294)	203.5%
Loss before income taxes	(20,744)	(36,944)	(16,200)	78.1%
Income tax expense	427	134	(293)	(68.6%)
Net loss	$(21,171)	$(37,078)	$(15,907)	75.1%

Revenue

Product revenue increased by $1.7 million, or 17.8%, with $1.3 million of the increase attributable to higher Growth Direct system placements as well as higher consumable shipment volumes due to an increase in cumulative

Growth Direct systems validated and increased utilizations at certain customer sites. Of the remaining increase of $0.4 million, a total of $0.5 million was attributable to higher average selling prices, partially offset by a $0.1 million decrease due to product mix during 2020.

Service revenue increased by $1.0 million, or 45.3%. The increase in service revenue was primarily due to a $0.7 million increase in service contract revenue, driven by an increase in cumulative Growth Direct systems validated, as well as a $0.2 million increase in validation revenue and a $0.1 million increase in field service revenue due to the increase in Growth Direct systems placed during 2020.

During the year ended December 31, 2020, travel restrictions and shelter-in-place orders related to COVID-19 negatively impacted our ability to ship, install and validate systems, as well as train customers in certain geographies. This negatively impacted our product and service revenue in the year. While we expect these disruptions to continue to impact our operating results, the related financial impact and duration of these disruptions cannot be reasonably estimated at this time.

Non-commercial revenue decreased by $3.1 million, or 60.6%. The decrease in non-commercial revenue was primarily due to a reduction in billable costs of $1.6 million due to a lower level of reimbursable activity and a reduction of $1.5 million in the cost-sharing percentage at which BARDA reimbursed costs under the contract.

Costs and operating expenses

Costs of revenue

Cost of product revenue increased by $8.0 million, or 75.4%. During the year ended December 31, 2019, we were able to sell inventory that was written down in previous years, resulting in no cost associated with these products. As a result, our cost of product revenue was lower by $3.5 million during the year ended December 31, 2019. The remaining increase was due to $1.4 million in higher product and freight cost due to increased sales volume, an increase of $1.3 million in personnel-related costs resulting from higher headcount to support increased production volume and manufacturing support activities as well as to provide redundancy in the event of potential COVID-19 related disruptions, a $1.2 million increase in material cost related to the transition to our new automated consumable production line and other one-time events, a $0.3 million increase in depreciation expense related to our automated production line, and a net increase of $0.3 million in other costs.

Cost of service revenue increased by $0.4 million, or 12.1%. This increase was primarily due to higher headcount-related costs associated with additional validation and field service employees hired in 2019 and 2020 to support increased service activity.

Cost of non-commercial revenue decreased by $1.0 million, or 31.6%. This decrease was primarily due to a reduction in spend due to the timing and extent of development activities, with consulting activities down $0.8 million and employee salary and benefit costs down $0.1 million.

Research and development

	Year Ended December 31,		Change	
	2019	2020	Amount	%
	(dollars in thousands)			
Research and development	$ 5,429	$ 6,531	$ 1,102	20.3%
Percentage of total revenue	32.9%	40.6%		

Research and development expenses increased by $1.1 million, or 20.3%. This increase was primarily due to an increase of $0.6 million in employee-related costs due primarily to higher headcount, an increase of $0.4 million in consulting expenses to support research and development activities, and an increase of $0.1 million in other general research and development expenses.

Sales and marketing

	Year Ended December 31,		Change	
	2019	2020	Amount	%
	(dollars in thousands)			
Sales and marketing	$ 4,047	$ 5,962	$ 1,915	47.3%
Percentage of total revenue	24.5%	37.1%		

Sales and marketing expenses increased by $1.9 million, or 47.3%. This increase was primarily due to the expansion of our sales organization, resulting in a $1.4 million increase in employee-related costs (including commissions earned), a $0.3 million increase in recruiting and consulting fees, and a $0.2 million increase in other expenses to support our sales and marketing organizations, net of lower travel-related expenses due to COVID-19.

General and administrative

	Year Ended December 31,		Change	
	2019	2020	Amount	%
	(dollars in thousands)			
General and administrative	$ 8,924	$ 9,976	$ 1,052	11.8%
Percentage of total revenue	54.0%	62.1%		

General and administrative expenses increased by $1.1 million, or 11.8%. This increase was primarily due to a $1.4 million increase in professional fees related to legal, audit, accounting, recruiting and consulting activities due to an increase in underlying business activity. The increase was partially offset by a $0.3 million reduction attributable to reduced travel-related expenses due to COVID-19 and lower stock compensation expense.

Other income (expense)

Interest expense

Interest expense for the years ended December 31, 2019 and 2020 was $2.4 million and $3.4 million, respectively. The increase of $1.1 million, or 45.1%, was primarily due to $0.7 million in term loan interest expense, which increased primarily due to the refinancing of our $18.0 million term loan with a new $25.0 million term loan in May 2020. Also contributing to the increase was $0.3 million in interest and amortization of derivative discount associated with the 2020 Convertible Notes issued in February 2020 and subsequently converted to shares of Series C1 Preferred Stock in April 2020.

Change in fair value of preferred stock warrant liability

The change in fair value of preferred stock warrant liability was a gain of $0.2 million for the year ended December 31, 2019, compared to a loss of $0.1 million for the year ended December 31, 2020. 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.

Loss on extinguishment of debt

There was no loss on extinguishment of debt for the year ended December 31, 2019, compared to a $2.9 million loss for the year ended December 31, 2020. The $2.9 million loss in 2020 is comprised of a $2.0 million extinguishment loss from the conversion of the 2020 Convertible Notes into Series C1 preferred stock and an extinguishment loss of $0.9 million from refinancing of our $18.0 million term loan with a new $25.0 million term loan in May 2020, which consisted of unamortized issuance cost of $0.2 million, back-end fee payment of $0.6 million, and early payment fees of $0.1 million.

Income tax expense

Income tax expense was $0.4 million for the year ended December 31, 2019, compared to $0.1 million for the year ended December 31, 2020. The decrease of $0.3 million relates primarily to a lower amount of income tax expense recorded related to our German subsidiary in 2020.

Comparison of the three months ended March 31, 2020 and 2021

The following table summarizes our results of operations for the three months ended March 31, 2020 and 2021:

	Three Months Ended March 31,		Change	
	2020	2021	Amount	%
	(in thousands)			
Revenue:				
Product revenue	$ 1,188	$ 3,718	$ 2,530	213.0%
Service revenue	410	1,067	657	160.2%
Non-commercial revenue	1,401	210	(1,191)	(85.0%)
Total revenue	2,999	4,995	1,996	66.6%
Costs and operating expenses:				
Cost of product revenue	3,212	5,510	2,298	71.5%
Cost of service revenue	951	1,137	186	19.6%
Cost of non-commercial revenue	797	414	(383)	(48.1%)
Research and development	1,438	2,147	709	49.3%
Sales and marketing	1,466	2,275	809	55.2%
General and administrative	2,371	3,203	832	35.1%
Total costs and operating expenses	10,235	14,686	4,451	43.5%
Loss from operations	(7,236)	(9,691)	(2,455)	33.9%
Other income (expense):				
Interest expense	(763)	(932)	(169)	22.1%
Change in fair value of preferred stock warrant liability	5	(11,448)	(11,453)	n/m
Other income (expense), net	7	(11)	(18)	(257.1%)
Total other income (expense), net	(751)	(12,391)	(11,640)	1549.9%
Loss before income taxes	(7,987)	(22,082)	(14,095)	176.5%
Income tax expense	20	19	(1)	(5.0%)
Net loss	$ (8,007)	$ (22,101)	$(14,094)	176.0%

Revenue

Product revenue increased by $2.5 million, or 213.0%. The increase of $2.7 million is attributable to higher number of Growth Direct system placements during the three months ended March 31, 2021, as well as higher volume of consumable shipments due to an increase in cumulative Growth Direct systems validated and increased utilizations at certain customer sites. The increase is partially offset by a $0.2 million decrease in price and product mix.

Service revenue increased by $0.7 million, or 160.2%. The increase in service revenue was primarily due to a $0.3 million increase in validation revenue, a $0.3 million increase in service contract revenue, driven by an increase in cumulative Growth Direct systems validated, as well as a $0.1 million increase in field service revenue due to the increase in Growth Direct systems placed during the first quarter of 2021.

Non-commercial revenue decreased by $1.2 million, or 85.0%. The decrease in non-commercial revenue was primarily due to a reduction in billable costs of $0.8 million due to a lower level of reimbursable activity and a reduction of $0.4 million in the cost-sharing percentage at which BARDA reimbursed costs under its contract with us.

Costs and operating expenses

Costs of revenue

Cost of product revenue increased by $2.3 million, or 71.5%. The increase was due to $1.5 million in higher product and freight cost due to increased sales volume, an increase of $0.5 million in personnel-related costs resulting from higher headcount to support increased production volume and manufacturing support activities, as well as to provide redundancy in the event of potential COVID-19 related disruptions, and a $0.3 million increase in facilities-related costs, which includes regular COVID-19 testing service for on-site employees.

Cost of service revenue increased by $0.2 million, or 19.6%. This increase was primarily due to higher headcount-related costs associated with additional validation and field service employees hired in the later part of 2020 and in early 2021 to support increased service activity.

Cost of non-commercial revenue decreased by $0.4 million, or 48.1%. This decrease was primarily due to a reduction in spend due to the timing and extent of development activities, with consulting activities down $0.3 million and a reduction in other BARDA-related costs of $0.1 million.

Research and development

	Three Months Ended March 31,		Change	
	2020	2021	Amount	%
	(dollars in thousands)			
Research and development	$ 1,438	$ 2,147	$ 709	49.3%
Percentage of total revenue	47.9%	43.0%		

Research and development expenses increased by $0.7 million, or 49.3%. This increase was primarily due to an increase of $0.5 million in consulting expenses to support research and development activities, an increase of $0.1 million in employee-related costs due primarily to higher headcount, and an increase of $0.1 million in other general research and development expenses.

Sales and marketing

	Three Months Ended March 31,		Change	
	2020	2021	Amount	%
	(dollars in thousands)			
Sales and marketing	$ 1,466	$ 2,275	$ 809	55.2%
Percentage of total revenue	48.9%	45.5%		

Sales and marketing expenses increased by $0.8 million, or 55.2%. This increase was primarily due to a $0.6 million increase in market research, recruiting and consulting fees, and a $0.2 million increase in employee-related costs (including commissions earned) due to higher headcount.

General and administrative

	Three Months Ended March 31,		Change	
	2020	2021	Amount	%
	(dollars in thousands)			
General and administrative	$ 2,371	$ 3,203	$ 832	35.1%
Percentage of total revenue	79.1%	64.1%		

General and administrative expenses increased by $0.8 million, or 35.1%. This increase was primarily due to a $0.6 million increase in employee-related costs driven by higher headcount and a $0.4 million increase in professional fees related to legal, audit, accounting, recruiting and consulting activities due to an increase in underlying business activity. The increase was partially offset by a decrease of $0.2 million in other general and administrative expenses.

Other income (expense)

Interest expense

Interest expense for the three months ended March 31, 2020 and 2021 was $0.8 million and $0.9 million, respectively. The increase of $0.1 million, or 22.1%, was primarily due to a larger long-term debt principal balance incurring interest expense at March 31, 2021.

Change in fair value of preferred stock warrant liability

The change in fair value of preferred stock warrant liability was a gain of less than $0.1 million for the three months ended March 31, 2020, compared to a loss of $11.4 million for the three months ended March 31, 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.

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, borrowings under loan agreements and revenue from sales of our products, services and contracts. As of March 31, 2021, we had cash and cash equivalents and short-term investments of $113.6 million. We believe that our existing cash and cash equivalents and short-term investments will enable us to fund our operating expenses, capital expenditure requirements and debt service payments for at least twelve months following the date these consolidated financial statements were to be issued.

We have based this estimate on assumptions that may prove to be inaccurate, and we may utilize our available capital resources sooner than we expect. Our future funding requirements will depend on many factors, including:

- market uptake of our Growth Direct system;
- the expansion of our sales, marketing and distribution capabilities;
- the cost of our research and development activities and timely launch of new features and products;
- the effect of competing technological and market developments;
- the ability to scale and expand manufacturing capabilities to support sales growth; and
- the level of our sales and marketing expenses and general and administrative expenses.

We cannot assure you that we will be able to obtain additional funds on acceptable terms, or at all. If we raise additional funds by issuing equity or equity-linked securities, our stockholders may experience dilution. Future debt financing, if available, may involve covenants, in addition to our existing covenants, restricting our operations or our ability to incur additional debt or potentially limiting our ability to obtain new debt financing or the refinance of our existing debt. Any debt or equity financing that we raise may contain terms that are not favorable to us or our stockholders. If we do not have or are not able to obtain sufficient funds, we may have to delay development or commercialization of our products. We also may have to reduce sales, marketing, research and development, customer support or other resources devoted to our products or cease operations.

Cash flows

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

	Year Ended December 31,		Three Months Ended March 31,	
	2019	2020	2020	2021
	(in thousands)			
Net cash used in operating activities	$(21,147)	$(30,996)	$ (8,315)	$ (11,262)
Net cash (used in) provided by investing activities	(1,695)	(15,670)	(79)	9,749
Net cash provided by financing activities	14,870	64,234	9,500	80,069
Net (decrease) increase in cash and cash equivalents and restricted cash	$ (7,972)	$ 17,568	$ 1,106	$ 78,556

Operating activities

During the year ended December 31, 2019, operating activities used $21.1 million of cash, primarily resulting from our net loss of $21.2 million and net cash used by changes in our operating assets and liabilities of $2.1 million, partially offset by non-cash charges of $2.2 million. Net cash used by changes in our operating assets and liabilities for the year ended December 31, 2019 consisted primarily of an increase of $3.9 million in raw material inventory to support a projected increase in demand, an increase of $1.3 million in prepaid expenses and other current assets primarily due to an inventory deposit and prepaid commitment fees related to our 2018 Term Loan, an increase in accounts receivable of $0.5 million and an increase of $0.3 million in other long-term assets. These cash uses were partially offset by an increase of $1.4 million in deferred revenue, an increase of $1.0 million in accounts payable, an increase of $1.0 million in accrued expenses and other current liabilities and an increase of $0.5 million in deferred rent. The increase in accounts payable and accrued expenses and other current liabilities was due to the timing of invoicing and cash disbursement. The increase in accounts receivable and deferred revenue was due to an increase in billing and timing of revenue recognition.

During the year ended December 31, 2020, operating activities used $31.0 million of cash, primarily resulting from our net loss of $37.1 million and net cash used by changes in our operating assets and liabilities of $1.1 million, partially offset by non-cash charges of $7.2 million. Net cash used by changes in our operating assets and liabilities for the year ended December 31, 2020 consisted primarily of an increase of $3.4 million in inventory to support a projected increase in demand, an increase in accounts receivable of $1.4 million, an increase of $1.3 million in prepaid expenses and other current assets, and an increase of $0.4 million in other long-term assets. These cash uses were partially offset by an increase of $2.5 million in deferred revenue, an increase of $1.8 million in accrued expenses and other current liabilities, and an increase of $1.0 million in accounts payable. The increase in accounts payable and accrued expenses was due to timing of invoicing and cash disbursement. The increase in accounts receivable was a result of higher product revenue. The increase in deferred revenue was due to an increase in advance billings for validation services related to the volume and timing of Growth Direct system placements as well as an increase in advance billings related to a higher number of systems under service contracts.

During the three months ended March 31, 2020, operating activities used $8.3 million in cash, primarily resulting from our net loss of $8.0 million, net cash used by changes in our operating assets and liabilities of $1.2 million, which were partially offset by non-cash charges of $0.9 million. Net cash used by changes in our operating assets and liabilities for the three months ended March 31, 2020 consisted primarily of increases in inventory of $1.0 million and other long-term assets of $1.0 million both related to purchases and deposits for inventory, as well as a decrease in accounts payable of $1.1 million. The cash used by operating assets and liability is partially offset by a decrease in accounts receivable of $1.2 million and an increase in deferred revenue of $0.7 million.

During the three months ended March 31, 2021, operating activities used $11.3 million in cash, primarily resulting from our net loss of $22.1 million, net cash used by changes in our operating assets and liabilities of

$1.3 million, which were partially offset by non-cash charges of $12.1 million, which include the non-cash change in fair value of preferred stock warrant liability of $11.4 million. Net cash used by changes in our operating assets and liabilities for the three months ended March 31, 2021 consisted primarily of increases in inventory of $0.8 million to support increased production volume, and decreases of $2.0 million in accounts payable and $0.8 million in accrued expenses and other current liabilities. The cash used by operating assets and liability is partially offset by a decrease in accounts receivable of $1.3 million, an increase in deferred revenue of $0.7 million, and a decrease in prepaid and other current assets of $0.3 million.

Investing activities

During the year ended December 31, 2019, net cash used in investing activities was $1.7 million, consisting entirely of purchases of property and equipment.

During the year ended December 31, 2020, net cash used in investing activities was $15.7 million, consisting of purchases of short-term investments of $25.0 million and purchases of property and equipment of $0.7 million, offset by maturities of short-term investments of $10.0 million.

During the three months ended March 31, 2020, net cash used in investing activities was $0.1 million, consisting entirely of purchases of property and equipment.

During the three months ended March 31, 2021, net cash provided by investing activities was $9.7 million, consisting of maturities of investments of $10.0 million, partially offset by purchases of property and equipment of $0.3 million.

Financing activities

During the year ended December 31, 2019, net cash provided by financing activities was $14.9 million, consisting primarily of net proceeds of $14.9 million from the issuance of Series B1 redeemable convertible preferred stock, net of issuance costs.

During the year ended December 31, 2020, net cash provided by financing activities was $64.2 million, consisting primarily of net proceeds of $49.9 million from the issuance of Series C1 and C2 redeemable convertible preferred stock, net of issuance costs, $24.1 million in net proceeds from borrowings under our 2020 Term Loan and $9.5 million in proceeds from the issuance of the Convertible Notes. These cash inflows were partially offset by a $19.4 million cash outflow for principal and fees paid in conjunction with the extinguishment of our 2018 term loan.

During the three months ended March 31, 2020, net cash provided by financing activities was $9.5 million, consisting of net proceeds of $9.5 million from the issuance of the Convertible Notes.

During the three months ended March 31, 2021, net cash provided by financing activities was $80.1 million, consisting primarily of net proceeds of $79.8 million from the issuance of Series D1 and D2 redeemable convertible preferred stock, and $0.6 million in proceeds from restricted common stock purchased by an employee and stock option exercises, partially offset by $0.3 million cash paid for deferred offering costs.

Long-term debt

In May 2020, we entered into 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, or the Term B Loan, and $15.0 million under the third tranche, or the Term C Loan, subject to certain Growth Direct system sales milestones. The milestone entitling us to draw the Term B Loan is achieved when we have received, on a cumulative basis, a predefined number of new system orders during a consecutive twelve month period between January 1, 2020 and November 14, 2021. The milestone entitling us to draw the Term C Loan is achieved when we receive, on a cumulative basis, a predefined number of new system orders during a consecutive eighteen month period between January 1, 2020 and May 14, 2022. At closing, we 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. We would be obligated to issue additional warrants to the lender with an aggregate exercise value equal to $1.1 million and $0.8 million in the event that we draw down the Term B Loan and Term C Loan, respectively. We paid a $0.8 million facility fee in connection with the 2020 Term Loan.

The 2020 Term Loan's interest rate can be elected each quarter by us, as either (a) 12%, up to 7% of which may be Payment in Kind, or PIK, interest or (b) 13% PIK interest. Accrued cash interest on the 2020 Term Loans is payable quarterly. All outstanding principal, including any and all accrued PIK interest, is due and payable in full in May 2025, or the Maturity Date. We have the option to prepay all or a portion of the principal balance prior to the Maturity Date, subject to a prepayment premium. The 2020 Term Loan agreement includes certain financial and non-financial covenants. These covenants include exceeding certain minimum revenue thresholds on a trailing twelve-month basis, maintaining a minimum balance of $1.5 million in cash and cash equivalents, maintaining all inventory in good and marketable condition, and reporting requirements for any material adverse changes in our financial condition. We were in compliance with all covenants through the issuance date of these consolidated financial statements. For additional information on the 2020 Term Loan please see Note 9 — *Long-term Debt* to consolidated financial statements.

Contractual obligations and commitments

In October 2013, we entered into an operating lease for office and manufacturing space in Lowell, Massachusetts, which expires in July 2026. The terms of the lease include options for a one-time, five-year extension of the lease and early termination of the lease in July 2024 as well as a $0.7 million tenant improvement allowance which has been drawn down in full. Future minimum commitments under this lease through July 2026 are $2.6 million and $2.5 million as of December 31, 2020 and March 31, 2021, respectively.

In December 2016, in connection with the amendment of a then-outstanding loan agreement with the lender, we entered into an agreement under which we are obligated to pay the lender an exit fee in the amount of $0.8 million in the event of a "qualifying exit event" prior to December 31, 2026. As defined in the agreement, a "qualifying exit event" includes but is not limited to a liquidation, merger, sale or change of control of the company or a public offering of its common stock. No amounts were accrued for this exit fee as of December 31, 2020 or March 31, 2021, as the occurrence of a qualifying exit event was not deemed probable.

In March 2020, we entered into an agreement with a supplier to secure future supply of certain materials used in the manufacturing of our Growth Direct systems. As of December 31, 2020, we had committed to minimum payments under these arrangements totaling $0.9 million through December 31, 2022. We had $0.1 million and less than $0.1 million accrued for the supply agreement as of December 31, 2020 and March 31, 2021, respectively.

In December 2020, we entered into a non-cancelable agreement with a service provider for software as a service and cloud hosting services. As of December 31, 2020, we had committed to minimum payments under these arrangements totaling $1.1 million through January 31, 2026. There were no amounts accrued for this agreement as of December 31, 2020 and March 31, 2021.

For additional information on our contractual obligation and commitments please see Note 16 — Commitments and Contingencies to our consolidated financial statements.

Seasonality

Our revenues typically increase progressively over the course of each calendar year, with the first quarter being the lowest and the fourth quarter being the highest revenue quarter in the year. However, our revenues can vary from quarter to quarter as a result of seasonality, including factors such as our customers' budgetary cycles and 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 seasonality to continue for the foreseeable future, which may cause fluctuations in our operating results and financial metrics. However, our seasonality trends may vary in the future as our revenue mix shifts from non-recurring to recurring revenues.

Critical accounting policies and significant judgments and estimates

Our 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.

While our significant accounting policies are described in more detail in Note 2 — *Summary of Significant Accounting Policies* to our consolidated financial statements included elsewhere in this prospectus, we believe that the following critical accounting policies are those most important to the judgments and estimates used in the preparation of our consolidated financial statements.

Revenue recognition

Product revenue

We derive product revenue primarily from the sale of Growth Direct systems and related consumables. Product revenue is recognized when control of the promised systems and consumables is transferred to our customers, in an amount that reflects the consideration we expect to be entitled to in exchange for those products or consumables (the transaction price). For Growth Direct systems and consumables sold by us, control transfers to the customer at a point in time.

Service revenue

We derive service revenue primarily from the sale of validation services, service contracts and field service (including installation). Revenue is recognized when services are provided to our customers, in an amount that reflects the consideration we expect to be entitled to in exchange for those services (the transaction price). Service revenue is recognized over time using an input method based on time lapsed for service contracts and using an output method based on milestones achieved for validation services and field service.

Performance obligations

A performance obligation is a promise in a contract to transfer a distinct product or service to a customer that are both capable of being distinct, whereby the customer can benefit from the product or service either on its own or together with other resources that are readily available, and are distinct in the context of the contract, whereby the transfer of the product or service is separately identifiable from other promises in the contract. Our main performance obligations in customer arrangements are Growth Direct systems, LIMS connection software, proprietary consumables, validation services, field service and services due under service contracts.

Multiple performance obligations

Our contracts may include multiple performance obligations when customers purchase a combination of products and services such as Growth Direct system sold together with the LIMS connection software, proprietary consumables or services. For these arrangements, we allocate the contract's transaction price to each performance obligation on a relative standalone selling price basis using our best estimate of the standalone selling price of each distinct product or service in the contract. The primary methods used to estimate standalone selling prices are based on the prices observed in standalone sales to customers or cost-plus margin depending on the nature of the obligation and available evidence of fair value. Allocation of the transaction price is determined at contract's inception.

Non-commercial revenue

We generate revenue from a long-term contract with BARDA, which is part of the U.S. government. The contract is a cost-reimbursable, cost-sharing contract, whereby BARDA reimburses us for a percentage of the total costs that have been incurred including indirect allowable rates. We include the unconstrained amount of consideration in the transaction price. The amount included in the transaction price is constrained to the amount for which it is probable that a significant reversal of cumulative revenue recognized will not occur.

Stock-based compensation

We measure stock-based option awards granted to employees, officers and directors based on their fair value on the date of grant using the Black-Scholes option-pricing model. Compensation expense for those awards is recognized over the requisite service period, which is generally the vesting period of the respective award. We account for forfeitures as they occur. The straight-line method of expense recognition is applied to all awards with service-only conditions.

The fair value of each stock option is estimated on the grant date using the Black-Scholes option-pricing model, which uses inputs such as the fair value of our common stock and assumptions we make for the volatility of our common stock, the expected term of our common stock options, the risk-free interest rate for a period that approximates the expected term of our common stock options, and our expected dividend yield.

We measure all restricted common stock 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, we have the right to repurchase unvested restricted common stock shares. As such the fair value of the restricted common stock is included in other long-term liabilities in the consolidated balance sheet.

Determination of fair value of common stock

As there has been no public market for our common stock to date, the estimated fair value of our common stock has been determined by our board of directors as of the date of each option grant, with input from management. The board considers our most recently available third-party valuations of common stock and an assessment of additional objective and subjective factors that it believed were relevant and which may have changed from the date of the most recent valuation through the date of the grant. These third-party valuations are performed in accordance with the guidance outlined in the American Institute of Certified Public Accountants' Accounting and Valuation Guide, Valuation of Privately-Held-Company Equity Securities Issued as Compensation.

Our common stock valuations are prepared using either an option pricing method, or OPM, or a hybrid method, both of which use market approaches and income approaches to estimate our enterprise value. The hybrid method is a probability-weighted expected return method, or PWERM, where the equity value in two or more of the scenarios is calculated using an OPM. The PWERM is a scenario-based methodology that estimates the fair value of common stock based upon an analysis of future values for the company, assuming various outcomes. The common stock value is based on the probability-weighted present value of expected future investment returns considering each of the possible outcomes available as well as the rights of each class of stock. The future value of the common stock under each outcome is discounted back to the valuation date at an appropriate risk-adjusted discount rate and probability weighted to arrive at an indication of value for the common stock. A discount for lack of marketability of the common stock is then applied to arrive at an indication of value for the common stock. The OPM treats common stock and preferred stock as call options on the total equity value of a company, with exercise prices based on the value thresholds at which the allocation among the various holders of a company's securities changes. Under this method, the common stock has value only if the funds available for distribution to stockholders exceeded the value of the preferred stock liquidation preferences at the time of the liquidity event, such as a strategic sale or a merger. These third-party valuations were performed as of various dates, which resulted in the following valuations of our common stock:

Date	Per-Share Valuation of Common Stock
October 21, 2019	$ 1.10
May 14, 2020	$ 0.75
January 1, 2021	$ 2.10
March 9, 2021	$ 10.85
May 24, 2021	$ 11.45
June 17, 2021	$ 13.60

In addition to considering the results of these third-party valuations, our board of directors considered various objective and subjective factors to determine the fair value of our common stock as of each grant date, including:

- the prices at which we sold shares of preferred stock (including our sale of Series D1 and Series D2 preferred stock in March 2021) and the superior rights and preferences of the preferred stock relative to our common stock at the time of each grant;
- the progress of the research and development of our products;
- our stage of development and commercialization and our business strategy;
- external market conditions affecting our industry and the global pharmaceutical industry;
- our financial position, including cash on hand, and our historical and forecasted performance and operating results;
- the lack of an active public market for our common stock and our preferred stock;
- the likelihood of achieving a liquidity event, such as an initial public offering, or IPO, or sale of our company in light of prevailing market conditions; and
- the analysis of IPOs and the market performance of similar companies in the life sciences tools and diagnostics industries.

The assumptions underlying these valuations represent management's best estimates, which involve inherent uncertainties and the application of management's judgment. As a result, if we had used significantly different assumptions or estimates, the fair value of our common stock and our stock-based compensation expense could have been materially different.

Once a public trading market for our common stock has been established in connection with the completion of this offering, it will no longer be necessary for our board of directors to estimate the fair value of our common stock in connection with our accounting for granted stock options and other such awards we may grant, as the fair value of our common stock will be determined based on the quoted market price of our common stock.

Options and restricted stock awards granted

The following table summarizes, by grant date, the number of shares subject to awards granted between January 1, 2020 and June 23, 2021, the per share exercise price of the options, the fair value of common stock on each grant date, and the per share estimated fair value of the awards:

Grant Date	Type of Award	Number of Shares Subject to Options/Awards Granted	Per Share Exercise Price of Options/ Awards	Per Share Fair Value of Common Shares on Grant Date	Per Share Estimated Fair Value of Options/ Awards
February 7, 2020	Options	20,000	$1.10	$1.10	$0.80
July 29, 2020	Options	1,113,489	$0.75	$0.75	$0.55
October 29, 2020	Options	171,265	$0.75	$0.75	$0.55
December 18, 2020	Options	42,246	$0.75	$0.75	$0.55
February 1, 2021	Options	308,903	$2.10	$2.10	$0.90

Grant Date	Type of Award	Number of Shares Subject to Options/Awards Granted	Per Share Exercise Price of Options/ Awards	Per Share Fair Value of Common Shares on Grant Date	Per Share Estimated Fair Value of Options/ Awards
February 2, 2021	Restricted Award	248,903	$ 2.10	$ 2.10	$2.10
March 15, 2021	Options	580,299	$10.85	$10.85	$4.75
June 7, 2021	Options	308,580	$11.45	$11.45	$4.85
June 23, 2021	Options	135,500	$13.60	$13.60	$5.75

Valuation of warrants to purchase preferred stock

We classify warrants to purchase shares of our redeemable convertible preferred stock as liabilities on our consolidated balance sheets as these warrants are free-standing financial instruments that may require us to transfer assets upon exercise. The preferred stock warrant liability is initially recorded at fair value on the issuance date of each warrant and is subsequently remeasured to fair value at each reporting date. Changes in the fair value of the preferred stock warrant liability are recognized as a component of other income (expense) in our consolidated statements of operations. We will continue to adjust the liability for changes in fair value until the warrants are exercised, expire or qualify for equity classification.

We utilize the Black-Scholes option-pricing model, which incorporates management's assumptions and estimates, to value the preferred stock warrants. We assess these assumptions and estimates on a quarterly basis as additional information impacting the assumptions is obtained. Estimates and assumptions impacting the fair value measurement include the fair value per share of the underlying redeemable convertible preferred stock, the remaining contractual term of the warrants, risk-free interest rate, expected dividend yield and expected volatility of the price of the underlying preferred stock. We determine the fair value per share of the underlying preferred stock by taking into consideration our most recent sales of our preferred stock as well as additional factors that we deem relevant. We have historically been a private company and lack company-specific historical and implied volatility information of our stock. Therefore, we estimate expected stock volatility based on the historical volatility of publicly traded peer companies for a term equal to the remaining contractual term of the warrants. The risk-free interest rate is determined by reference to the U.S. Treasury yield curve for time periods approximately equal to the remaining contractual term of the warrants. We have estimated a 0% dividend yield based on the expected dividend yield and the fact that we have never paid or declared dividends.

Upon the closing of this offering, the warrants to purchase shares of redeemable convertible preferred stock will become exercisable for shares of common stock, at which time we will adjust the redeemable convertible preferred stock warrant liability to fair value prior to reclassifying the redeemable convertible preferred stock warrant liability to additional paid-in capital. As a result, following the closing of this offering, the warrants will no longer be subject to fair value accounting.

Valuation of inventory

We value inventory at the lower of cost or net realizable value. Cost is computed using the first-in, first-out method. We regularly review inventory quantities on-hand for excess and obsolescence and, when circumstances indicate, we record charges to write down inventories to their estimated net realizable value after evaluating future demand, expected product life cycles and current inventory levels. Such charges are classified as cost of product revenue in the statements of operations. Any write-down of inventory to net realizable value creates a new cost basis.

Valuation of derivatives

We record derivatives initially at fair value upon the issuance of our Unsecured Subordinated Convertible Promissory Notes, or Convertible Notes, issued in February 2020 which relates to a conversion option whereby upon the closing of a specified financing event the Convertible Note will automatically convert into shares of the same class and series of capital stock we issued to other investors in the financing at a conversion price equal

to 80% of the price per share of the securities paid by the other investor. The initial fair value was determined using management's assumption on the likelihood a qualified financing event would occur. Change in the fair value of the derivative liability were recognized as a component of other income (expense), net in the consolidated statement of operations. In April 2020, the specified financing event was consummated, as such the notes were converted into shares of Series C1 Preferred Stock, and the derivative liability was extinguished, and the unamortized derivative discount was recognized as an extinguishment loss.

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 consolidated financial statements appearing at the end of this prospectus.

Quantitative and qualitative disclosures about market risks

Interest rate risk

As of December 31, 2020, we had cash and cash equivalents and short-term investments of $45.1 million, which consisted of cash equivalents and U.S. Treasury securities. As of March 31, 2021, we had cash and cash equivalents and short-term investments of $113.6 million, which consisted of cash equivalents and U.S. Treasury securities. Interest income is sensitive to changes in the general level of interest rates; however, due to the nature of these investments, an immediate 10% change in interest rates would not have a material effect on the fair market value of our investment portfolio.

Borrowings under our 2020 Term Loan bear interest at either (a) 12%, up to 7% of which may be PIK interest or (b) 13% PIK interest. An immediate 10% change in the Wall Street Journal prime rate would not have a material impact on our debt-related obligations, financial position or results of operations.

Foreign currency exchange risk

We are not currently exposed to significant market risk related to changes in foreign currency exchange rates. Our operations may be subject to fluctuations in foreign currency exchange rates in the future.

Inflation risk

We do not believe that inflation has had a material effect on our business, financial condition or results of operations. If our costs were to become subject to significant inflationary pressures, we may not be able to fully offset such higher costs through price increases. Our inability or failure to do so could harm our business, financial condition or results of operations.

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 this offering, (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.

Business

Defining the future of pharmaceutical quality control

We are leading a global transformation toward fully automated microbial quality control within pharmaceutical manufacturing. Our products safeguard the most complex and critical bioprocessing workflows in the industry, enabling faster, safer, and higher capacity drug production. Through our unique expertise at the intersection of microbiology, robotic systems, and advanced vision algorithms, we are setting the foundation for end-to-end quality control automation to enable the future of advanced pharmaceutical manufacturing.

Overview

We are an innovative life sciences technology company providing mission critical automation solutions to facilitate the efficient manufacturing and fast, safe release of healthcare products such as biologics, vaccines, cell and gene therapies, and sterile injectables. Our flagship Growth Direct platform automates and modernizes the antiquated, manual microbial quality control, or MQC, testing workflows used in the largest and most complex pharmaceutical manufacturing operations across the globe. The Growth Direct platform brings the quality control lab to the manufacturing floor, unlocking the power of in-line / at-the-line MQC automation to deliver faster results, greater accuracy, increased operational efficiency, better compliance with data integrity regulations, and quicker decision making that our customers rely on to ensure safe and consistent supply of important healthcare products.

Our Growth Direct platform is the only fully automated, high-throughput and secure MQC solution. Developed with over 15 years of active feedback from our customers, Growth Direct was purpose-built to meet the MQC challenges posed by the increasing scale, complexity, and regulatory scrutiny confronting global pharmaceutical manufacturers. Our platform delivers the robust and scalable automation necessary to support rapidly expanding demand for novel and complex therapeutic modalities, such as biologics, vaccines, cell and gene therapies, and sterile injectables. Our systems are designed to absorb and automate the vast majority of daily MQC test volume in any pharmaceutical manufacturing facility and can be operated in networked fleets of multiple systems per facility or campus to scale up with high-volume manufacturing.

MQC is a ubiquitous and critical testing process, executed daily at massive scale globally, that ensures pharmaceutical manufacturing facilities and products are free of microbial contamination from exogenous microorganisms such as bacteria, mold, and other foreign substances. MQC ensures the safety of final drug products released for patient use, via the constant testing for microbial contamination of raw materials, production environments, personnel, and in-process and final sterility testing for drug products. A single drug production facility may conduct anywhere from tens of thousands to over one million MQC tests per year to ensure product quality. This testing is mandated and closely monitored by the U.S. Food and Drug Administration, or FDA, and other global regulatory agencies to ensure the safety of all pharmaceutical products, with serious regulatory and financial consequences for lack of compliance. Companies that have failed to pass FDA MQC audits have been subject to repeat FDA Form 483s, warning letters, complete response letters, or CRLs, extended plant shutdowns, and substantial product scrap and remediation costs. An FDA Form 483 is issued by the FDA at the conclusion of an inspection for conditions that may constitute violations of the Federal Food, Drug, and Cosmetic Act or other laws and regulations enforced by the FDA.

The traditional method of MQC testing, or the traditional method, also known as the compendial method, involves detection of viable, potentially contaminating organisms by a process known as “growth promotion.” In this method, samples are manually collected on media plates, hand labeled and inventoried, physically transported to a centralized lab, and incubated at various temperatures for days to weeks. MQC specialists then visually inspect these plates manually, counting colonies of microbial organisms and recording their counts of thousands of plates by hand, which is a repetitive process predisposed to operator miscounts. In total, the traditional method can require 15 individual processing steps per sample. The benefit of this long-standing method is that it is trusted—a colony growing on media strongly implies the existence of viable, potentially contaminating organisms growing in the location or sample from which the assay was collected.

However, the manual traditional MQC method has become antiquated and is unable to match the growing scale of global pharmaceutical manufacturing—especially complex bioprocessing of biologics, cell, and gene therapies—principally because the process is slow to deliver results, entirely dependent on human labor, subject to technician fallibility and error, unsecured, and non-compliant with data integrity regulations. In time-sensitive, highly regulated pharmaceutical manufacturing operations, these process vulnerabilities can expose organizations to significant operational, financial, and reputational risks, including loss of valuable product batches, reduced manufacturing capacity, lengthy regulatory investigations, costly enforcement actions, and delayed release of life-saving products.

Our Growth Direct platform improves the traditional MQC process, maintaining the fundamental trusted method of growth promotion, but applying advanced robotic automation, powerful optical imaging, algorithmic vision analysis, and data management to render it more scalable and efficient for the future of advanced pharmaceutical manufacturing. Our proprietary technology works by replacing human counting of growing colonies with software and algorithm detection and counting based on image analysis. We exploit the natural autofluorescent properties of microbial organisms to count microcolonies by detecting minute changes to their brightness over time using proprietary vision algorithms, without any new reagents or additional sample prep. Our system wraps this core detection technology with fully automated, high-volume, walk-away robotic sample handling and incubation, locked behind a secured interface that enables compliance with data integrity regulations.

We believe the MQC market is poised for disruption and modernization via the widespread deployment of our Growth Direct platform, and we have embarked on the mission of transforming the MQC test market to standardize on our fully automated solution.

The Growth Direct platform fully automates and digitizes the process of pharmaceutical MQC and enables our customers to perform this critical testing process more efficiently, accurately, and securely. Our platform comprises the Growth Direct system, proprietary consumables, lab information management system, or LIMS, connection software, and comprehensive customer support and validation services. Our Growth Direct system is a fully automated, high throughput instrument for daily processing of MQC samples on our proprietary consumables—a microbiology quality control lab in a box. We have achieved an automated method that is faster and produces more accurate, reliable and accessible data than the traditional method. Growth Direct delivers faster results in half

the time, and with its higher testing throughputs and capacity can absorb the vast majority of daily MQC testing in any facility. Our system increases accuracy and efficiency through full automation of the MQC process. Customers depend on Growth Direct's robust security, connectivity, and data integrity capabilities, reinforced by its high reliability with >99% uptime.

We believe we are the first company to solve the existing barriers to MQC automation. Our product platform reflects our expertise at innovating and integrating across multiple technology disciplines, including systems design, robotic handling, microbiology, optical imaging, software image analysis, data management and security, and process automation. Our business was specifically built to meet the needs of pharmaceutical manufacturing and has developed a track record of delivering reliable results for our customers, which is why we believe we are the trusted standard in microbial automation.

On a global scale, we estimate nearly 350 million MQC tests are conducted annually in thousands of dedicated pharmaceutical manufacturing facilities responsible for producing billions of doses of therapeutics every year. We estimate our total addressable market, or TAM, to be approximately $10 billion in 2021, which we expect to grow to over $14 billion by 2026. Our TAM includes both a system sales opportunity and a recurring opportunity from sales of consumables and service contracts, the latter of which is estimated to be approximately $5 billion in 2021. As we embed our products within global pharmaceutical manufacturing operations and begin to automate and digitize their workflows, we believe our platform is exceptionally well-positioned to enable the future of quality control automation and unlock further significant TAM expansion opportunities.

We employ direct commercial and service teams that drive the adoption of our products globally. We create a superior user experience from pre-sales, to onboarding, consultative validation services, onsite technical training, and continued customer support throughout our relationship. We have a scalable commercial infrastructure including a direct sales force in North America and Europe. This is supplemented with an extensive and highly specialized customer service and validation infrastructure. This infrastructure ensures successful on-boarding of the Growth Direct through both initial validation and follow-on purchases throughout the entire customer site network, where the highest volume sites may require dozens of Growth Direct systems. We currently have customers across approximately 70 sites in 14 countries and the majority of our customers have multiple Growth Direct systems and have deployed Growth Direct across multiple facility locations.

We launched the latest generation of the Growth Direct system in 2017 and have placed over 100 systems and sold over 1 million consumables globally. Our customer base includes over half of the top twenty pharmaceutical companies as measured by revenue and the manufacturers of 30% of globally approved cell and gene therapies. Once installed and validated in our customers' facilities, Growth Direct provides for recurring revenues through ongoing consumables and service contracts. Based on the significant value that our Growth Direct platform provides to our customers, we have experienced strong organic growth over the last two fiscal years, despite the impact of the COVID-19 pandemic, resulting in combined product and service revenue of $11.5 million and $14.1 million for the fiscal years ended December 31, 2019 and 2020, respectively, representing an annual growth rate of 22.9%. We generated net losses of $21.2 million and $37.1 million for the years ended December 31, 2019 and 2020, respectively.

We seek to establish Growth Direct as the trusted global standard in automated MQC by delivering the speed, accuracy, security, and data integrity and regulatory compliance that our customers depend on to ensure patient safety and consistent drug supply.

Industry background and challenges

MQC overview

MQC is the principal method by which pharmaceutical manufacturers ensure the ongoing sterility of their facilities and finished products by detecting and stopping contamination from any outside microorganisms, such as bacteria, mold, and other foreign substances. MQC is a critical component of the bioprocess and pharmaceutical production process and is regulated and mandated by the FDA under current good manufacturing practice, or

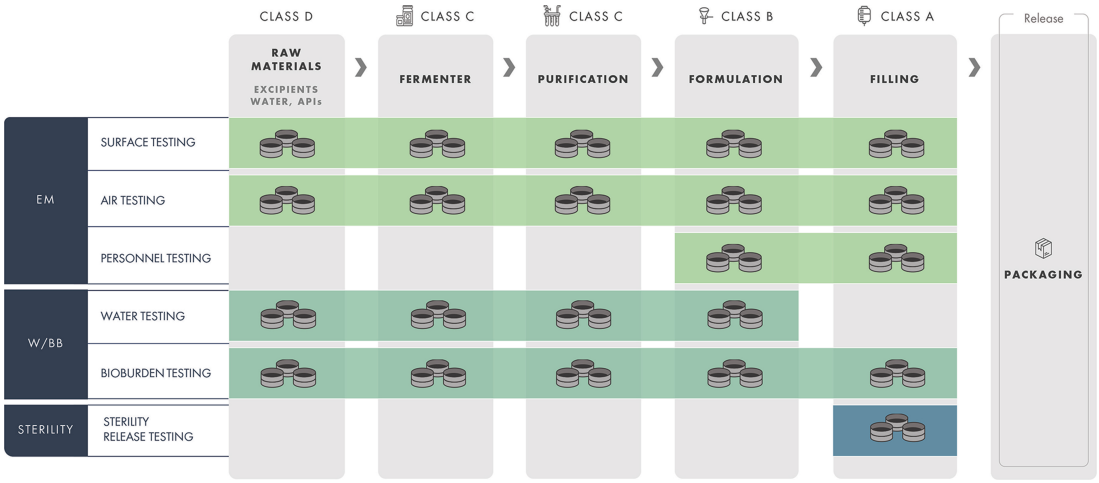
cGMP, and by other international regulatory agencies. Current MQC testing methods are manual, laborious, have lacked innovation over the past several decades.

Most bioprocess and pharmaceutical manufacturing processes follow a conventional high-level workflow:

1. **Raw Materials:** Raw materials such as excipients, active pharmaceutical ingredients, or APIs, and water are received and prepared.
2. **Upstream Processing:** These raw materials are combined and transformed through various processing steps to produce drug product.
3. **Downstream Processing:** The drug product is formulated and aliquoted into its dosage form in a fill / finish operation.
4. **Fill/Finish:** Finally, finished doses are packaged and prepared for release.

These process steps occur in manufacturing suites in ISO designated clean rooms, with increasingly stringent controls denoted by escalating cleanroom class (with Class A the most controlled), as the process nears final product release.

Pharmaceutical manufacturing workflow



To guarantee the quality of the end products and the safety of patients who receive them, manufacturers must ensure that their products are free of potentially harmful microbial contamination. This requirement creates a considerable operational challenge, as the natural environment is rife with microorganisms that could pose serious risk to patients should they transit into these clean rooms and contaminate any aspect of the manufacturing process. Consequently, pharmaceutical companies must maintain strict sterility control in their manufacturing facilities by vigilantly monitoring their sites, equipment, and finished drugs, and responding quickly to any microbial contamination. This is accomplished through MQC testing, which generally encompasses four specific applications for testing of microbial contamination:

- **Environmental Monitoring (EM)**—tests the manufacturing environment, including circulating air, exposed surfaces, and personnel, and represents approximately 65-70% of global MQC test volume;
- **Water (W)**—tests any purified water used at any stage of the drug production process, including water for injection, or WFI, and represents approximately 15% of global MQC test volume;
- **In-Process Bioburden (BB)**—tests raw materials, drug substance and in-process product, and represents approximately 15% of global MQC test volume; and

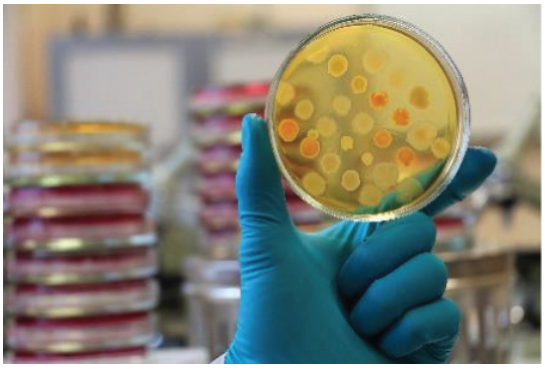
- **Sterility Release (ST)**—final testing of finished product to ensure sterility before the product is released for commercial sale, and represents less than 5% of global MQC test volume.

MQC testing occurs at high volumes due to its importance across all dimensions of a pharmaceutical manufacturing operation and must be executed daily and implemented across all production lines. As a result, pharmaceutical manufacturing facilities may conduct as many as tens of thousands to over one million tests per year.

Legacy MQC techniques and key challenges

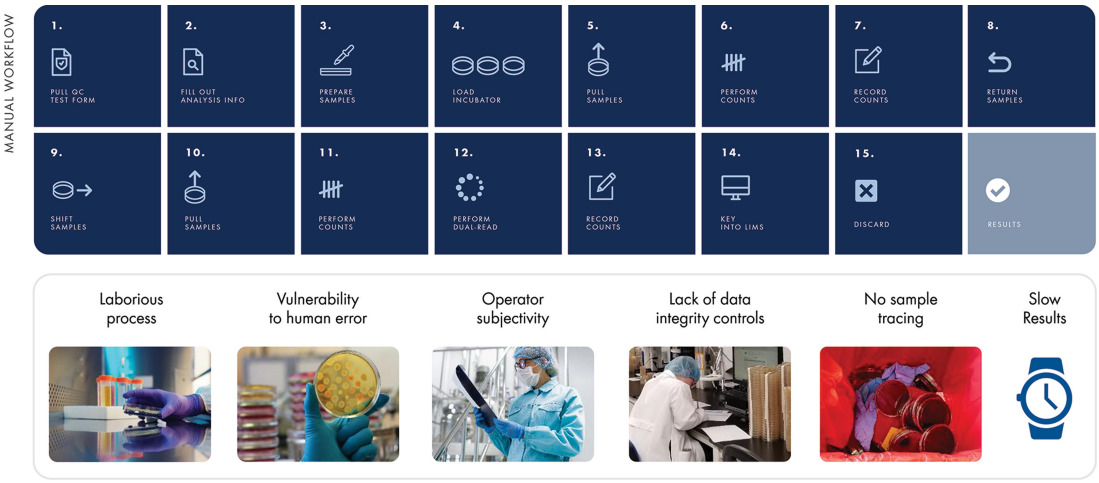
The traditional method of MQC testing, which we estimate accounts for over 95% of all MQC testing, involves detection of viable organisms by a process known as “growth promotion.” In this process, samples are collected from a manufacturing site (e.g., on equipment, water, raw materials) and deposited by various methods onto plates with a matrix (typically agar) containing growth media with nutrients that encourage microbial growth. These plates are hand-labeled, inventoried, and physically transported to a centralized MQC lab. The plates are incubated under various conditions favorable for microbial growth; a manufacturing operation may simultaneously maintain multiple different incubation conditions and processes. If the original sample is contaminated with microbial organisms, the transferred organisms will divide and expand on the test plate, eventually forming visible colonies on the surface of the growth media. Technicians inspect these plates manually, counting colonies and recording their counts by hand. Visualization of colonies indicates the original presence of viable—that is, living—organisms from the sampled location or substance, and a likely microbial contamination for investigation and remediation.

The typical MQC lab today using the traditional method



A typical MQC testing process using the traditional testing method involves 15 or more manual steps per sample, including sample collection, labeling, transport, inventory, incubation, multiple reading and re-incubation steps, final counting, data recording, and data entry. The process is inherently inefficient, with some of the early sample collection steps occurring inside the manufacturing suites spread across a campus, and others centralized in campus MQC labs, requiring sample transport. The manual handling aspect of the traditional method makes it more prone to human error than an automated alternative and can lead to extensive labor and other direct and indirect costs given the thousands to millions of MQC tests required annually per manufacturing facility.

15-step process for traditional microbial MQC method



The traditional method poses several operational problems:

- **Delayed results —** Colonies must grow to a certain size, typically 10 million cells, before the human eye is able to detect them. Across the range of organisms and incubation protocols that facilities handle, this growth time can range from 5-14 days. Until then, no definitive result can be determined, which delays any dependent processes.
- **Test subjectivity —** Once growth has occurred, a human operator will count the colonies and decide whether the number of colonies meets or exceeds their organization's threshold for remediation. However, colonies can grow together or overlap completely, or can be mistaken for other artifacts, confounding operators' ability to generate an accurate, subjective count, especially given the fact that human operators can only check plates a few times during the incubation cycle.
- **Vulnerability to errors —** Operators must manually categorize, label, track and manage numerous plates through a complex multi-step, multi-day process of incubation and analysis, risking the loss or mishandling of samples. Manual analysis of samples also requires human data collection and entry, introducing risk of mistakes during recording and transcription of data.
- **Lack of data integrity and audit controls —** The manual, traditional method of data handling faces challenges in meeting the current regulatory standards requiring data integrity. Current processes, which are often paper based, introduce risk of erroneous or fraudulent data as critical data entry points are reliant on the experience, state of mind, and motives of the individual recording them.
- **Laborious process —** Manual growth promotion is a labor-intensive, multi-step process that requires operators to cycle samples through incubators multiple times per day as they check for growth and often requires physical transport from a manufacturing facility to a centralized lab.

Lapses in traditional MQC processes and potential contamination have resulted in increased regulatory scrutiny and organizational risk, leading to lengthy regulatory investigations and costly enforcement actions in addition to product loss and resulting lost revenue. The risks and costs of inadequate traditional MQC testing include:

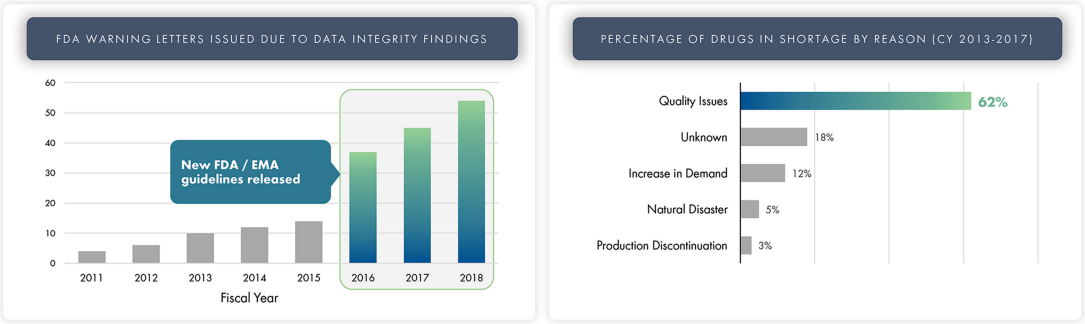
- **Global data integrity risk —** 40-50% of all warning letters issued globally contain a data integrity component.
- **Lengthy regulatory investigations —** The time to resolution of FDA 483s and warning letters is approximately 6-24 months, and even longer in some cases.
- **FDA enforcement action risk —** Risk of significant and costly FDA enforcement actions, up to and including consent decrees.

- **Significant product loss —** Up to $100 million annual product loss per company due to MQC failures has been observed in recent years.
- **Shareholder value destruction —** Potential shareholder value destruction in the hundreds of millions to billions of dollars due to MQC issues, resulting product and financial issues, potential customer concerns, and impact from negative press.

In the last several years alone, there have been numerous publicized incidents involving leading pharmaceutical companies that highlight the risk of poorly controlled, manual MQC testing and protocols, resulting in lengthy site closures, CRLs, and delays to product approvals.

Furthermore, regulatory compliance pressures in the pharmaceutical industry have generally increased over the past decade, with the FDA issuing nearly 780 Form 483s and over 180 warning letters globally for various manufacturing and quality violations in 2019. More specifically, the proportion of FDA warning letters containing a data integrity complaint has risen in recent years, as the agency devotes greater attention to that topic. We expect there to be continued regulatory scrutiny as the industry shifts to more complex biological manufacturing and manufacturing returns domestically.

Increasing industry tailwinds



Key MQC automation growth drivers

We believe several industry trends are driving need for MQC automation, including:

- **Increasing regulatory scrutiny —** Regulatory compliance pressures in the pharmaceutical industry have increased over the past decade, with the FDA issuing nearly 780 Form 483s and over 180 warning letters globally for various manufacturing and quality violations in 2019. Moreover, between 2011 and 2018, FDA inspectors issued more than 180 warning letters related to data integrity problems. Other international regulatory agencies are also defining and increasingly enforcing the highest standards for consistent data robustness, including the U.K. and the World Health Organization.
- **Data integrity and need for remote, real-time monitoring of facilities —** Facing increased data integrity scrutiny from regulatory authorities in their quality control lab and manufacturing areas, pharmaceutical manufacturers must focus on meeting these regulatory requirements as defined by the FDA and other international regulatory bodies. Breakdown of data integrity, even if inadvertent, can result in warning letters, refusal to approve applications, and even product bans from a jurisdiction. Additionally, given the increasingly complex nature of biopharmaceutical manufacturing, there is a growing need to be able to monitor MQC testing in real-time and remotely to ensure the constant quality of production processes.
- **Expansion of high growth biologics and advent of new, more complex therapeutic modalities such as cell and gene therapies —** At $1 trillion in sales in 2021, the global prescription drug market is large and growing, driven by demand for new therapies, such as biologics and cell and gene therapies. The global biologics market is expected to grow at a 9.6% CAGR through 2026 according to EvaluatePharma, and

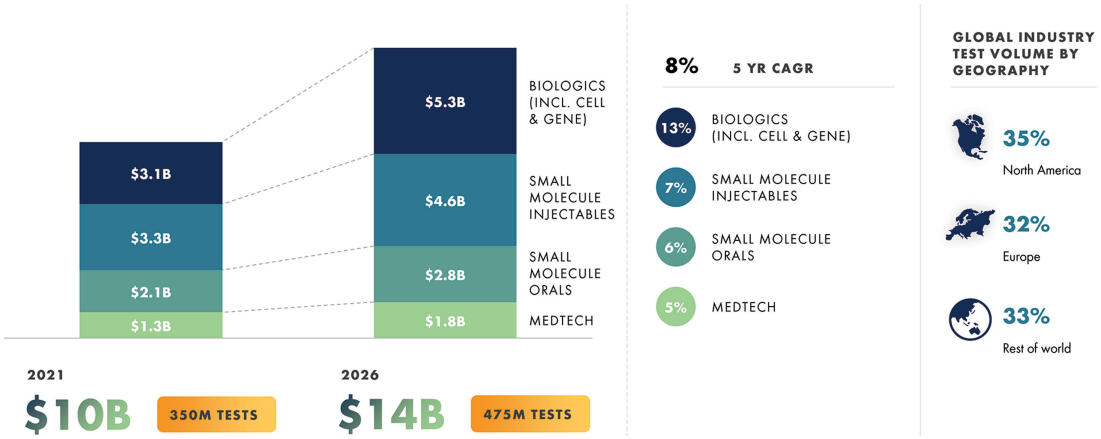
account for 35% of prescriptions and 55% of total revenue of the top 100 drugs, driven in part by the rise in the burden of chronic diseases and growing demand for innovative therapies. Within the biotechnology segment, certain modalities are growing even faster, such as cell and gene therapies, where MQC testing volume is projected to grow at a 10-30% CAGR through 2026. Biologics, cell, and gene therapies require complex multi-step manufacturing processes which demand efficient automated MQC processes. These complex biologics have the highest MQC testing intensity per batch of manufactured product, given that they are often manufactured in a highly modularized fashion where each manufacturing batch often represents an individual dose to a specific patient. These dynamics extend to CDMOs, which continue to benefit from increased outsourcing and the need for contract partners that can manufacture these complex therapeutics.

- **Greater efficiency and focus on six sigma lean manufacturing principles —** The pharmaceutical industry is under significant pressure to commercialize products faster in order to maximize their patent life. There is continued focus on concepts such as lean manufacturing and six sigma to drive efficiencies in the manufacturing process and a greater emphasis on automating MQC testing to reduce errors and decrease manufacturing lead times and inventory requirements in supply chains. The complex nature of emerging biologics and novel therapeutics such as cell and gene therapy also require increased focus on efficiency and precision manufacturing. For example, autologous cell therapies require collection of patient tissue, ex vivo manipulation of these cells, and delivery via reinjection into patients—all steps which must be conducted within a short time span, and with absolute microbiological sterility. Such “vein-to-vein” processes require an intense focus on purity and contamination control throughout every step of the manufacturing workflow, given the value of the individualized ingredients and fast turnaround time required to deliver the therapy back to the patient.
- **Rebuilding of domestic growth supply chain / increased scrutiny of outsourced materials with focus on reshoring drug development process —** The pharmaceutical industry has historically embraced a global supply chain which has provided cost advantages made available by offshoring certain services, such as drug and API manufacturing. However, many companies are pushing to re-shore their global supply chains to resume domestic manufacturing, in part driven by recent supply chain disruptions from the COVID-19 pandemic as well as the potential for geopolitical and intellectual property infringement risk. We believe the reshoring of manufacturing operations will further necessitate the need for efficient automated MQC testing.

Market opportunity

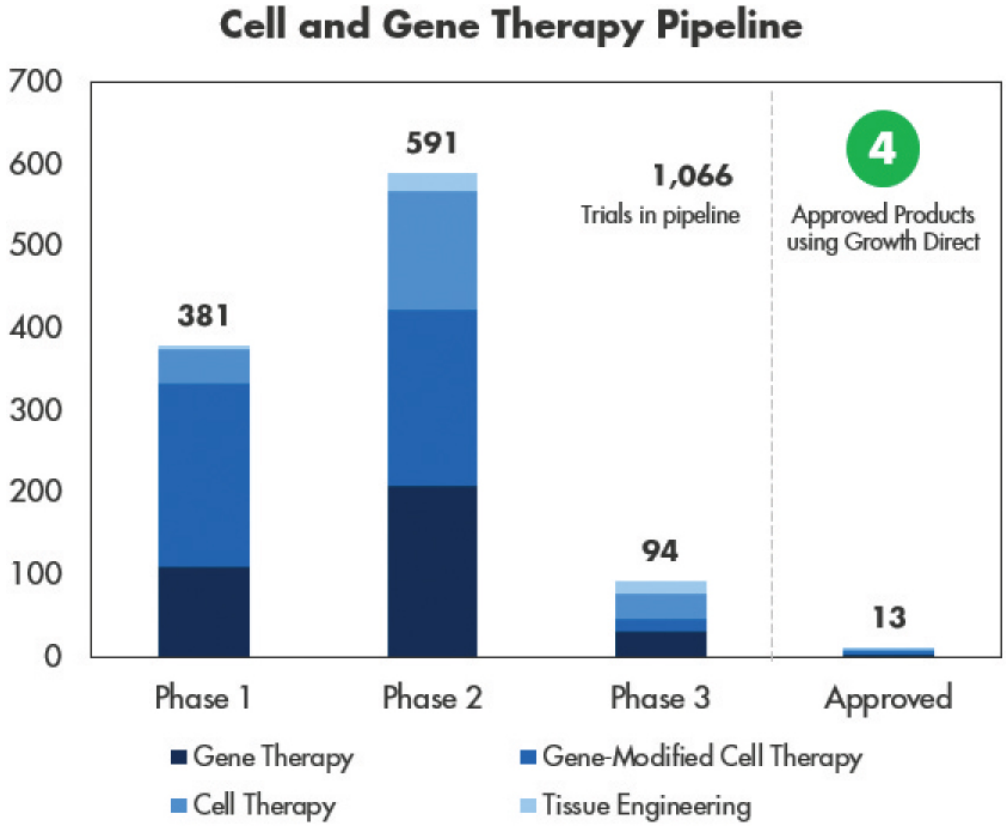
Our core market of MQC testing encompasses a ubiquitous and high-volume testing process deployed across all pharmaceutical manufacturing operations. We address a total systems, consumables, and services market that we estimate to be approximately $10 billion in 2021 and is forecasted to grow at an approximate 8% CAGR to over $14 billion by 2026. We based our estimated TAM on total potential demand for our products derived from research we commissioned conducted by Health Advances LLC and our current pricing. Our TAM includes both a system sales opportunity and a recurring opportunity from sales of consumables and service contracts, the latter of which is estimated to be approximately $5 billion in 2021. We estimate that our global addressable MQC testing market represents approximately 350 million MQC tests annually in 2021 and is expected to grow at a CAGR of 8% to a total of approximately 475 million tests by 2026. This aggregate test volume is composed of MQC testing across several addressable end markets, including biologic therapeutics such as cell and gene therapies, vaccines, and protein therapies (approximately 125 million annual MQC tests); small molecule orals (approximately 90 million annual MQC tests); small molecule injectables (approximately 100 million annual MQC tests); and medtech products (approximately 35 million annual MQC tests). We serve this market across three geographic territories: North America, which accounts for approximately 35% of the global MQC testing market, Europe (approximately 32%), and the rest of the world (approximately 33%).

Our core total addressable market



We are especially focused on serving the high-growth biologics, cell, and gene therapy markets, which have the highest MQC testing intensity per batch of manufactured product. We seek to drive substantial growth by establishing Growth Direct as the standard for MQC automation in advanced bioprocessing for biologics, cell, and gene therapies. MQC testing for these complex therapeutics modalities is forecasted to grow at a 10-30% compounded annual growth rate through 2026. Because these advanced modalities require complex multi-step manufacturing processes with individualized batches and increased product handling, we believe traditional MQC will not scale efficiently to serve this end market, and that the Growth Direct is well positioned to address this opportunity. The need is further highlighted given we have observed an increased scrutiny by regulators and concerns over data integrity, particularly for complex therapeutic manufacturing where MQC is still dominated by legacy, manual processes. We estimate MQC testing for biologic therapeutics will grow at a 13% CAGR from 2021 through 2026. As the sector continues to witness significant advancement, we estimate that nearly 50% of our total TAM growth through 2026 will be driven by the biologics, cell, and gene therapy end markets. Within the cell and gene therapy category, the need for faster, more efficient manufacturing presents an attractive targeted growth opportunity for Growth Direct. Thirty percent of globally approved cell and gene therapy products use Growth Direct to automate MQC, and the remaining 1,000+ cell and gene therapies in Phase 1 to 3 clinical trials represent a significant opportunity for our business.

Cell and gene therapy market and pipeline



Our business is further well-positioned to execute on several TAM expansion opportunities. We believe there is an opportunity to expand our existing automated MQC testing solution in adjacent markets such as personal care product manufacturing, where our Growth Direct platform is currently in use and which we estimate presents an approximately $8 billion opportunity with an estimated 270 million MQC tests annually. We based this estimated TAM on total potential demand for our products derived from research we commissioned conducted by Health Advances LLC and our current pricing. We also intend to develop services and products to allow us to deliver integrated QC workflows not currently addressed by our Growth Direct platform, which we estimate represents an approximately $10 billion opportunity. We based this estimated TAM on potential demand derived from our own market research and current pricing of comparable integrated products in other markets. Combined with our core TAM, we believe these expansion opportunities could increase our potential TAM to $32 billion.

The Growth Direct platform

Our proprietary Growth Direct platform fully automates and digitizes the trusted growth-based method of MQC and enables customers to perform this critical testing process more efficiently, accurately, and securely. Our platform comprises the Growth Direct system, proprietary consumables, LIMS connection software, and comprehensive customer support and validation services. The platform's suite of products reflects our expertise at innovating and integrating across multiple technology disciplines, including systems design, robotic handling, microbiology, optical imaging, image analysis, data management and security, and process automation, and is supported by our unwavering commitment to the highest level of customer support.

Our technology

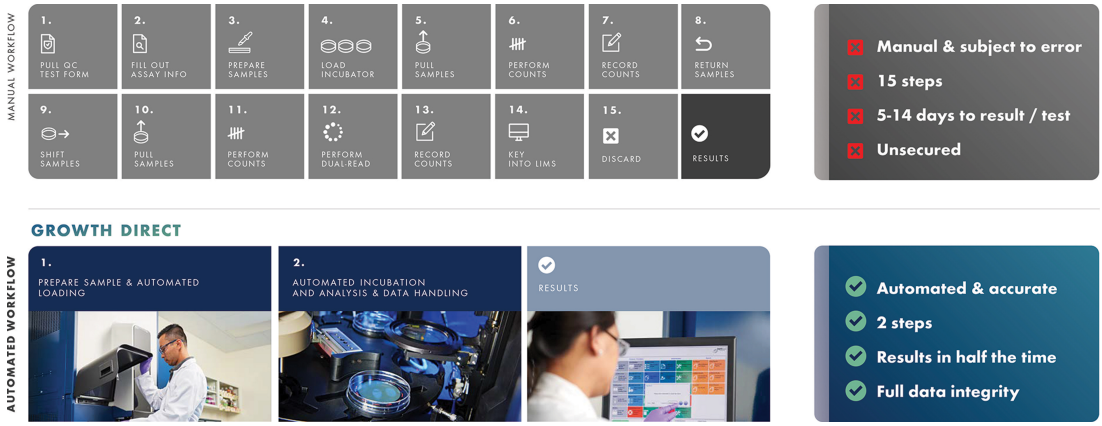
To date, prior technology products have not succeeded in automating MQC workflow at scale, due to a combination of insufficient platform throughput, lack of full automation, and non-viable technology approaches. Most testing

solutions on the market that seek to replace the traditional method diverge from directly measuring microbial growth, using alternative analytical technologies that often require additional reagent preparation and that do not deliver the same results as the existing traditional method. These methods are difficult to validate relative to the traditional method and have therefore seen low adoption across the industry.

Growth Direct method

The Growth Direct method relies on a fundamental property of all microorganisms—they contain cellular components required for growth, called flavins and flavoproteins, that autofluoresce, or glow, without the addition of reagents under certain frequencies of light. Our proprietary system detects microcolonies of microorganisms by illuminating them with blue-spectrum light and directing the resulting green-spectrum signal onto a Charged-Coupled Device, or CCD, chip—an array of independent photosensitive pixel elements. Our image analysis software interprets these light signals and counts the clusters of illuminated pixels representing each microcolony. The end result is an automated method that is faster and produces more reliable and accessible data than the traditional method. 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 85% of the manual steps of traditional MQC, generating significant time, operational, and cost savings for our customers.

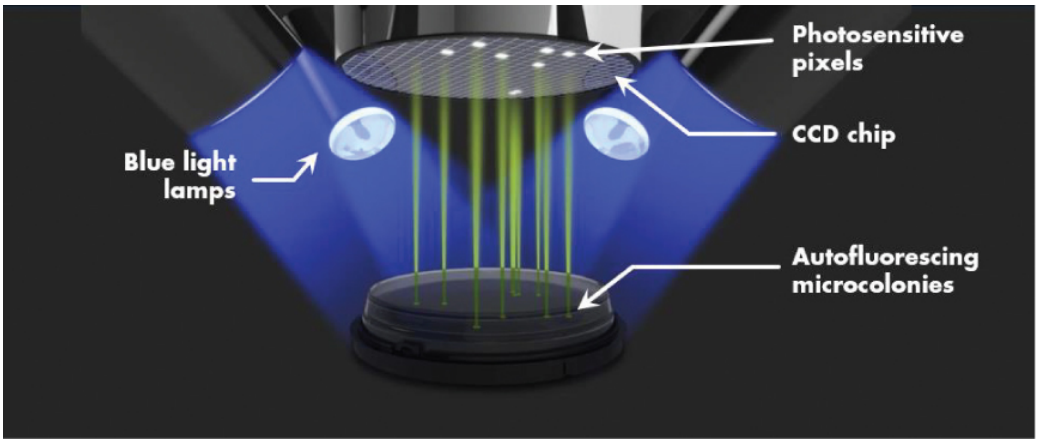
Traditional microbial method compared to Growth Direct method



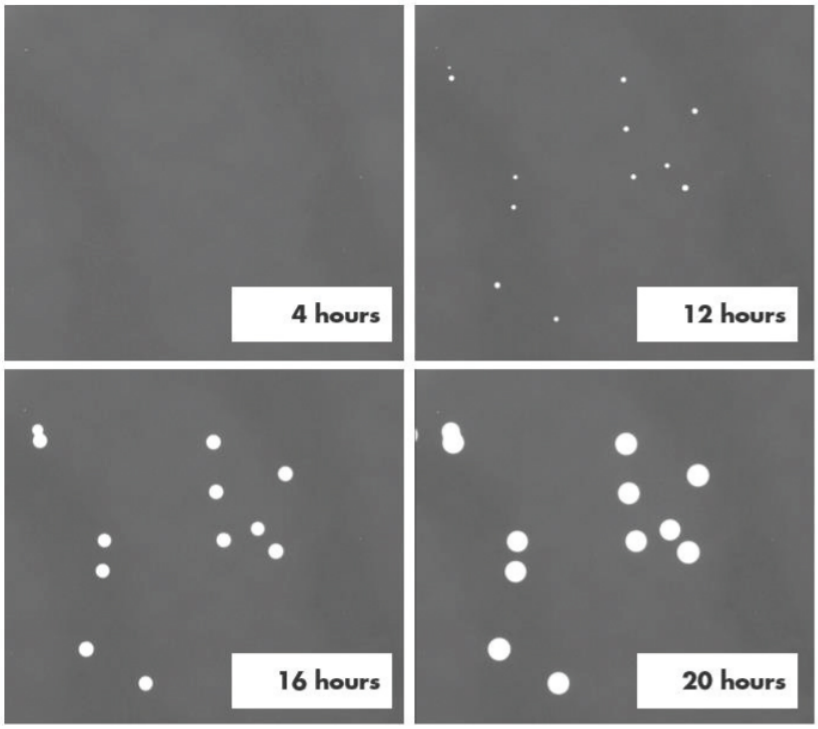
Core detection technology

Our system illuminates samples using an array of high-intensity blue LED lights, which causes microcolonies to autofluoresce without destroying them. All microbial cells autofluoresce in the green-spectrum when illuminated with blue LED light. A CCD chip captures images with illuminated pixels wherever autofluorescence from microbial cells is detected. Our software detects and registers the clusters of illuminated pixels that represent underlying microcolonies. The system generates a time series of images as the sample incubates and is imaged every four hours. Finally, vision analysis software continuously evaluates the time series for evidence of growing colonies, represented by increasing signal intensity and size of illuminated groups of pixels.

Illumination of a sample via a blue LED light causes microcolonies to fluoresce



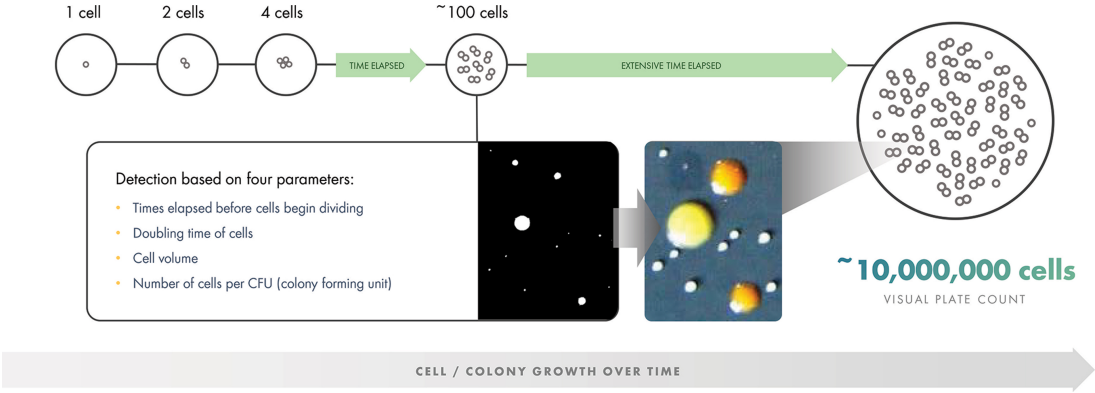
Growing autofluorescent *S. aureus* microcolonies in Growth Direct imaging time series



A key feature of detection via imaging of autofluorescence is that this approach does not harm cells, and as such is a non-destructive method. This provides several benefits, including ensuring that detected colonies represent actual viable microbial contaminations, and permitting detected microcolonies to grow into visible colonies for use in subsequent microbial identification for root cause investigation follow-up.

Our platform can detect microorganism growth at the microcolony stage at approximately 100 cells, which typically occurs in half the time required for visual plate counting to detect visible colonies by eye at approximately 10 million cells.

Growth Direct finds colonies earlier than operators using visual plate inspection.

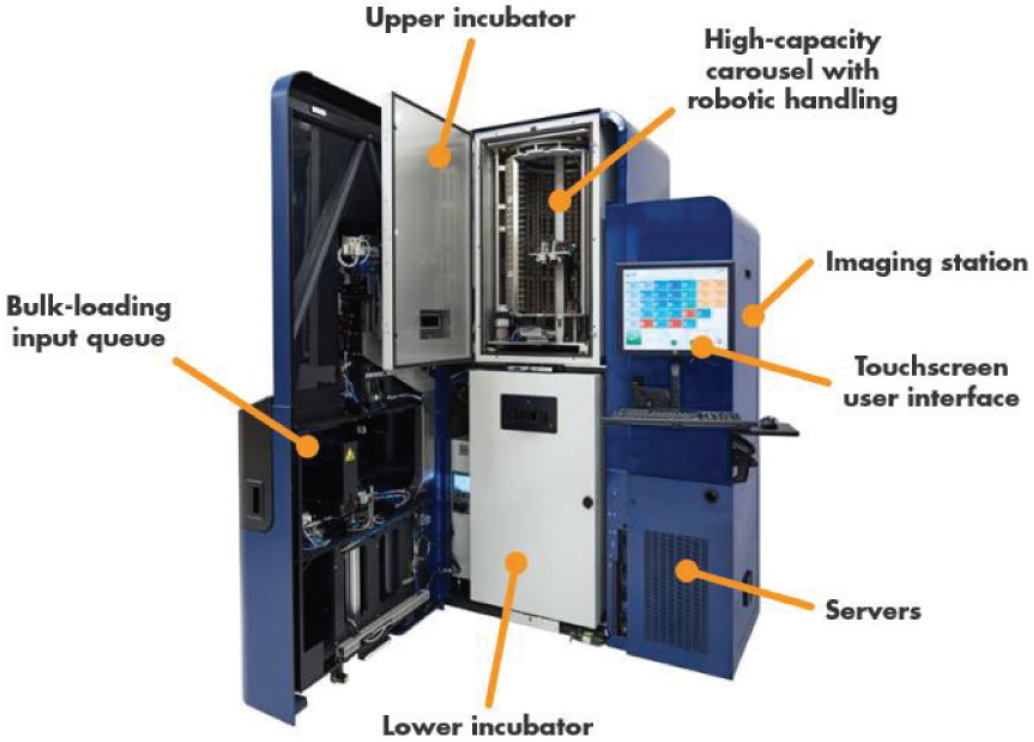


System components and workflow

The Growth Direct system comprises two automated and temperature-controlled incubators, robotic sample transport systems, an advanced imaging system, two servers (one for system control, the other for image analysis) and associated hardware and staging required for the handling of up to 700 of our consumables.

The overall workflow of the automated Growth Direct method mirrors the traditional visual plate counting assays, allowing for operator familiarity of use, ease of integration into existing MQC protocols, and a streamlined regulatory validation process.

Growth Direct system components



The Growth Direct workflow begins when microbial organisms are collected on proprietary growth media plates using the same collection methods as the traditional method—via direct contact, air settling or air filtration for

environmental monitoring testing, or via funnel filtration of liquid samples onto the membrane of the consumable for water or bioburden testing. For ease of use, our consumables are compatible with existing hardware, such as active air samplers or liquid filtration systems, and are supplied by us with identical nutrient agar media as traditional media plates.

A Growth Direct operator loads the system in bulk using two carriers designed to hold up to 60 of our consumables each. A key benefit of the Growth Direct is that the system can be placed directly in a production area, compared to the traditional method which often requires transporting samples to a centralized lab for testing. Our consumables are pre-labeled with unique bar codes for forensic trail identification, management and to enable data integrity compliance. Every consumable bar code contains a unique serial number that allows traceable information to be captured by two bar code scanners on the Growth Direct system. That allows metadata such as sample location, time, type, test protocol, and operator to be captured and associated with each consumable result. Intake sensors within the system automatically read, identify, and catalog the bar-coded samples, after which the samples are transferred from the loading queue to one of two independently controlled incubators, which together have a capacity of 700 of our consumables, and which support the operation of multiple custom incubation protocols. Once loaded into the system, consumables cannot be removed or tampered without generating an auditable record of actions by an operator.

During the incubation phase, the Growth Direct captures images of each consumable at intervals of four hours. To perform the imaging, the system transfers consumables from the incubator to the imaging chamber, illuminates them using a blue-spectrum light and captures autofluorescence signals in a high-resolution image using the CCD camera. Samples are returned to the incubators to continue their incubation protocols. Automated sample handling means no sample is ever missed for testing or replaced into the wrong incubator or accidentally discarded.

Over the course of the incubation protocol, the system’s image analysis software uses proprietary algorithms to analyze the behavior of autofluorescent objects over an accumulating time series of images, enabling the Growth Direct to identify and count growing microcolonies and distinguish them from non-living debris.

After the image analysis is complete, the system reports the number of growing colonies found on the surface of the consumable. The result data can be printed or transmitted to LIMS via our LIMS connection software for storage and user review. When a sample demonstrates growth that exceeds the threshold for contamination set by the organization, automatic email alerts notify quality personnel of a possible contamination before the end of the incubation period. A powerful yet intuitive user interface allows the operator to track the consumables in the system throughout the testing process and monitor the results in real time, which offers a significant advantage to the manual and traditional method that has to wait to the end of the incubation before counting. After results are reviewed, the consumable can either be unloaded to a carrier for further microbiological identification or automatically discarded as waste at the operator’s discretion.

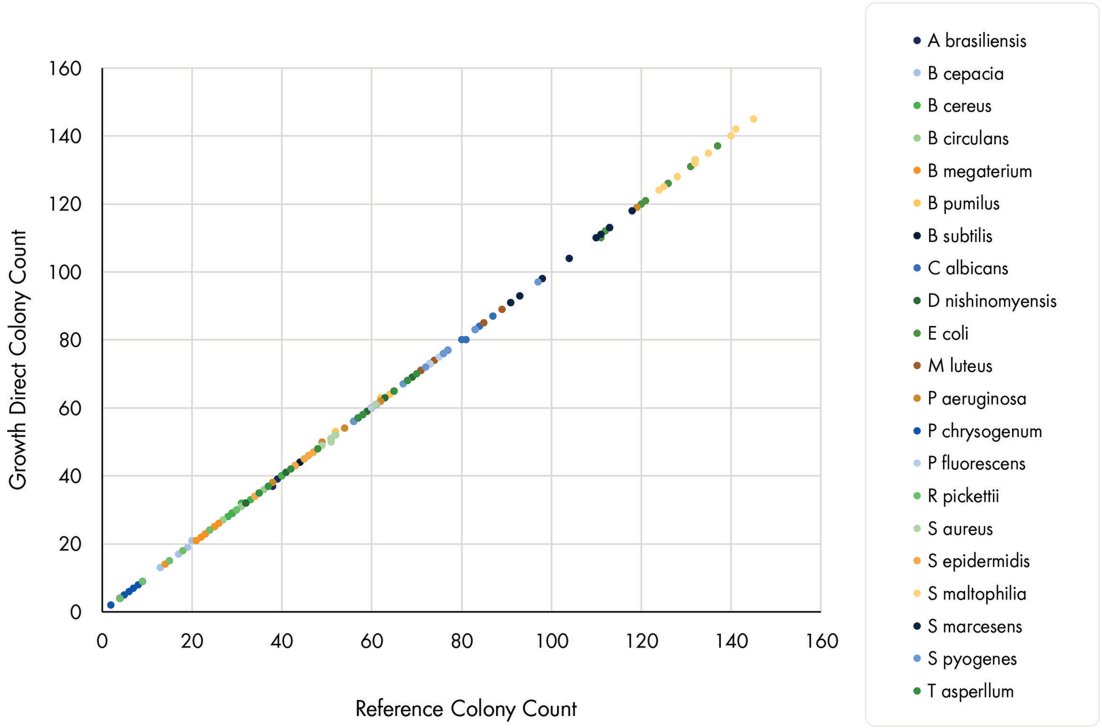
Validation framework

We have demonstrated the accuracy, speed, and reliability of detecting microcolonies using the Growth Direct’s automated image analysis compared to conventional methods through numerous scientific studies.

Accuracy. The Growth Direct is highly accurate when compared to traditional methods. Studies of the Growth Direct comparing its vision-based detection and enumeration of colonies against the MQC gold-standard USP <61> benchmark reference set of micro-organisms demonstrate that the Growth Direct delivers the same results or better as traditional, manual verification of colonies.

The figure below demonstrates the accuracy of the Growth Direct imaging and analysis technology compared to a reference count produced by an analyst interpreting the image data created by the software. A wide range of organism types—both mandated by the United States Pharmacopeia, or USP, and those commonly found in pharmaceutical facilities—were evaluated.

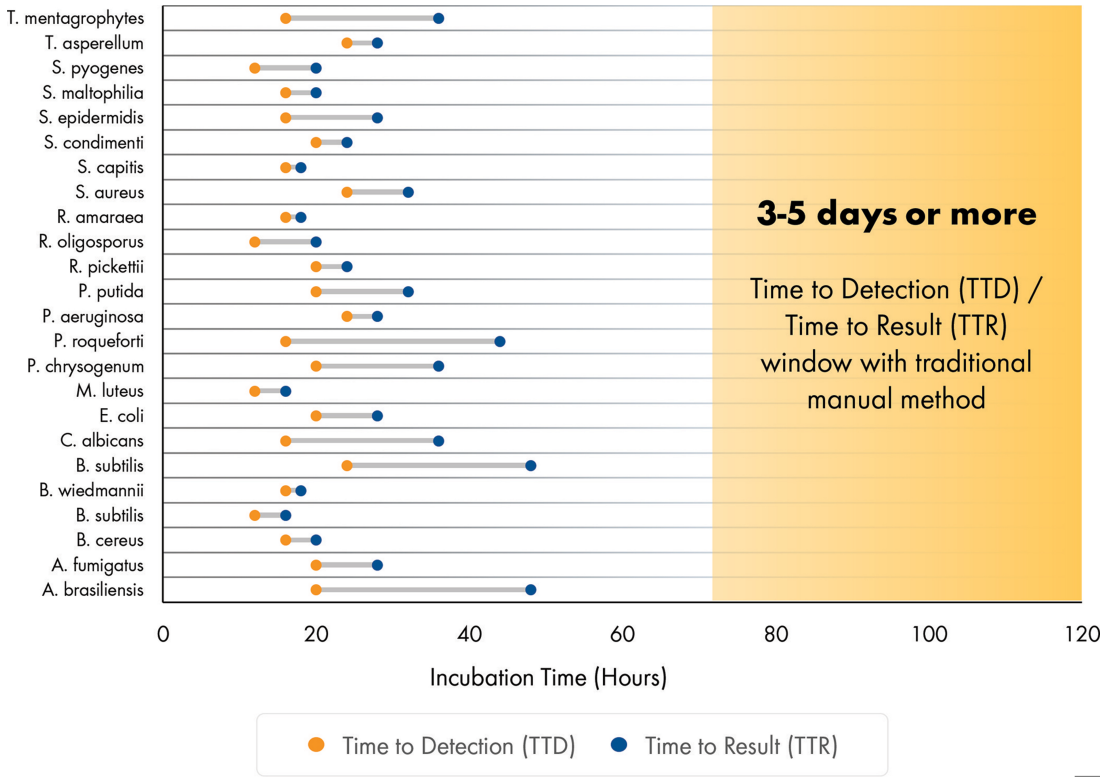
Growth Direct colony count accuracy vs. standard reference



Speed. The Growth Direct is faster than the traditional method. Across a range of organisms of interest, the Growth Direct detects colonies in half the time or faster.

The figure below shows the time to detection, or TTD, and time to result, or TTR, in hours for a wide range of pharma lab-relevant microorganisms using the EM application on the Growth Direct system compared to the TTD/TTR window using traditional manual tests (72+ hours).

Growth Direct time to result vs. traditional method



Reliability. The Growth Direct is more reliable than the traditional method for accuracy of organism enumeration. In studies of environmental monitoring plates incubated for five days, which compared Growth Direct's vision-based detection and enumeration to visual counting conducted by technicians, the Growth Direct regularly identified and counted colonies that technicians missed, as shown by the counts in the shaded area in the figure below.

Growth Direct colony detection reliability vs. traditional method

Our Growth Direct platform

We pioneered the Growth Direct platform—a combination of our novel Growth Direct system, proprietary consumables, LIMS connection software, and comprehensive customer support and validation services—to fully automate and digitize the process of MQC in the sterile manufacturing of important health care products.

The Growth Direct system

Our latest version of the second-generation Growth Direct, launched in 2017, reflects our deep experience with delivering automation to the MQC market. The Growth Direct system is a fully automated, high throughput system for processing MQC samples—a microbiology quality control lab in a box. The Growth Direct contains two high-capacity incubators, an advanced imaging system and internal robotics for sample handling. The system enables walk-away bulk sample loading, holding 700 of our consumables per system. Its dual, independently controlled incubators automatically manage multi-temperature incubation protocols. Onboard imaging and vision software detects and counts microbial growth, delivering test results in half the time of the manual method. The system's compact 57" x 39" x 95" size delivers these benefits in a footprint that allows customers to place the Growth Direct directly in manufacturing suites of various sizes compared to the traditional method, where samples are often required to be transferred to a centralized lab. Co-location in manufacturing minimizes delays to incubation and errors introduced by sample transfer to the QC lab. Growth Direct brings the lab to the manufacturing floor, for in-line / at-the-line automated MQC testing, anywhere in the facility or manufacturing campus.

The Growth Direct system

Proprietary consumables

We offer two proprietary consumables plates to capture test samples for analysis on the Growth Direct: (1) an Environmental Monitoring, or EM, consumable and (2) a Water / Bioburden, or W/BB, consumable. Both types are custom-designed proprietary consumables with specific mechanical and optical features to facilitate automated handling and image processing within our Growth Direct system and have bar codes for tracking and data integrity. Two bar codes are used—one applied during our manufacturing process to define the media type and expiration dates, and a second that is generated by the Growth Direct system at time of testing that defines the sample ID and LIMS number. The consumables incorporate multiple standard media for each application as both products are based on the traditional growth method.

Growth Direct Environmental Monitoring and Water / Bioburden consumables

Environmental Monitoring Consumable

Water / Bioburden Consumable

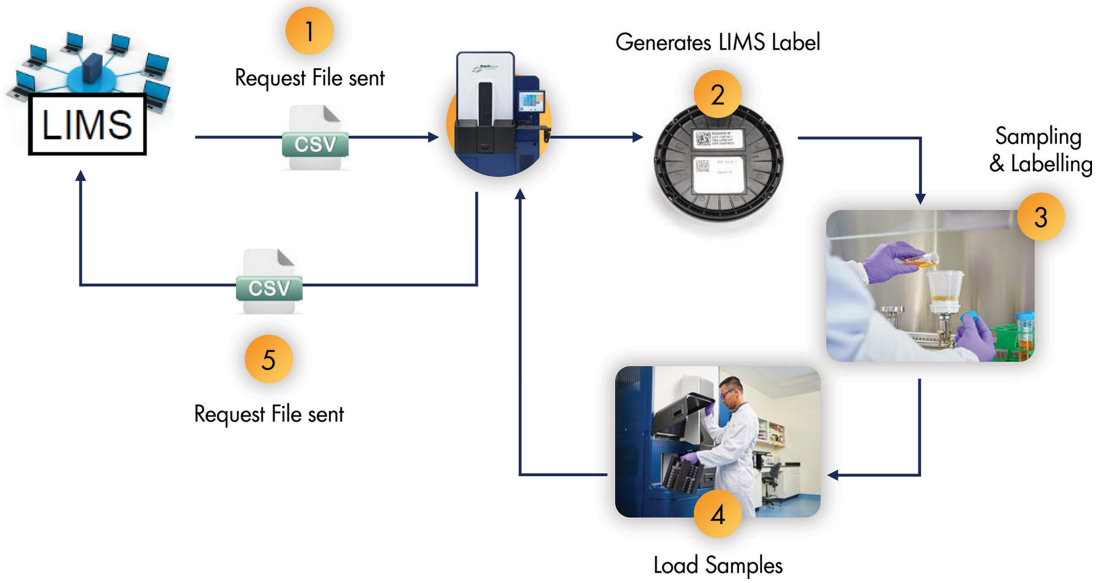
In addition, we are developing a growth-based rapid automated sterility test for use on the Growth Direct system. Rapid sterility tests are utilized for final release testing in any facility that manufactures sterile products such as biologics and sterile injectables, as a final quality check before shipment. The traditional sterility test utilizes a growth method that requires at least 14 days to deliver final results, during which time dependent manufacturing steps are paused or proceed at risk, or final products are held in inventory. This causes delays to patient access and manufacturer revenue recognition as well as excess inventory costs. Sterility tests are especially valuable in vaccine manufacturing to enable faster release and greater capacity, and in cell and gene therapy manufacturing environments given the challenging balance of purity, contamination control, and speed required in the manufacturing of those products. For example, vaccine production requires two or more sterility tests during manufacturing, each of which imposes a 14-day delay on the production process. In total, release of critical vaccines can be delayed by months. Similarly, autologous cell therapies require collection of patient tissue, *ex vivo* manipulation of these cells, and delivery via reinjection into patients — all steps which must be conducted within approximately two weeks, which the traditional method of sterility testing exceeds, causing delays or requiring release of the product at risk.

When commercialized, we expect our rapid sterility test will reduce the traditional method's 14-day time to results by at least 50%, permitting faster final release, with the goal of speeding critical drugs and vaccines to market. When released, we expect our rapid sterility test will also deliver the other benefits of the Growth Direct platform, including increased efficiency, reduced risk of errors, and enabling data integrity compliance. Our development program is supported by contract funding from U.S. Department of Health and Human Services Biomedical Advanced Research & Development Authority, or BARDA, which is supporting the development of improvements in vaccine production methods that accelerate the availability of vaccines against viruses with pandemic potential.

Growth Direct LIMS connection software

Our Growth Direct allows for two-way integration to LIMS enabling a fully paperless workflow. The bi-directional LIMS connection uses the widely supported comma-separated values, or CSV, file format to communicate, delivering compatibility with all existing LIMS. The connection supports the use of LIMS for Growth Direct created barcodes that are applied to our consumables. After sampling, the consumables are loaded into the Growth Direct system, which performs the incubation, detection and enumeration of colonies. Final results are automatically uploaded to the LIMS. This eliminates the risk of human error that could arise from manually entering the results, while improving efficiency. Moreover, the LIMS connection eliminates the need to use paper in the lab and delivers information to stakeholders in a secure manner, designed to enable compliance with data integrity regulations.

Growth Direct LIMS connection



Our service team works directly with customers' IT teams to help integrate Growth Direct software into their LIMS for seamless connectivity.

Validation services

As part of our customer support experience, we offer full validation support to ensure customer success with the Growth Direct. This offering helps our customers validate their Growth Direct for full routine use faster, typically in just three to nine months, and develops confidence in the operation of our platform.

Support begins prior to system purchase when our sales representative brings in a validation expert for consultation about specific application requirements. The validation teams offer a complete array of documents and services to support validation efforts, including:

- Installation Qualification
- Operational Qualification
- Performance Qualification
- Time-To-Results Qualification, or TTR
- 21 CFR Part 11 Assessment
- Method Qualification/Method Suitability

Once initial systems are validated, our customized validation approach allows customers to quickly validate follow-on systems through a Technical Transfer Method, facilitating faster adoption throughout their site network.

Customer support

We offer full 24/7 maintenance support via our annual service contract. Purchase of the Growth Direct comes with one-year warranty, after which customers may purchase annual maintenance packages. Our maintenance support package offers access to a staffed online and phone help desk with knowledge base, remote management and troubleshooting, and a 24-hour response time from our on-site field service engineer team.

Key advantages of our Growth Direct platform

Several factors differentiate our technology and will continue to be significant drivers of customer adoption of Growth Direct:

- **Faster Results at Higher Testing Throughputs and Capacity —** The Growth Direct uniquely combines superior detection and enumeration capabilities—translating to a 50% reduction in detection time compared to the traditional method—with a high-throughput, 700-sample total capacity form factor. This allows Growth Direct to offer a large volume automated testing solution that allows for fewer investigations, more targeted interventions, and more uptime for manufacturers, therefore saving time and money.
- **Increased Accuracy through Automation —** The automation of both sample handling and enumeration virtually eliminates human errors from the MQC process. Samples are transferred automatically at the right time, reducing the risk of sample loss, misplacement or mislabeling. The Growth Direct also more reliably distinguishes distinct colonies, hence avoiding the subjectivity that human operators introduce through visual inspection of plates.
- **Increased Process Efficiency —** Faster time to results means faster decision-making and intervention in the event of contamination, preventing production of contaminated batches, and reducing waste and overproduction. Meanwhile, elimination of unnecessary manual labor allows skilled MQC specialists to spend time on test design, interventions, standard operating procedure, or SOP, updates and other critical tasks.
- **Robust Security and Connectivity —** Growth Direct can integrate with existing LIMS, allowing for seamless data transfer from the system to the LIMS. This connection not only makes it easier for quality control

personnel to handle and process their testing data, but it also allows other stakeholders to instantly access information critical to continued production.

- **Superior Data Integrity —** By maintaining accurate, complete, and intact records within their original context, Growth Direct ensures the trustworthiness of data. Moreover, data reside in permanent form for the lifetime of the record, easily accessible to authorized users, which allows operators to analyze trends over time for timely, cost-saving decision-making. The system is designed to enable compliance with industry data integrity standards such as 21 CFR Part 11, which set forth the FDA's standards for electronic records and electronic signatures.
- **High Reliability with Clear Path to Validation —** The Growth Direct delivers the reliability that customers need for their mission-critical manufacturing processes, with a consistent record of over 99% uptime in live production use. Our platform's reliability is further supported by our 24/7 support infrastructure and extensive regulatory validation services to ensure quick and seamless integration with customer's facilities and IT systems.

Competitive strengths

We believe our continued growth will be driven by the following competitive strengths.

- ***Our proprietary technology platform offering best-in-class automated and secure MQC testing —*** Our platform was purpose built to meet the growing demands posed by the increasing scale, complexity, and regulatory scrutiny of global pharmaceutical manufacturing. We believe that our Growth Direct leads the industry in throughput, accuracy, reliability, security, and data integrity. Compared to the traditional method, 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 85% of the manual steps of traditional MQC, generating significant time, operational, and cost savings for our customers. Growth Direct is backed by our comprehensive validation and value-added service offerings, which create a continuous, positive touch point with our customers. Altogether, we believe our technology and service platform best address the growing needs of our customers.
- ***Our investment and patent-protected innovation across multiple technology disciplines —*** Our platform reflects our expertise at innovating and integrating across multiple technology disciplines, including systems design, robotic handling, microbiology, optical imaging, software image analysis, data management and security, and process automation. Through multiple years of development and investments from both investors and institutional partners, such as BARDA, we have amassed a core set of technologies that form the foundation of our growing suite of products and solutions. We also believe that our first mover advantage in automated MQC testing reinforces our growing position in this market, with over 15 years of customer development and feedback, technical development, advocacy, and customer success. We continue to focus on investing in our business and have a well-defined product roadmap which includes development of new, innovative products, as well as advancements to our existing suite of technologies. Moreover, we have a strong intellectual property portfolio, including at least thirty issued or granted patents globally with eight U.S. issued or granted patents and thirty-nine pending patent applications globally with seven U.S. pending patent applications as of March 15, 2021.
- ***Top-tier customer partners establishing Growth Direct as an industry standard globally —*** We have cultivated long-standing and collaborative relationships with our significant and growing customer base. We originally developed our platform in close collaboration with our customers, and our customers' success in validating our technology constitutes a major driver for platform deployment. Moreover, our comprehensive validation, value-added service, and customer support offerings create a continuous touch point with our customers, cementing the value and integration of our products. Through these efforts, we deliver high quality experiences at every step of the customer journey which creates and strengthens our customer loyalty.
- ***Deep integration into heavily regulated pharmaceutical manufacturing processes —*** Our products are entrenched within our customers' workflow and the majority of our customers have purchased multiple

systems and at multiple locations. For every drug product manufactured or in development, our customers are required to establish a validated QC process that they can execute consistently and reliably. Customers typically dismantle manual testing infrastructure after switching to our platform, creating enormous switching costs that get amplified by the network effect of linked systems and data aggregation across customer sites. Since initial installation, our relentless focus on providing robust validation support ensures assimilation of our platform into our customers' SOPs, further contributing to customer captivity. We believe that our first mover advantage has further enabled us to become deeply rooted within our customer's facilities and provide for ongoing opportunity with our existing customer base.

- ***Our highly attractive business model that leverages our growing installed base of systems to generate persistent recurring revenues through consumables and service contracts —*** Once embedded and validated in our customers' facilities, our Growth Direct provides for recurring revenues through ongoing consumables and service contracts. When our customers invest in our technology, they commit to a long-term use of our products. Our customers regularly purchase our proprietary consumables to perform MQC testing and maintain their systems via annual service contracts. Our products are used daily in our customer's facilities and their key workflows, reinforced by regulatory requirements that are driving the industry towards further automation. Once validated, additional systems can be deployed to absorb the majority of test volume in a facility. Moreover, once a Growth Direct system is installed within a customer's facility, it provides for an opportunity to place additional systems in existing and new facilities, which can be installed and validated in a faster, more efficient manner given the comprehensive validation process for the initial system.
- ***Ability to leverage our extensive regulatory expertise to better serve our customers' needs—*** We believe we are a thought-leader with respect to regulatory requirements. We have a long history engaging with the major regulatory bodies in our industry, such as the FDA and European Medicines Agency, or EMA, some of whom are also our customers. Our regulatory strategy has benefited our business in several ways, including: 1) by achieving the definition of the Growth Direct Technology as an "automated compendial validation" in key trade group and regulatory issuances, such as the Parenteral Drug Association, or PDA, Technical Report 33, and USP chapter <1223>; 2) by working with industry and regulatory forums to define a fast validation strategy that allows a short timeline routine testing implementation; 3) and by helping our customers obtain regulatory acceptance from the EMA and the FDA for the use of our technology and validation strategy for new drug applications with the Bioburden application (EM and water do not need regulatory license change). Our technology has also been audited regularly by regulatory inspectors as part of routine audits of customer sites, with no citations received to date. We have also succeeded in securing a substantial long-term government contract from BARDA to support development of new products as part of an ongoing partnership concerning areas of shared strategic interest regarding accelerated pandemic vaccine release.
- ***Our experienced management team and workforce with deep domain knowledge —*** Our management team combines strong subject matter expertise with a demonstrated history of commercial and operational execution. Moreover, our workforce has deep domain knowledge across a range of healthcare, technology and business disciplines, which we believe drives our continued commercial success. We have supplemented our diverse technical experience by assembling an operational team with expertise in manufacturing, legal, sales, marketing, customer service and finance. We believe this confluence of talent from multiple disciplines allows us to stay ahead of our competitors by identifying highly impactful opportunities and building products and solutions that address these opportunities.

Our growth strategy

We aim to position the Growth Direct as the industry standard for automated MQC testing. We believe we can achieve this through the following key growth strategies.

Leverage our first-mover advantage and our industry leadership to cement Growth Direct as the new standard of MQC automation in the rapidly growing bioprocessing market, including biologics, cell, and gene therapy

manufacturing — Our MQC process automation platform is particularly well-suited to the manufacturing of biologics, cell, and gene therapies. These products are manufactured in a highly modularized fashion where each manufacturing batch often represents an individual dose to a specific patient. These therapies are therefore exceedingly valuable, and the manufacturing methods to produce them are time-sensitive and exposed to outsized risk of contamination given the amount of material handling and process change-over. We have demonstrated the value of our platform in cell and gene therapy manufacturing with our early success in converting customers in this segment. Furthermore, companies in this space are developing new approaches to manufacture these complex products, including novel facility layouts, new processes and workflows, and new quality and risk management frameworks. We intend to capitalize on our first-mover advantage to define the standard of MQC automation in this growing market by moving upstream in the cell and gene therapy manufacturing design practice, creating thought leadership on MQC automation in cell and gene therapy manufacturing, partnering with facility design firms who specialize in manufacturing infrastructure for these modalities, and targeting contract development and manufacturing organizations, or CDMOs, CMOs and contract research organizations, or CROs, with significant exposure to this segment.

Drive new customer adoption of the Growth Direct platform by converting the leading manufacturers in our core markets, including but not limited to top 50 pharmaceutical companies and leading CDMOs — With the launch of our latest generation Growth Direct in 2017, over 30 customers have adopted the Growth Direct platform to automate MQC testing in more than 60 manufacturing facilities. We intend to drive global adoption by broadly seeking new customers in our core pharmaceutical manufacturing end markets. Our initial focus is on influential high-volume top 50 pharmaceutical companies as measured by revenue and global contract manufacturing organizations, which provide manufacturing services directly to pharmaceutical companies. Our existing customer base includes over 50% of the top twenty pharmaceutical companies by revenue. Our target geographies include North America and Europe and we are expanding our direct and indirect sales teams to access new customers in other geographic territories, such as Asia.

Expand implementation of the Growth Direct platform within our existing customer base by deploying additional systems across their global manufacturing site network and driving increased application utilization and consumable pull through on a system-by-system basis — We pursue a land-and-expand strategy to drive broad global adoption of our systems. Our approach begins by placing initial systems within our customers' global manufacturing network. The majority of our customers, which comprise over 50% of the top twenty pharmaceutical companies as measured by revenue, have global operations with multiple manufacturing facilities. We guide these initial sites as they gain experience with the Growth Direct, assisting their validation of initial applications, proving the value of our systems, and establishing a relationship as a trusted and reliable vendor. Our system is specifically designed to absorb the daily MQC testing volume at our customer's facilities. We then successfully sell additional systems to support additional suites at existing sites as well as leverage our high customer satisfaction at existing facilities to drive adoption at new sites within our customers' global manufacturing network. The majority of our customers have multiple Growth Direct systems per site and across different facility locations. We accomplish this expansion via direct peer-to-peer selling facilitated by our commercial team, and by partnering with executive decision makers to execute global customer rollout agreements. We simultaneously drive increased utilization on a system-by-system basis by providing our customers our full suite of applications that can be validated and used on the Growth Direct. Moreover, our customers' strong desire to globally standardize and harmonize their MQC operations provides us a direct opportunity to grow with them, and after validating their first system we are able to install and validate more systems globally for them in a much faster time period given the initial validation process.

Increase the value of our platform by innovating and launching new applications, hardware, and software products that deliver the power of integrated automation across our customers' QC workflows — We believe the depth, scalability and robust capabilities of our Growth Direct platform allow us to address key challenges facing MQC testing in the pharmaceutical industry. As an innovative leader in automatic MQC testing, we intend to invest in further enhancements in our existing platform as well as end-to-end workflow solutions in our core market. We have a well-defined roadmap for our existing products, which includes new consumables to expand our platform's MQC testing applications, such as in sterility testing; improvements to on-board algorithms that

enable greater insight from our image analysis; additional imaging modalities to unlock new testing functionality; additional system formats to accommodate new customer use cases; and new software to enable fleet management and analytics. Our product roadmap also includes new products to automate upstream and downstream workflow elements, such as microbial identification and automated sample collection, and data-rich products including data management, fleet integration, and predictive analytics. 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.

Expand the Growth Direct platform into adjacent end markets with high volumes of manual MQC testing — We have identified markets that conduct high volumes of MQC testing under regulatory control and derive value from improving operational efficiency via MQC automation and we may opportunistically enter these markets. We could expand into these markets through our existing technologies, through adapting our existing technologies, or through developing new products specific to the unmet needs of adjacent markets. We have identified several market expansion opportunities which we expect to pursue in the near term, including deploying our existing Growth Direct platform into the personal care products market, in which an estimated 270 million MQC tests are performed annually, equating to an overall market of approximately $8 billion. We continuously seek to identify other market opportunities where our Growth Direct platform could enhance MQC testing.

Pursue opportunistic strategic investments, partnerships, and acquisitions — Our strong growth to date has been entirely organic as we continue to add customers to our growing install base of Growth Direct users, while also expanding our consumables and product offering to those customers. At the appropriate stage we may consider opportunistic investments, partnerships, and acquisitions which may strengthen our product platform, allow us to enter new markets, and enhance our growth profile.

Commercial

We launched the latest generation of the Growth Direct system in 2017, which includes the Growth Direct platform and consumables for three applications: environmental monitoring, water, and bioburden testing. Our principal commercial strategy since launch has been to focus on converting customers among the top fifty global pharmaceutical companies. Our land-and-expand approach concentrates on placing initial systems at leading pharmaceutical manufacturers, validating our products, driving high customer satisfaction, and then expanding throughout our customer's network of sites with more systems and applications. We have simultaneously and opportunistically pursued other important customer types outside of top fifty global pharmaceutical companies, such as CDMOs, CMOs, CROs, vaccine manufacturers, pharmacy compounders (503Bs), among others.

With this approach, we have substantially grown our customer base to over 30 global customers and have placed over 100 systems and sold over 1 million consumables globally. We have customers across approximately 70 sites in 14 countries and the majority of our customers have multiple Growth Direct systems per site and across different facility locations. Our customer base includes manufacturers of biologics, including cell and gene therapies, sterile injectables, small molecule pharmaceutical manufacturers, and CDMOs, among others. We have sold to over half of the top twenty global pharmaceutical companies as measured by revenue. Moreover, we serve customers who operate some of the most complex manufacturing modalities in the world; for example, we support 30% of globally approved cell and gene therapies. Our customers generally purchase our Growth Direct system at one time and we expect them to use these systems for many years before needing to purchase new systems. As a result, a significant portion of our annual sales currently comes from the purchase of our Growth Direct system by a small number of different customers each year. We are working to expand our new customer base and sales within existing customers' organizations to provide a steady stream of sales of our systems and to grow our recurring sales stream from consumables and service contracts.

We have a global commercial team that includes direct sales, commercial operations, validation, field services, strategic marketing, marketing communications and product management. This staff is primarily located in North America and Europe, and we also maintain direct customer support teams providing both validation and field service capabilities in the same territories. We intend to significantly expand our sales, support, and marketing

efforts in the future by expanding our direct footprint in North America and Europe as well as developing a comprehensive distribution and support network in Asia where significant new market opportunities exist.

We increase awareness of our products among our target customers through direct sales calls, trade shows, seminars, academic conferences, web presence, social media and other forms of internet marketing. We supplement these traditional marketing efforts by fostering an active community of users of our products through user groups, customer advisory board meetings, forums and blogs with internally generated and user-generated content.

We employ a high-touch, customer-centric commercial approach focused on maximizing customer success. After a system sale is closed, our team works closely with customers to install systems and provide on-site validation and training support. We focus on supporting our customer's transition to an automated MQC protocol and aim to ensure customer success in routine use. We maintain high customer satisfaction through a robust service and maintenance offering, including an online phone and help desk, remote support and on-site field service.

Manufacturing and supply

Our primary manufacturing facility is located in our headquarters in Lowell, MA. The facility has over 52,000 square feet, with 20,000 square feet of manufacturing floor space that houses multiple manufacturing spaces and functions, including assembly of Growth Direct systems, an ISO-8 cleanroom with ISO-5 laminar flow hoods for consumable manufacturing, dedicated areas for media preparation. The facility has robust quality control from materials receiving to product distribution.

We believe that our manufacturing capacity is sufficient to meet our near-term growth targets for both systems and consumables. Our consumables manufacturing operation, in particular, is designed to meet the demands of high-volume media supply necessary to serve our market. It is centered around a state-of-the-art automated production line that we believe has enough capacity to support near and medium-term growth. To support continuous supply for our customers, we have manufacturing redundancies and maintain inventory in multiple locations, including our Lowell headquarters, a second redundant storage location in the metropolitan Boston area, and at our third-party logistics, or 3PL, warehouses in Schiphol, Netherlands and Frankfurt, Germany.

Our manufacturing strategy includes direct manufacturing of certain products, and third-party outsourcing for certain components and subassemblies. We obtain components and subassemblies for our Growth Direct systems from multiple third-party suppliers and contract manufacturers. While some of these components are sourced from a single supplier, we have qualified second sources for several of our critical parts. We believe that having dual sources for our critical components helps reduce the risk of a production delay caused by a disruption in the supply of a critical component. We perform final assembly, commissioning, and inspection of the systems in our Lowell facility before shipping to customers. Our consumable plate assemblies and lids are manufactured to our specifications by manufacturing partners. We procure media from third-party suppliers and fill and assemble the final consumables in our Lowell facility. We contract with third party vendors to sterilize our consumables before shipping to customers.

We continue to invest in our manufacturing capabilities to increase capacity ahead of future growth, to ensure continuity of supply, and to make order fulfillment consistent and convenient for our customers. Our future manufacturing plans may include expansion of our existing facilities, additional global sites, additional automation lines, and further manufacturing redundancy plans. We are continually evaluating our supply chain and may proactively optimize certain aspects of our manufacturing and supply chain footprint to meet our business objectives.

License agreement

License agreement with Thermo Fisher

In May 2013, we entered into a patent license agreement, or the Thermo Fisher license agreement, with Thermo CRS, Ltd., or Thermo Fisher, pursuant to which we obtained a non-exclusive, worldwide, royalty-bearing, non-sublicensable license under Thermo Fisher's patent rights relating to robotic devices. Pursuant to the Thermo

Fisher license agreement, we paid Thermo Fisher one-time fees in the aggregate of $125,000 and are also obligated to pay royalties at a fixed dollar amount ranging from the low to mid four figures for our sale of each system containing the licensed products, subject to increase or decrease upon certain events. The Thermo Fisher license agreement will remain in effect until the last to expire of the licensed patent rights.

Intellectual property

Our success depends in part on our ability to obtain and maintain intellectual property protection for our products and technology, including by seeking and maintaining patent protection, protecting our trade secrets and other proprietary information, obtaining and maintaining our licenses to use intellectual property owned by third parties, and continually evaluating third-party technologies for further licensing opportunities. We also seek trademark protection where appropriate to protect the names that identify us as the source of our products and services.

We own certain patents, patent applications and intellectual property and license certain patents and other intellectual property from third parties. We have also entered into certain supply and commercial agreements with various vendors and suppliers under which we receive rights to their intellectual property for use in our products. Our material licenses with Thermo Fisher is described in more detail above.

As of June 30, 2021, we own eight issued patents in the United States, 23 issued patents in foreign jurisdictions, including Canada, China, countries in Europe, Hong Kong, India, Japan and Mexico, six pending patent applications in the United States, one pending international application and 35 pending patent applications in foreign jurisdictions, including Australia, Brazil, Canada, China, the European Patent Office, Hong Kong, India, Japan, Malaysia, Mexico, the Philippines, Singapore, South Korea and Thailand. Our issued patents and pending patent applications cover our technologies and products, including machines, manufactures, compositions of matter, and methods of use with respect thereto, related to the Growth Direct platform. Additionally, as of June 30, 2021, we license three issued patents in the United States, Canada and Europe from Thermo Fisher relating to a robotic carousel workstation. The issued or granted patents that we own or that we in-license from Thermo Fisher and any patents that may issue from pending applications that we own have expiration dates or, in the case of patent applications, projected statutory expiration dates, between 2022 and 2039, excluding, with respect to patents that may be issued from our patent applications, any additional term for patent term adjustments or patent term extensions, if applicable.

With respect to our technology related to rapid detection of replicating cells, as of June 30, 2021, we own three issued patents in the United States, six issued patents in foreign jurisdictions including Canada, China, countries in Europe (validated in Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Monaco, Netherlands, Slovakia, Spain, Sweden, Switzerland/Liechtenstein, Turkey and the United Kingdom) and Japan and one pending patent application in the United States, and two pending patent applications in foreign jurisdictions including the European Patent Office and Hong Kong. As set forth in more detail in the following table, our issued patents are expected to expire between 2022 and 2024 and any patent that may be issued from our pending patent application is expected to expire in 2022, without accounting for any patent term adjustments or extensions.

Patents and Patent Applications Related to Our Technology of Rapidly Detecting Replicating Cells	Expected Expiration Date(s) Without Accounting for Any Patent Term Adjustments or Extensions for Pending Applications
Three issued patents in the United States	September 2022; November 2023; May 2024
Three issued patents in Europe (Austria (3), Belgium (3), Czech Republic (3), Denmark (3), Finland (1), France (3), Germany (3), Ireland (3), Italy (3), Luxembourg (2), Monaco (2), Netherlands (3), Slovakia (1), Spain (3), Sweden (3), Switzerland/	September 2022

Patents and Patent Applications Related to Our Technology of Rapidly Detecting Replicating Cells	Expected Expiration Date(s) Without Accounting for Any Patent Term Adjustments or Extensions for Pending Applications
Liechtenstein (3), Turkey (1), and the United Kingdom (3))	
One issued patent in Canada	September 2022
One issued patent in China	September 2022
One issued patent in Japan	September 2022
One pending patent application in the United States	If issued, September 2022
One pending patent application in Europe	If issued, September 2022
One pending patent application in Hong Kong	If issued, September 2022

With respect to our cassette for sterility testing, as of June 30, 2021, we own two issued patents in the United States, eight issued patents in foreign jurisdictions including China, countries in Europe (validated in Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Netherlands, Norway, Poland, Romania, Slovakia, Spain, Sweden, Switzerland/Liechtenstein, Turkey, and the United Kingdom), Hong Kong, Japan and Mexico, one pending patent application in the United States and four pending patent applications in foreign jurisdictions including Canada, India, Japan and Mexico. As set forth in more detail in the following table, our issued patents are expected to expire between 2032 and 2033 and any patents that may be issued from our pending patent applications are expected to expire in 2032, without accounting for any patent term adjustments or extensions.

Patents and Patent Applications Related to Our Cassette for Sterility Testing	Expected Expiration Date(s) Without Accounting for Any Patent Term Adjustments or Extensions for Pending Applications
Two issued patents in the United States	November 2032; November 2033
Two issued patents in Europe (Austria (2), Belgium (2), Czech Republic (1), Denmark (2), Finland (1), France (2), Germany (2), Hungary (2), Iceland (1), Ireland (2), Italy (2), Netherlands (2), Norway (1), Poland (2), Romania (2), Slovakia (1), Spain (2), Sweden (2), Switzerland/Liechtenstein (2), Turkey (10), and the United Kingdom (2))	November 2032
One issued patent in China	November 2032
Two issued patents in Hong Kong	November 2032
Two issued patents in Japan	November 2032
One issued patent in Mexico	November 2032
One pending patent application in the United States	If issued, November 2032
One pending patent application in each of Canada, India, Japan and Mexico	If issued, November 2032

With respect to our cell culturing device, as of March 31, 2021, we own one issued patent in the United States, five issued patents in foreign jurisdictions including China, Hong Kong, India, Japan and Mexico, one pending patent application in the United States and four pending patent applications in foreign jurisdictions including Canada, the European Patent Office, India and Mexico. As set forth in more detail in the following table, the United States issued patent is expected to expire in 2034, the foreign issued patents are expected to expire in 2033 and any patents that may be issued from our pending patent applications are expected to expire in 2033, without accounting for any patent term adjustments or extensions.

Patents and Patent Applications Related to Our Cell Culturing Device	Expected Expiration Date(s) Without Accounting for Any Patent Term Adjustments or Extensions for Pending Applications
One issued patent in the United States	July 2034
One issued patent in China	April 2033
One issued patent in Hong Kong	April 2033
One issued patent in India	April 2033
One issued patent in Japan	April 2033
One issued patent in Mexico	April 2033
One pending patent application in the United States	If issued, April 2033
One pending patent application in Europe	If issued, April 2033
One pending patent application in each of Canada, India and Mexico	If issued, April 2033

With respect to our microbiological growth media and methods of use thereof, as of June 30, 2021, we own one issued patent in the United States, one pending patent application in the United States and 12 pending patent applications in foreign jurisdictions including Australia, Brazil, Canada, China, the European Patent Office, Hong Kong, India, Japan, South Korea, Mexico and Singapore. As set forth in more detail in the following table, the issued patent is expected to expire in 2036 and any patents that may be issued from our pending patent applications are expected to expire in 2035, without accounting for any patent term adjustments or extensions.

Patent and Patent Applications Related to Our Microbiological Growth Media and Methods of Use Thereof	Expected Expiration Date(s) Without Accounting for Any Patent Term Adjustments or Extensions for Pending Applications
One issued patent in the United States	September 2036
One pending patent application in the United States	If issued, April 2035
One pending patent application in Europe	If issued, April 2035
Two pending patent applications in Mexico	If issued, April 2035
One pending patent application in each of Australia, Brazil, Canada, China, Hong Kong, India, Japan, Singapore and South Korea	If issued, April 2035

With respect to our technology relating to the use of clean and dry gas for particle removal and assembly therefor, as of June 30, 2021, we own one pending patent application in the United States and 13 pending patent applications in foreign jurisdictions including Australia, Brazil, Canada, China, the European Patent Office, India, Japan, Malaysia, Mexico, the Philippines, Singapore, South Korea and Thailand. As set forth in more detail in the following table, any patents that may be issued from our pending patent applications are expected to expire in 2039, without accounting for any patent term adjustments or extensions.

Patent Applications Regarding the Use of Clean and Dry Gas for Particle Removal and Assembly Therefor	Expected Expiration Date(s) Without Accounting for Any Patent Term Adjustments or Extensions
One pending patent application in the United States	If issued, August 2039
One pending patent application in Europe	If issued, August 2039
One pending patent application in each of Australia, Brazil, Canada, China, India, Japan, Malaysia, Mexico, the Philippines, Singapore, South Korea and Thailand	If issued, August 2039

With respect to our attenuated-background microbiological nutrient media and method of use thereof, as of June 30, 2021, we own one pending international patent application which, if issued in the United States or foreign jurisdiction, is expected to expire in 2041, without accounting for any patent term adjustments or extensions. Further, with respect to our technology related to filtration assemblies, cassettes, systems and methods for filtration and cell growth, as of June 30, 2021, we own one pending patent application in the United States which, if issued, is expected to expire in 2041, without accounting for any patent term adjustments or extensions.

Further, with respect to the three issued patents non-exclusively licensed from Thermo Fisher, one United States patent is expected to expire in April 2024, one Canadian patent is expected to expire in December 2023 and one European patent (to the extent validated in member countries) is expected to expire in December 2023.

The term of our patents depends upon the laws of the countries in which they are obtained and commonly ends 20 years from the earliest date of filing of a non-provisional patent application. A provisional patent application is not eligible to become an issued patent until, among other things, we file a non-provisional patent application within 12 months of the filing date of the provisional patent application. If we do not timely file non-provisional patent applications, we may lose our priority date with respect to our provisional patent applications and any patent protection on the inventions disclosed in our provisional patent applications. In the United States, patent term adjustments may be available depending upon the time the United States Patent and Trademark Office takes to examine and eventually issue a patent. The protection of patents may vary on a country-by-country and claim-by-claim basis, which can vary the scope of protection afforded by such patents. In addition, we must generally pay fees to maintain our patents annually or at other specified intervals or risk the patent lapsing. We cannot provide any assurance that any of our current or future owned or licensed patent applications will result in the issuance of patents, or that any of our current or future owned or licensed issued patents will effectively protect any of our products or technology or prevent others from commercializing competitive products or technology.

Competition

As a life sciences technology company, we face competition from a wide array of companies in the pharmaceutical manufacturing industry. This competition includes both small companies and large companies with greater financial and technical resources and longer operating histories than our own.

Our competitors may have significantly greater financial resources, established presence in the market, and expertise in research and development, manufacturing, and sales and marketing than we do. These competitors also compete with us in recruiting and retaining qualified engineering, sales, marketing and management personnel, as well as in acquiring technologies complementary to, or necessary for, our programs. Smaller or early-stage companies may also prove to be significant competitors, particularly if they establish collaborative arrangements with large companies.

The key competitive factors affecting the success of the products that we develop are likely to be the continued growth of our market position, our ability to expand our integration with existing customers, our ability to develop new products and improve our existing products, and our ability to grow our sale and marketing capabilities. Our commercial opportunity for any of our products could be reduced or eliminated if our competitors develop and commercialize products that are more effective, are more convenient, or are less expensive than our products, or if they are able to more effectively integrate their systems with customers before we do.

We primarily compete with established manufacturers of traditional MQC testing products, such as petri dishes, incubators, and other manual testing equipment, which our products aim to displace. These companies include bioMerieux, Becton Dickinson, Charles River Labs, Merck Millipore and Thermo Fisher. We also compete with a limited number of companies that have or are attempting to enter the MQC testing market with alternative automated solutions, such as Interscience, which has developed a partially-automated system for MQC testing. There are also several established companies in the bioprocessing technology market with whom we do not currently compete, but that could develop products that will compete with us in the future. Many of the established

companies have substantially greater financial and other resources than us, including larger research and development teams or more established marketing and sales and commercial teams.

Government regulation

We provide products and services used for quality-control testing in pharmaceutical product and medical device manufacturing. Although our Growth Direct platform is not directly subject to regulation by the U.S. Food and Drug Administration, or FDA, our customers' products and product candidates are subject to extensive regulation by the FDA and other federal and state authorities in the United States, as well as comparable authorities in foreign jurisdictions. In the United States, many of our customers' products are regulated as either medical devices or drugs under the Federal Food, Drug, and Cosmetic Act, or FDCA, and its implementing regulations, or as biological products under the FDCA and the Public Health Service Act, or PHSA, and their implementing regulations, each as amended and enforced by the FDA. The FDA regulates the development, design, non-clinical and clinical research, manufacturing, safety, efficacy, labeling, packaging, storage, installation, servicing, recordkeeping, premarket clearance or approval, adverse event reporting, advertising, promotion, marketing and distribution, and import and export of medical devices, drugs and biological products to ensure that such products distributed domestically are safe and effective for their intended uses and otherwise meet the applicable requirements of the FDCA and PHSA. Failure to comply with the applicable U.S. requirements at any time during the product development process, approval process or after approval, may subject an applicant or manufacturer to administrative or judicial civil or criminal sanctions and adverse publicity.

The manufacture of our Growth Direct system and our consumables is subject to compliance with regulatory systems, standards, guidance and other requirements, as appropriate, including, but not limited to, laws and regulations for safe working conditions and certifications from the International Organization for Standardization. Our products are also subject to various federal, state, local, and foreign laws, regulations and recommendations, relating to the safe and proper use, transportation and disposal of hazardous or potentially hazardous substances. In addition, U.S. and international import and export laws and regulations, including those enforced by the U.S. Departments of Commerce, State and Treasury and OFAC, require us to abide by certain standards relating to the cross-border transit of finished goods, raw materials and supplies and the handling of related information. Our logistics activities must comply with the rules and regulations of the Department of Transportation, the Department of Homeland Security, Department of Commerce, Department of Defense, and the Federal Aviation Administration and similar foreign agencies. We are also subject to various other laws and regulations concerning the conduct of our foreign operations, including the Foreign Corrupt Practices Act and other anti-bribery laws as well as laws pertaining to the accuracy of our internal books and records. We also contract and may in the future contract with the U.S. government. As such, we are subject to certain laws and regulations applicable to companies doing business with the government, as well as with those concerning government contracts, including being subject to potential investigation for compliance with government contract regulations.

Employees and human capital resources

As of June 30, 2021, we had 160 employees of which 157 were full-time employees.

We believe that developing a diverse, equitable and inclusive culture is critical to continuing to attract and retain the top talent necessary for our long-term success and strategy. We value diversity at all levels and continue to focus on extending our diversity and inclusion initiatives across our entire workforce, including the expansion of individuals with diverse backgrounds in leadership.

Our principles of accountability, honesty, integrity and customer-focused, serve as our cultural pillars. We focus our efforts on creating a collaborative environment where our colleagues feel respected and valued. We provide our employees with competitive compensation, opportunities for equity ownership and a robust employment package, including health care, disability and long-term planning insurance, retirement planning and paid time off. In addition, we regularly interact with our employees to gauge employee satisfaction and identify areas of focus.

Facilities

Our principal office is located in Lowell, Massachusetts, where we lease 52,802 square feet of office, laboratory, manufacturing and inventory-storage space. We lease this space under a lease agreement, as amended, that terminates on July 31, 2026. In June 2021, we entered into a Sublease agreement for 33,339 square feet of office and manufacturing space in Lexington, Massachusetts, which expires in June 2029. Further, we maintain inventory at storage warehouses in Schiphol, Netherlands and in Frankfurt, Germany. We believe that our facilities are sufficient to meet our current needs.

Legal proceedings

We are not subject to any material legal proceedings.

Management

Executive officers and directors

The following table sets forth the name, age and position of each of our executive officers and directors as of the date of this prospectus.

Name	Age	Position
Executive Officers		
Robert Spignesi	52	President and Chief Executive Officer and Director
Sean Wirtjes	51	Chief Financial Officer
John Wilson	54	Chief Operating Officer
Victoria Vezina	54	Chief Human Resources Officer
Jonathan Paris	46	General Counsel
Directors		
Jeffrey Schwartz(2)(3)	42	Director, Chairperson
Bruce Cohen(4)	68	Director
David Hirsch, M.D., Ph.D.(2)	50	Director
Richard Kollender(1)(3)	51	Director
Melinda Litherland(1)	63	Director
Natale Ricciardi(2)(3)	72	Director
Alexander Schmitz(1)	46	Director

(1) Member of the audit committee.

(2) Member of the compensation committee.

(3) Member of the nominating and corporate governance committee.

(4) Mr. Cohen will resign as a member of our board of directors effective immediately prior to the effectiveness of the registration statement of which this prospectus forms a part.

Executive officers

Robert Spignesi has served as the President and Chief Executive Officer of our company since October 2014 and as a member of our board of directors since October 2014. Previously, Mr. Spignesi served as the Vice President & General Manager, Americas of the Microbiology Division at Thermo Fisher Scientific and the Vice President of Global Strategy, Business Development and Marketing at Fisher Scientific. Earlier in his career, he was an Aviation Officer with the U.S. Army. Mr. Spignesi holds an M.B.A. from Columbia University and a B.S. in Economics from the United States Military Academy at West Point. We believe that Mr. Spignesi's role as Chief Executive Officer of our company and broad industry experience qualify him to serve on our board of directors.

Sean Wirtjes has served as the Chief Financial Officer of our company since September 2018. From August 2012 to July 2016, Mr. Wirtjes served as the Vice President, Finance and Controller of the Asia Pacific, Middle East and Africa region for Boston Scientific Corporation, a manufacturer of medical devices, where he led all aspects of financial management for the region. Mr. Wirtjes holds a B.S. in Accounting from the Carroll School of Management at Boston College.

John Wilson has served as the Chief Operating Officer of our company since January 2021. From November 2010 to January 2021, Mr. Wilson served in various roles at BD, a medical technology company, including Vice President of Global Operations, Director of Operational Excellence, Vice President of Manufacturing and Plant Manager, where he led manufacturing activities worldwide to ensure the quality, supply, and delivery of product for BD. Mr. Wilson holds an M.B.A. from the University of San Francisco and a B.S. in Business Management from the University of Phoenix.

Victoria Vezina has served as the Chief Human Resources Officer of our company since September 2020. From May 2019 to June 2020, Ms. Vezina served as the Chief People Officer at SimpliSafe, a home security company based in Boston. Ms. Vezina also served as Head of Global Services HR at The Boston Consulting Group, a management consulting firm, from May 2016 to March 2019. Ms. Vezina holds an M.A. in Organizational Psychology from William James College and a B.A. in Government from Clark University.

Jonathan Paris has served as the General Counsel of our company since May 2021. From September 2015 to May 2021, Mr. Paris served as the Deputy General Counsel at Insulet Corporation, a medical device company. Prior to that, Mr. Paris also served as an Associate General Counsel at Covidien plc from July 2009 to February 2015 and at Medtronic plc from February 2015 to September 2015. Mr. Paris holds a J.D. from Suffolk University Law School, an M.S.F. from Suffolk University Sawyer Business School and a B.A. in Economics and Government from Colby College.

Non-employee directors

Jeffrey Schwartz has served as a member of our board of directors and Chairperson since April 2018. Mr. Schwartz currently serves as a managing director of Bain Capital Life Sciences, LP, where he is a founding member. Prior to founding Bain Capital Life Sciences, LP in 2016, he was a leader within the healthcare vertical of Bain Capital Private Equity, LP. Mr. Schwartz has also served on the boards of directors of BCLS Acquisition Corp since August 2020, SpringWorks Therapeutics, Inc. since August 2017 and Hugel, Inc. since July 2017. Mr. Schwartz holds an M.B.A. from The Wharton School at the University of Pennsylvania and holds a B.A. in economics from Yale University. We believe that Mr. Schwartz's extensive industry and transactional experience qualify him to serve on our board of directors.

Bruce Cohen has served as a member of our board of directors since April 2018. Mr. Cohen has served as Chief Executive Officer of Statim Pharmaceuticals, Inc., a drug delivery technology company, since November 2018 and as Venture Partner of Xeraya Capital, a private equity and venture capital firm, since January 2016. Mr. Cohen previously served as Chief Executive Officer of PrIME Biologics Pte Ltd, a Singapore-based biotechnology company, from April 2017 to March 2019. Mr. Cohen served on the board of directors of Viropro Inc. from June 2014 to July 2018. Mr. Cohen holds an M.B.A. from Harvard Business School, an M.A. in Sociology from Tufts University and a B.A. in Sociology from Tufts University. We believe that Mr. Cohen's extensive experience with biopharmaceutical and biotechnology companies qualifies him to serve on our board of directors. Mr. Cohen will resign as a member of our board of directors effective immediately prior to the effectiveness of the registration statement of which this prospectus forms a part.

David Hirsch, M.D., Ph.D. has served as a member of our board of directors since June 2013. Dr. Hirsch has served as a Managing Director of Longitude Capital Management Co., LLC, a venture capital firm Dr. Hirsch co-founded, since July 2006, where he focuses on investments in biotechnology. Dr. Hirsch has served on the board of directors of Poseida Therapeutics, Inc. since March 2018, Molecular Templates, Inc. since August 2017, and Tricida, Inc. since June 2013. Dr. Hirsch previously served on the board of directors of Collegium Pharmaceutical from January 2012 to July 2020. Dr. Hirsch holds a Ph.D. in Biology from the Massachusetts Institute of Technology, an M.D. from Harvard Medical School and a B.A. in Biology from Johns Hopkins University. We believe that Dr. Hirsch's extensive experience serving on the boards of public companies, his investment experience and his scientific expertise and education qualify him to serve on our board of directors.

Richard Kollender has served as a member of our board of directors since July 2009, except for the period from February 2017 to October 2018. From August 2016 to September 2018, Mr. Kollender served as our Chief Business Officer and Chief Financial Officer. Mr. Kollender served on the board of directors of Strongbridge Biopharma plc, a biopharmaceutical company, from March 2015 to September 2019, where he also served as Chief Operating Officer from September 2019 to March 2021 and currently serves as President and Chief Financial Officer. Since January 2011, he has served as a Partner and Executive Manager of Quaker Partners Management, LP, a healthcare investment firm, which he initially joined in 2003. Mr. Kollender previously served as a director of Celator Pharmaceuticals, Inc., currently a subsidiary of Jazz Pharmaceuticals plc, Nupathe, Inc., and Insmed, Inc. Mr. Kollender holds a B.A. in accounting from Franklin and Marshall College and an M.B.A. and a certificate

degree in the Graduate Program in Health Administration and Policy, both from the University of Chicago. We believe that Mr. Kollender's knowledge of our company and experience in the industry qualify him to serve on our board of directors.

Melinda Litherland has served as a member of our board of directors since June 2021. Ms. Litherland currently serves on the board of directors of Bio-Rad Laboratories, Inc., where she has served since April 2017. Ms. Litherland retired in 2015 as a Partner at Deloitte & Touche LLP. During her 34 years at Deloitte & Touche LLP, she worked primarily with technology and life science companies in both audit and consulting capacities. Ms. Litherland holds a B.A. in Economics from Rice University and an MAcc from the Rice University Jones Graduate School of Business. Ms. Litherland is a certified public accountant and a member of the American Institute of CPAs (AICPA). We believe that Ms. Litherland's extensive financial and life sciences background qualifies her to serve on our board of directors.

Natale Ricciardi has served as a member of our board of directors since March 2016. Mr. Ricciardi spent his entire 39-year career at Pfizer Inc., a biopharmaceutical company, retiring in 2011 as a member of the Pfizer Executive Leadership Team. While holding the positions of President, Pfizer Global Manufacturing, and Senior Vice President of Pfizer Inc. from 2004 until 2011, Mr. Ricciardi was directly responsible for all of Pfizer's internal and external supply organization. Mr. Ricciardi maintained responsibility for global manufacturing activities from 2004 through 2011. Previously, from 1999 to 2004, he had oversight for Pfizer's U.S. manufacturing operations and from 1995 to 1999 was Vice President of Manufacturing for Pfizer's Animal Health Group. Mr. Ricciardi has served on the board of directors of Dynavax Technologies Corporation since June 2013 and Prestige Consumer Healthcare, Inc. since May 2016. Mr. Ricciardi holds an M.B.A. in Finance and International Business from Fordham University and a Bachelor of Engineering in Chemical Engineering from The City College of New York. We believe that Mr. Ricciardi's extensive experience at Pfizer and his experience serving on boards of various life sciences companies qualify him to serve on our board of directors.

Alexander Schmitz has served as a member of our board of directors since May 2020. Mr. Schmitz currently serves as a Partner at Endeavour Vision Ltd., a private equity firm, where he has worked since 2015, investing in growth-stage medical device and digital health companies. Mr. Schmitz holds an M.B.A. from INSEAD and a B.S.F.S. in International Economics from Georgetown University. We believe that Mr. Schmitz's industry knowledge and investment experience qualify him to serve on our board of directors.

Board composition and election of directors

Director independence

Our board of directors currently consists of eight members. Effective immediately prior to the effectiveness of the registration statement of which this prospectus forms a part, Bruce Cohen will resign as a member of our board of directors, and our board of directors will then consist of seven members. In connection with this offering, our board of directors has undertaken a review of the independence of each of these seven directors and considered whether each director has a material relationship with us that could compromise his or her ability to exercise independent judgment in carrying out his or her responsibilities. As a result of this review, our board of directors has determined that, of these seven directors, Jeffrey Schwartz, David Hirsch, Melinda Litherland, Natale Ricciardi and Alexander Schmitz do not have a relationship that would interfere with the exercise of independent judgment in carrying out the responsibilities of a director and that each of these directors is "independent" as that term is defined under the rules of The Nasdaq Stock Market LLC, or Nasdaq. There are no family relationships among any of our directors or executive officers.

Classified board of directors

In accordance with our restated certificate of incorporation that will go into effect upon the closing of this offering, our board of directors will be divided into three classes with staggered, three-year terms. At each annual meeting of stockholders, the successors to directors whose terms then expire will be elected to serve from the

time of election and qualification until the third annual meeting following election. Effective upon the closing of this offering, our directors will be divided among the three classes as follows:

- the Class I directors will be David Hirsch and Alexander Schmitz, and their terms will expire at our first annual meeting of stockholders following this offering;
- the Class II directors will be Jeffrey Schwartz, Richard Kollender and Natale Ricciardi, and their terms will expire at our second annual meeting of stockholders following this offering; and
- the Class III directors will be Melinda Litherland and Robert Spignesi, and their terms will expire at the third annual meeting of stockholders following this offering.

Our restated certificate of incorporation that will go into effect upon the closing of this offering will provide that the authorized number of directors may be changed only by resolution of the board of directors. Any additional directorships resulting from an increase in the number of directors will be distributed among the three classes so that, as nearly as possible, each class will consist of one-third of the directors. The division of our board of directors into three classes with staggered three-year terms may delay or prevent a change of our management or a change in control of our company. Our directors may be removed only for cause by the affirmative vote of the holders of at least two-thirds of our outstanding voting stock entitled to vote in the election of directors.

Our directors were elected to and currently serve on the board pursuant to a voting agreement among us and several of our largest stockholders. See “Certain Relationships and Related Party Transactions—Voting Agreement.” This agreement will terminate upon the closing of this offering, after which there will be no further contractual obligations regarding the election of our directors.

Board leadership structure

Our board of directors is currently chaired by Jeffrey Schwartz. In connection with this offering, we will implement corporate governance guidelines. These guidelines provide that, if the chairperson of the board is a member of management or does not otherwise qualify as independent, the independent directors of the board may elect a lead director. The lead director’s responsibilities include, but are not limited to: presiding over all meetings of the board of directors at which the chairperson is not present, including any executive sessions of the independent directors; approving board meeting schedules and agendas; and acting as the liaison between the independent directors and the chief executive officer and chairperson of the board. Our corporate governance guidelines further provide the flexibility for our board of directors to modify our leadership structure in the future as it deems appropriate.

Role of the board in risk oversight

One of the key functions of our board of directors is informed oversight of our risk management process. Our board of directors does not have a standing risk management committee, but rather administers this oversight function directly through our board of directors as a whole, as well as through various standing committees of our board of directors that address risks inherent in their respective areas of oversight. In particular, our board of directors is responsible for monitoring and assessing strategic risk exposure and our audit committee has the responsibility to consider and discuss our major financial risk exposures and the steps our management has taken to monitor and control these exposures, including guidelines and policies to govern the process by which risk assessment and management is undertaken. Our audit committee also monitors compliance with legal and regulatory requirements. Our nominating and corporate governance committee monitors the effectiveness of our corporate governance practices, including whether they are successful in preventing illegal or improper liability-creating conduct. Our compensation committee assesses and monitors whether any of our compensation policies and programs has the potential to encourage excessive risk-taking. While each committee is responsible for evaluating certain risks and overseeing the management of such risks, our entire board of directors is regularly informed through committee reports about such risks.

Board committees

Our board of directors has established three standing committees—audit, compensation and nominating and corporate governance—each of which operates under a charter that has been approved by our board of directors. Upon our listing on The Nasdaq Global Select Market, each committee's charter will be available under the Corporate Governance section of our website at *www.rapidmicrobio.com*. The reference to our website address does not constitute incorporation by reference of the information contained at, or available through our website, and you should not consider it to be a part of this prospectus.

Audit committee

The audit committee's responsibilities include, among other things:

- appointing, approving the compensation of, and assessing the independence of our registered public accounting firm;
- overseeing the work of our independent registered public accounting firm, including through the receipt and consideration of reports from such firm;
- reviewing and discussing with management and the independent registered public accounting firm our annual and quarterly financial statements and related disclosures as well as critical accounting policies and practices used by us;
- coordinating our board of directors' oversight of our internal control over financial reporting, disclosure controls and procedures and code of business conduct and ethics;
- discussing our risk management policies;
- meeting independently with our internal auditing staff, if any, independent registered public accounting firm and management;
- reviewing and approving or ratifying any related person transactions; and
- preparing the audit committee report required by Securities and Exchange Commission, or SEC, rules.

The members of our audit committee are Melinda Litherland, Richard Kollender and Alexander Schmitz. Melinda Litherland serves as the chairperson of the committee. All members of our audit committee meet the requirements for financial literacy under the applicable listing rules of Nasdaq, or the Nasdaq rules. We intend to rely on the phase-in rules of the Nasdaq rules with respect to the requirement that the audit committee be composed entirely of members of our board of directors who satisfy the standards of independence established for independent directors under the Nasdaq rules. Our board of directors has determined that Melinda Litherland, Richard Kollender and Alexander Schmitz meet the independence requirements of Rule 10A-3 under the Exchange Act and that Melinda Litherland and Alexander Schmitz meet the independence requirements of the applicable Nasdaq rules. Our board of directors has determined that Melinda Litherland is an "audit committee financial expert" as defined by applicable SEC rules and has the requisite financial sophistication as defined under the applicable Nasdaq rules.

Compensation committee

The compensation committee's responsibilities include, among other things:

- reviewing and approving, or recommending for approval to the board of directors, the compensation of our Chief Executive Officer and our other executive officers;
- overseeing and administering our cash and equity incentive plans;
- reviewing and making recommendations to our board of directors with respect to director compensation;
- reviewing and discussing annually with management our "Compensation Discussion and Analysis," to the extent required; and

- preparing the annual compensation committee report required by SEC rules, to the extent required.

The members of our compensation committee are David Hirsch, Natale Ricciardi and Alexander Schmitz. David Hirsch serves as the chairperson of the compensation committee. Our board of directors has determined that each of David Hirsch, Natale Ricciardi and Alexander Schmitz is independent under the applicable Nasdaq rules, including the Nasdaq rules specific to membership on the compensation committee, and is a "non-employee director" as defined in Rule 16b-3 promulgated under the Exchange Act.

Nominating and corporate governance committee

The nominating and corporate governance committee's responsibilities include, among other things:

- identifying individuals qualified to become board members;
- recommending to our board of directors the persons to be nominated for election as directors and to each board committee;
- developing and recommending to our board of directors corporate governance guidelines, and reviewing and recommending to our board of directors proposed changes to our corporate governance guidelines from time to time; and
- overseeing a periodic evaluation of our board of directors.

The members of our nominating and corporate governance committee are Jeffrey Schwartz, Richard Kollender and Natale Ricciardi. Jeffrey Schwartz serves as the chairperson of the nominating and corporate governance committee. We intend to rely on the phase-in rules of the Nasdaq rules with respect to the requirement that the Nominating and Corporate Governance Committee be composed entirely of members of our board of directors who satisfy the standards of independence established for independent directors under the Nasdaq rules. Our board of directors has determined that Jeffrey Schwartz and Natale Ricciardi are independent under the applicable Nasdaq rules.

Compensation committee interlocks and insider participation

No member of our compensation committee is or has been our current or former officer or employee. None of our executive officers served as a director or a member of a compensation committee (or other committee serving an equivalent function) of any other entity, one of whose executive officers served as a director or member of our compensation committee during the fiscal year ended December 31, 2020.

Code of ethics and code of conduct

We have adopted a written code of business conduct and ethics that applies to our directors, officers and employees, including our principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions. Upon our listing on The Nasdaq Global Select Market, our code of business conduct and ethics will be available under the Corporate Governance section of our website at *www.rapidmicrobio.com*. In addition, we intend to post on our website all disclosures that are required by law or the Nasdaq rules concerning any amendments to, or waivers from, any provision of the code. The reference to our website address does not constitute incorporation by reference of the information contained at or available through our website, and you should not consider it to be a part of this prospectus.

Executive and director compensation

This section discusses the material components of the executive compensation program for our executive officers who are named in the “2020 Summary Compensation Table” below. In 2020, our “named executive officers” were as follows:

- Robert Spignesi, Chief Executive Officer;
- Sean Wirtjes, Chief Financial Officer; and
- Victoria Vezina, Chief Human Resources Officer.

2020 Summary compensation table

The following table sets forth summary information concerning the compensation of our named executive officers for the year ended December 31, 2020:

Name and Principal Position	Year	Salary ($)	Option Awards ($)(1)	Non-Equity Incentive Plan Compensation ($)(2)	All Other Compensation ($)(3)	Total ($)
Robert Spignesi *Chief Executive Officer*	2020	445,228	301,770	311,644	3,563	1,062,205
Sean Wirtjes *Chief Financial Officer*	2020	342,531	59,485	180,261	2,924	585,201
Victoria Vezina *Chief Human Resources Officer*(4)	2020	101,039	92,466	37,696	997	232,198

(1) The amounts represent the full grant-date fair value of option awards granted during 2020 computed in accordance with FASB ASC Topic 718, or Topic 718, rather than the amounts paid to or realized by the named individual. The information regarding the assumptions used to calculate the value of option awards made to executive officers is discussed in Note 13 to our consolidated financial statements included elsewhere in this prospectus. For Mr. Spignesi, amount also includes $4,894 in the incremental fair value attributable to the repricing of certain of his options in 2020.

(2) The amounts represent (i) performance-based annual cash bonuses earned based on corporate and individual performance during 2020 in the amount of $211,644 for Mr. Spignesi, $130,261 for Mr. Wirtjes and $37,696 for Ms. Vezina, and (ii) special performance-based bonuses earned based on the consummation of a financing and the achievement of certain other corporate objectives during 2020 in the amount of $100,000 for Mr. Spignesi and $50,000 for Mr. Wirtjes.

(3) The amounts represent company 401(k) matching contributions.

(4) Ms. Vezina was appointed our Chief Human Resources Officer effective September 8, 2020.

Narrative disclosure to summary compensation table

2020 Salaries

The base salary payable to each named executive officer is intended to provide a fixed component of compensation reflecting the executive’s skill set, experience, role and responsibilities. The 2020 annual base salaries for our named executive officers were $445,547 for Mr. Spignesi, $342,792 for Mr. Wirtjes and $320,000 for Ms. Vezina. The 2020 annual base salaries for Messrs. Spignesi and Wirtjes were increased from their 2019 levels of $431,000 and $331,200, respectively, effective April 1, 2020.

The base salaries of our named executive officers were adjusted in connection with this offering. See “Recent Changes in Executive Compensation — Annual Base Salaries” below for additional information.

2020 Bonuses

We maintain an annual performance-based cash bonus program in which our named executive officers participated in 2020. Each named executive officer’s target bonus is expressed as a percentage of base salary, which can be

achieved by meeting certain performance goals discussed below at target level. The 2020 annual bonuses for Messrs. Spignesi and Wirtjes and Ms. Vezina were targeted at 50%, 40% and 40% of their base salaries, respectively. Ms. Vezina's 2020 annual bonus was prorated to reflect her partial period of employment.

For the year ended December 31, 2020, our named executive officers were eligible to earn annual cash bonuses based on the achievement of certain corporate goals approved by the board of directors as well as individual performance. The corporate goals under our 2020 bonus program related to the areas of: (i) commercial and revenue; (ii) costs, expenses and productivity; (iii) customers; (iv) products and quality; (v) profitability, cash flow and capitalization; and (vi) employees. Corporate achievement was weighted 75% and individual achievement was weighted 25%.

In 2020, Messrs. Spignesi and Wirtjes also received special performance-based bonuses in the amount of $100,000 for Mr. Spignesi and $50,000 for Mr. Wirtjes, which were earned based on the consummation of an equity financing of the company and the company's performance for the first half of 2020 being generally consistent with the company's 2020 corporate objectives, as determined by the board of directors.

The actual annual cash bonuses awarded to each named executive officer under the 2020 annual bonus program and the special performance-based bonuses are set forth above in the Summary Compensation Table in the column entitled "Non-Equity Incentive Plan Compensation."

The target bonuses for our named executive officers were adjusted in connection with this offering. See "Recent Changes in Executive Compensation — Target Bonuses" below for additional information.

Equity compensation

We have granted stock options to our employees, including our named executive officers, in order to attract and retain them, as well as to align their interests with the interests of our stockholders. To provide a long-term incentive, these stock options generally vest over four years subject to continued service to the company.

In July 2020, we granted to Mr. Spignesi an option to purchase 538,305 shares of our Class A common stock and Mr. Wirtjes an option to purchase 107,860 shares of our Class A common stock. The options vest in 48 equal monthly installments following the grant date, subject to the executive's continued service to us, provided that Mr. Spignesi's option will vest in full in the event of a Change of Control (as defined in Mr. Spignesi's offer letter) and Mr. Wirtjes' option will vest in full in the event of Mr. Wirtjes' termination without Cause (as defined in the 2010 Plan) or resignation for Good Reason (as defined in the option agreement) in connection with, and effective as of or within 12 months following, a Sale Event (as defined in the 2010 Plan). In October 2020, we granted to Ms. Vezina an option to purchase 165,265 shares of our Class A common stock, which vests as to 25% of the shares subject to the option on September 8, 2021 and as to 1/48th of the shares subject to the option monthly thereafter, subject to Ms. Vezina's continued service to us, provided that the option will vest in full in the event of Ms. Vezina's termination without Cause or resignation for Good Reason in connection with, and effective as of or within 12 months following, a Sale Event. These options were granted under our 2010 Stock Option and Grant Plan, which we refer to as the 2010 Plan, with exercise prices equal to the fair market value of our Class A common stock on the date of grant, as determined by the board of directors.

In July 2020, our board of directors also approved the repricing of certain outstanding options to reduce the per share exercise price from $17.50 to the then-current per share fair market value of our Class A common stock of $0.75, including options covering an aggregate of 12,635 shares held by Mr. Spignesi.

In March 2021, we granted Mr. Spignesi an option to purchase 121,579 shares of our Class A common stock, Mr. Wirtjes an option to purchase 24,360 shares of our Class A common stock, and Ms. Vezina an option to purchase 12,157 shares of our Class A common stock. The options vest in 48 equal installments following March 9, 2021, subject to the executive's continued service to us, provided that Mr. Spignesi's option will vest in full in the event of a Change of Control, and the options granted to Mr. Wirtjes and Ms. Vezina will vest in full in the event of such executive's termination without Cause or resignation for Good Reason in connection with, and effective as of or within 12 months following, a Sale Event.

In connection with this offering, we have adopted the 2021 Incentive Award Plan, referred to below as the 2021 Plan, to facilitate the grant of cash and equity incentives to directors, employees (including our named executive officers) and consultants of our company and certain of its affiliates and to enable us to obtain and retain services of these individuals, which is essential to our long-term success. The 2021 Plan will be effective on the date immediately prior to the date the registration statement relating to this offering becomes effective. For additional information about the 2021 Plan, please see the section titled “Equity Incentive Plans” below.

Other elements of compensation

Retirement plans

We currently maintain a 401(k) retirement savings plan for our employees, including our named executive officers, who satisfy certain eligibility requirements. Our named executive officers are eligible to participate in the 401(k) plan on the same terms as other full-time employees. The Internal Revenue Code of 1986, as amended, or the Code, allows eligible employees to defer a portion of their compensation, within prescribed limits, on a pre-tax basis through elective contributions to the 401(k) plan. Currently, we match contributions made by participants in the 401(k) plan up to a specified percentage of the employee contributions, and these matching contributions are fully vested as of the date on which the contribution is made. We believe that providing a vehicle for tax-deferred retirement savings though our 401(k) plan adds to the overall desirability of our executive compensation package and further incentivizes our employees, including our named executive officers, in accordance with our compensation policies.

Employee benefits

All of our full-time employees, including our named executive officers, are eligible to participate in our health and welfare plans, which for U.S. employees include medical, dental and vision benefits, medical and dependent care flexible spending accounts, short-term and long-term disability insurance, and life insurance, on the same terms.

Outstanding equity awards at 2020 fiscal year-end

The following table summarizes the number of shares of Class A common stock underlying outstanding equity awards for each named executive officer as of December 31, 2020.

	Option Awards				
Name	Vesting Commencement Date	Number of Securities Underlying Unexercised Options (#) Exercisable	Number of Securities Underlying Unexercised Options (#) Unexercisable	Option Exercise Price ($)	Option Expiration Date
Robert Spignesi	9/26/2014	7,833	0	0.75	10/22/2025
	10/22/2015	3,400	0	0.75	10/22/2025
	8/12/2016	1,402	0	0.75	8/11/2026
	10/12/2017(1)	128,096	46,867	1.00	10/11/2027
	4/12/2018(1)	584,500	292,250	1.00	5/28/2028
	7/29/2020(1)	56,073	482,232	0.75	7/28/2030
Sean Wirtjes	9/12/2018(2)	0	97,686	0.75	9/11/2028
	7/29/2020(3)	0	96,624	1.00	7/28/2030
Victoria Vezina	9/8/2020(2)	0	165,265	0.75	10/28/2030

(1) Options vest in 48 equal monthly installments following the vesting commencement date, subject to the executive’s continued service on each applicable vesting date, provided that the options will vest in full on a Change of Control.

(2) Option vests as to 25% of the underlying shares on the first anniversary of the vesting commencement date and as to 1/48th of the underlying shares on each monthly anniversary thereafter, subject to the executive’s continued service on each applicable vesting date, provided that the option

will vest in full in the event of the executive's termination without Cause or resignation for Good Reason in connection with, and effective as of or within 12 months following, a Sale Event.

(3) Option vests in 48 equal monthly installments following the vesting commencement date, subject to the executive's continued service on each applicable vesting date, provided that the option will vest in full in the event of the executive's termination without Cause or resignation for Good Reason in connection with, and effective as of or within 12 months following, a Sale Event.

Executive employment arrangements

We previously entered into offer letters with each of our named executive officers in connection with his or her commencement of employment with us, which set forth the terms and conditions of their employment as described below. In connection with this offering, we have entered into new employment agreements with each of our named executive officers, which will supersede their prior offer letters with us. See "Recent Changes in Executive Compensation — Executive Employment Agreements" below for additional information.

Mr. Spignesi. We entered into an offer letter with Mr. Spignesi in September 2014 setting forth the terms of his employment as our Chief Executive Officer, including his initial base salary, target bonus, initial stock option grants and benefit plan participation eligibility. Mr. Spignesi's offer letter provides that all of Mr. Spignesi's equity awards will vest in full upon a change of control. In addition, Mr. Spignesi's offer letter provides that in the event Mr. Spignesi is terminated by us without Cause, he resigns for Good Reason, or he resigns within forty-five days following a change of control that results in a material adverse change in the level of his reporting responsibility or a diminution of duties, then subject to his execution of a release of claims in favor of us, he will be entitled to receive: (i) amount equal to 12 months of base salary and a pro-rated bonus for the year of termination, payable in substantially equal installments; (ii) up to 12 months of health benefits continuation; and (iii) six months' accelerated vesting of his outstanding equity awards.

For purposes of Mr. Spignesi's offer letter:

"Cause" means (i) dishonest statements or acts by the executive with respect to us or any of our affiliates, or any of our current or prospective customers, vendors or other third parties with which such entity does business; (ii) gross negligence or willful misconduct by the executive in the performance of his duties required by his offer letter; (iii) indictment for, formal admission to (including a plea of guilty or nolo contendere to), or conviction of a felony or any misdemeanor involving moral turpitude, deceit, dishonesty or fraud; (iv) material breach of the offer letter by the executive, which breach has been communicated to the executive in the form of a written notice from our board, and if such breach is curable, has not been cured by the executive within a reasonable period not to exceed 30 days following receipt of such written notice; or (v) a violation of any provision of any agreement(s) between the executive and us relating to noncompetition, nondisclosure and/or assignment of inventions.

"Good Reason" generally means, subject to certain notice and cure provisions, (i) a material diminution in the executive's base salary except for across-the-board salary reductions based on our financial performance similarly affecting all or substantially all of our senior management employees; (ii) a material diminution of the executive's duties and responsibilities without his consent; (iii) a change of the primary location to which the executive is assigned that results in an increase of at least 50 miles in the driving distance from the executive's primary residence to such primary location; or (iv) a material breach of the offer letter by us.

Mr. Wirtjes. We entered into an offer letter with Mr. Wirtjes in August 2018 setting forth the terms of his employment as our Chief Financial Officer, including his initial base salary, target bonus, initial stock option grant and benefit plan participation eligibility. Mr. Wirtjes's offer letter provides that in the event that Mr. Wirtjes's employment is terminated by us without Cause or he resigns for Good Reason, then subject to his execution of a release of claims in favor of us and continued compliance with any ongoing restrictive covenants or other obligations, he will be entitled to a lump sum amount equal to six months of base salary and up to six months of health benefits continuation.

For purposes of Mr. Wirtjes's offer letter:

"Cause" means (i) dishonest statements or acts by the executive with respect to us or any of our affiliates, or any of our current or prospective customers, vendors or other third parties with which such entity does business;

(ii) commission of a felony or any misdemeanor involving moral turpitude, deceit, dishonesty or fraud; (iii) gross negligence, willful misconduct or repeated or material insubordination by the executive with respect to us or any of our affiliates; or (iv) a violation of any provision of any agreement(s) between the executive and us relating to noncompetition, nondisclosure and/or assignment of inventions.

"Good Reason" generally means, subject to certain notice and cure provisions, (i) a material diminution in the executive's base salary except for across-the-board salary reductions based on our financial performance similarly affecting all or substantially all of our senior management employees; (ii) a material diminution of the executive's job responsibilities; or (iii) a relocation of the executive's principal place of employment that would increase the executive's daily commute by at least 50 miles each way.

Ms. Vezina. We entered into an offer letter with Ms. Vezina in August 2020 setting forth the terms of her employment as our Chief Human Resources Officer, including her initial base salary, target bonus, initial stock option grant and benefit plan participation eligibility. Ms. Vezina's offer letter provides that in the event that Ms. Vezina's employment is terminated by us without Cause or, within twelve months following a Sale Event (as defined in the offer letter), she resigns for Good Reason, then subject to her execution of a release of claims in favor of us and continued compliance with any ongoing restrictive covenants or other obligations, she will be entitled to a lump sum amount equal to six months of base salary and up to six months of health benefits continuation.

For purposes of Ms. Vezina's offer letter:

"Cause" means (i) dishonest statements or acts by the executive with respect to us or any of our affiliates, or any of our current or prospective customers, vendors or other third parties with which such entity does business; (ii) commission of a felony or any misdemeanor involving moral turpitude, deceit, dishonesty or fraud; (iii) gross negligence, willful misconduct or repeated or material insubordination by the executive with respect to us or any of our affiliates; or (iv) a violation of any provision of any agreement(s) between the executive and us relating to noncompetition, nondisclosure and/or assignment of inventions.

"Good Reason" generally means, subject to certain notice and cure provisions, (i) a material diminution in the executive's base salary except for across-the-board salary reductions based on our financial performance similarly affecting all or substantially all of our senior management employees; or (ii) a material reduction in the executive's job responsibilities.

Recent changes in executive compensation

In connection with this offering, our board of directors approved certain changes to our named executive officers' compensation arrangements. These include adjusting annual base salaries and target bonus opportunities and entering into new employment agreements that replaced our named executive officers' prior offer letters. Each of these arrangements is described in more detail below.

Annual base salaries

Our board of directors approved increases to the annual base salaries of our named executive officers, effective upon the date of this offering, as follows: $570,000 for Mr. Spignesi; $400,000 for Mr. Wirtjes; and $370,000 for Ms. Vezina.

Target bonuses

Our board of directors approved changes to the target bonuses for our named executive officers, effective upon the date of this offering, as follows: 80% of base salary for Mr. Spignesi and 50% of base salary for Mr. Wirtjes and Ms. Vezina.

Executive employment agreements

We entered into an employment agreement with each of our named executive officers that will supersede the executive's prior offer letter with us effective as of the date of this offering. The employment agreements entitle

our named executive officers to receive the annual base salaries and annual target bonus opportunities described above under the headings “Annual Base Salaries” and “Target Bonuses.”

Under the new employment agreements, if we terminate Mr. Spignesi, Mr. Wirtjes or Ms. Vezina without “cause” or if such executive resigns for “good reason” (each as defined below), subject to the executive’s timely executing a release of claims and his or her continued compliance with certain restrictive covenants, the executive will be entitled to receive: (i) base salary continuation for a period of nine months (or 12 months for Mr. Spignesi); (ii) payment of any earned but unpaid annual bonus for the year prior to the year of termination; (iii) an amount in cash equal to a pro-rated portion of the annual bonus for the year of termination based upon actual performance; (iv) continued health coverage pursuant to COBRA for up to nine months (or 12 months for Mr. Spignesi) following termination; and (v) for Mr. Spignesi only, six months’ accelerated vesting of all unvested equity or equity-based awards held by Mr. Spignesi that vest solely based on continued employment or service and up to 12 months following the date of his termination to exercise any outstanding vested options.

In addition, if we terminate Mr. Spignesi, Mr. Wirtjes or Ms. Vezina without “cause” or such executive resigns for “good reason”, in either case, on or within three months prior to a change in control, or within 12 months following a change in control, then, in lieu of the severance payments and benefits described above, subject to the executive’s timely executing a release of claims and the executive’s continued compliance with certain restrictive covenants, such executive is entitled to receive (i) a lump sum payment equal to one times (or 1.5 times for Mr. Spignesi) the executive’s annual base salary; (ii) payment of any earned but unpaid annual bonus for the year prior to the year of termination; (iii) continued health coverage pursuant to COBRA for up to 12 months following termination (or 18 months for Mr. Spignesi); (iv) a lump sum payment equal to one times (or 1.5 times for Mr. Spignesi) the executive’s annual target bonus; and (v) for Mr. Wirtjes and Ms. Vezina, full accelerated vesting of all unvested equity or equity-based awards held by the executive that vest solely based on continued employment or service.

Under Mr. Spignesi’s employment agreement, in the event of a change in control, Mr. Spignesi will receive full accelerated vesting of all unvested equity or equity-based awards and will have up to one year following the change in control to exercise any outstanding vested options.

For purposes of the employment agreements, “cause” generally means: (i) the executive’s gross negligence or willful misconduct in the performance of the executive’s duties under the employment agreement, (ii) the executive’s conviction of a felony or any misdemeanor involving moral turpitude, deceit, dishonesty or fraud, (iii) the executive’s material breach of a material provision of the employment agreement that, to the extent capable of cure, has remained uncured for a period of thirty (30) days following written notice from the company, (iv) violation of any material provision of any agreement between the executive and the company relating to non-competition, nondisclosure and/or assignment of inventions, (v) breach of any company policy that materially harms the company that, to the extent capable of cure, has remained uncured for a period of 30 days following written notice from the company, (vi) refusal to carry out the reasonable and lawful instructions of the board of directors concerning duties or actions consistent with the executive’s position with the company and such event or omission results in demonstrable and material harm to the company, as determined in the board of director’s reasonable and good faith determination, (vii) unlawful use or possession of illegal drugs on the company’s (or any of our affiliate’s) premises or while performing the executive’s duties and responsibilities under the employment agreement, or (viii) commission of any act of fraud, embezzlement, misappropriation, willful misconduct, or breach of fiduciary duty against the company or any of our affiliates.

For purposes of the employment agreements, “good reason” generally means, subject to an opportunity for notice and cure, (i) a reduction in the executive’s annual base salary, except for a reduction made as part of across-the-board reductions based on the company’s financial performance similarly affecting all or substantially all of our senior management employees in a similar percentage amount, (ii) a material decrease in the executive’s duties, authority or areas of responsibility as are commensurate with executive’s title or position with the company, including, for Mr. Spignesi only, ceasing to report to the board of directors or the board of directors of the Company’s ultimate parent, (iii) the relocation of the executive’s primary office to a location that results in an

increase to the executive's one-way commute of more than fifty (50) miles, or (iv) the company's material breach of a material agreement between the executive and the company.

Each of our named executive officers has agreed to refrain from competing with us while employed and for a period of 12 months following his or her termination of employment if terminated for cause or if the executive resigns for any reason and as a condition to the receipt of severance benefits upon a termination without cause or resignation for good reason. Each of our named executive officers has also agreed to refrain from soliciting our employees, consultants, customers, suppliers or vendors, in each case, while employed and for a period of 12 months following his or her termination of employment for any reason.

Director compensation

We have not historically maintained a formal non-employee director compensation program. However, we have granted stock options to certain of our directors from time to time, and Mr. Ricciardi, as a non-employee director who is not affiliated with one of our investors, receives a director fee of $30,000 annually for his service on our board of directors. Mr. Spignesi receives no additional compensation for his service as director. His compensation as our Chief Executive Officer is set forth in the 2020 Summary Compensation Table above.

As described above under "Narrative to Summary Compensation Table—Equity Compensation", in July 2020, we repriced certain outstanding options to reduce the per share exercise price from $17.50 to the then-current per share fair market value of our Class A common stock of $0.75, including the options covering 842 shares held by Christopher Cashman, options covering 3,508 shares held by Mr. Kollender and options covering 842 shares held by Mr. Ricciardi.

2020 Director compensation table

Name	Fees Earned or Paid in Cash ($)	Option Awards ($)	Total ($)
Christopher Cashman(1)	—	17,007(2)	17,007
Bruce Cohen	—	—	—
David Hirsch	—	—	—
Richard Kollender	—	1,326(3)	1,326
Natale Ricciardi	30,000	307(3)	30,307
Alexander Schmitz(4)	—	—	—
Jeffrey Schwartz	—	—	—

(1) Mr. Cashman resigned from our board of directors effective April 28, 2020.

(2) In connection with Mr. Cashman's resignation, our board of directors approved the accelerated vesting of all his then-unvested options effective as of the date of his resignation and extended exercisability of his outstanding options until April 28, 2021. Amount represents the incremental fair value attributed to the accelerated vesting and extended exercisability approved by the board of directors ($16,695) and the incremental fair value attributed to the repricing of options held by Mr. Cashman in 2020, in each case, computed in accordance with ASC Topic 718 ($312).

(3) The amounts reflect the incremental fair value attributed to the repricing of options held by the non-employee director in 2020 computed in accordance with Topic 718.

(4) Mr. Schmitz was appointed to our board of directors effective April 28, 2020.

The table below shows the aggregate numbers of option awards (exercisable and unexercisable) held as of December 31, 2020 by each non-employee director. None of our non-employee directors held any stock awards as of December 31, 2020.

Name	Option Awards Outstanding at 2020 Fiscal Year-End
Christopher Cashman	0

Name	Option Awards Outstanding at 2020 Fiscal Year-End
Bruce Cohen	—
David Hirsch	—
Richard Kollender	162,085
Natale Ricciardi	60,042
Alexander Schmitz	—
Jeffrey Schwartz	—

Director IPO grants

In connection with this offering, our board of directors approved the grant of options to purchase 25,000 shares of our Class A common stock pursuant to the 2021 Plan to each of Jeffrey Schwartz, David Hirsch, Melinda Litherland, Richard Kollender, Natale Ricciardi and Alexander Schmitz. These option grants will become effective upon the effectiveness of the registration statement of which this prospectus forms a part and have an exercise price equal to the initial price to the public our Class A common stock in this offering. Each option will vest in 36 equal monthly installments following the grant date, subject to continued service as a non-employee director as of the applicable vesting date, provided that each option will vest in full upon a change in control to the extent then-outstanding.

Non-employee director compensation program

In connection with this offering, our board of directors adopted, and our stockholders approved, a non-employee director compensation program pursuant to which our non-employee directors will be entitled to the cash and equity compensation described below. The compensation payable under the program is intended to be competitive in relation to both the market in which the company operates and the nature, complexity and size of the company's business.

Following this offering, our non-employee directors will receive the following amounts for their services on our board under the non-employee director compensation program:

Cash compensation

- An annual director fee of $40,000;
- If the director serves as lead independent director or chair or on a committee of our board, an additional annual fee as follows:
  - Chair of the board or lead independent director, $40,000;
  - Chair of the audit committee, $20,000;
  - Audit committee member other than the chair, $10,000;
  - Chair of the compensation committee, $14,000;
  - Compensation committee member other than the chair, $7,000.
  - Chair of the nominating and corporate governance committee, $10,000;
  - Nominating and corporate governance committee member other than the chair, $5,000.

Director fees will be payable quarterly in arrears, provided that the amount of each payment will be prorated for any portion of a quarter that a director is not serving on our board.

Equity compensation

- *Initial Awards*: Each non-employee director who is initially elected or appointed to serve on our board of directors after the effective date of the non-employee director compensation program automatically will be granted, on the date on which such non-employee director is appointed or elected to serve on the board, an option to purchase 25,000 shares of our Class A common stock with an exercise price per share of Class A common stock equal to the fair market value of a share of our Class A common stock on the date of grant. These initial options will vest in 36 equal monthly installments following the date of grant, such that the initial options will be fully vested and exercisable on the third anniversary of the date of grant, subject to the non-employee director's continued service as a non-employee director through the applicable vesting date.
- *Subsequent Awards*: Each non-employee director who (i) has been serving on our board for at least six months as of the date of any annual meeting of our stockholders after the effective date of this offering and (ii) will continue to serve as a director immediately following such meeting automatically will be granted, on such annual meeting date, an option to purchase 12,500 shares of our Class A common stock with an exercise price per share of Class A common stock equal to the fair market value of a share of our Class A common stock on the date of grant. Each annual option will vest in full on the earlier to occur of (i) the first anniversary of the applicable grant date and (ii) the date of the next annual meeting following the grant date, subject to such non-employee director's continued service as a non-employee director through the applicable vesting date.

In addition, each initial option and annual option will vest in full upon a change in control of the company (as defined in the 2021 Plan). If a non-employee director's service as a non-employee director on our board terminates for any reason, unless the board determines otherwise, such director's awards that are outstanding and unexercisable at the time of such termination will be forfeited and will not become thereafter vested or thereafter exercisable.

Incentive compensation plans

The following summarizes the material terms of the 2021 Plan and the 2021 Employee Stock Purchase Plan, or the 2021 ESPP, which will be the long-term incentive compensation plans in effect following this offering, and the 2010 Plan, under which we have previously made periodic grants of equity and equity-based awards to our directors and named executive officers.

2021 Incentive award plan

Effective the day prior to the first public trading date of our Class A common stock, we have adopted, and our stockholders have approved, the 2021 Plan, under which we may grant cash and equity-based incentive awards to eligible service providers in order to attract, retain and motivate the persons who make important contributions to our company. The material terms of the 2021 Plan are summarized below.

Eligibility and administration

Our employees, consultants and directors, and employees and consultants of our subsidiaries, will be eligible to receive awards under the 2021 Plan. The 2021 Plan will be administered by our board of directors, which may delegate its duties and responsibilities to one or more committees of our directors and/or officers (referred to collectively as the plan administrator below), subject to the limitations imposed under the 2021 Plan, Section 16 of the Exchange Act, stock exchange rules and other applicable laws. The plan administrator will have the authority to take all actions and make all determinations under the 2021 Plan, to interpret the 2021 Plan and award agreements and to adopt, amend and repeal rules for the administration of the 2021 Plan as it deems advisable. The plan administrator will also have the authority to grant awards, determine which eligible service providers receive awards and set the terms and conditions of all awards under the 2021 Plan, including any vesting and vesting acceleration provisions, subject to the conditions and limitations in the 2021 Plan.

Shares available for awards

An aggregate of 4,200,000 shares of our Class A common stock will initially be available for issuance under the 2021 Plan. The number of shares initially available for issuance will automatically increase on January 1 of each calendar year beginning in 2022 and ending in and including 2031, equal to the lesser of (A) 5% of the shares of Class A common stock outstanding on the final day of the immediately preceding calendar year and (B) a smaller number of shares determined by our 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. Shares issued under the 2021 Plan may be authorized but unissued shares, shares purchased on the open market or treasury shares.

If an award under the 2021 Plan or the 2010 Plan, expires, lapses or is terminated, exchanged for or settled in cash, surrendered, repurchased, canceled without having been fully exercised or forfeited, any unused shares subject to the award will, as applicable, become or again be available for new grants under the 2021 Plan. Awards granted under the 2021 Plan in substitution for any options or other stock or stock-based awards granted by an entity before the entity's merger or consolidation with us or our acquisition of the entity's property or stock will not reduce the shares available for grant under the 2021 Plan, but may count against the maximum number of shares that may be issued upon the exercise of incentive stock options, or ISOs.

Awards

The 2021 Plan provides for the grant of ISOs, nonqualified stock options, or NSOs, stock appreciation rights, or SARs, restricted stock, dividend equivalents, restricted stock units, or RSUs, and other stock or cash-based awards. Certain awards under the 2021 Plan may constitute or provide for payment of "nonqualified deferred compensation" under Section 409A of the Code. All awards under the 2021 Plan will be set forth in award agreements, which will detail the terms and conditions of awards, including any applicable vesting and payment terms and post-termination exercise limitations. A brief description of each award type follows:

- Stock Options and SARs. Stock options provide for the purchase of shares of our Class A common stock in the future at an exercise price set on the grant date. ISOs, by contrast to NSOs, may provide tax deferral beyond exercise and favorable capital gains tax treatment to their holders if certain holding period and other requirements of the Code are satisfied. SARs entitle their holder, upon exercise, to receive from us an amount equal to the appreciation of the shares subject to the award between the grant date and the exercise date. The plan administrator will determine the number of shares covered by each option and SAR, the exercise price of each option and SAR and the conditions and limitations applicable to the exercise of each option and SAR. The exercise price of a stock option or SAR will not be less than 100% of the fair market value of the underlying share on the grant date (or 110% in the case of ISOs granted to certain significant stockholders), except with respect to certain substitute awards granted in connection with a corporate transaction. The term of a stock option or SAR may not be longer than ten years (or five years in the case of ISOs granted to certain significant stockholders).
- Restricted Stock and RSUs. Restricted stock is an award of nontransferable shares of our Class A common stock that remain forfeitable unless and until specified conditions are met and which may be subject to a purchase price. RSUs are contractual promises to deliver shares of our Class A common stock in the future, which may also remain forfeitable unless and until specified conditions are met and may be accompanied by the right to receive the equivalent value of dividends paid on shares of our Class A common stock prior to the delivery of the underlying shares. The plan administrator may provide that the delivery of the shares underlying RSUs will be deferred on a mandatory basis or at the election of the participant. The terms and conditions applicable to restricted stock and RSUs will be determined by the plan administrator, subject to the conditions and limitations contained in the 2021 Plan.
- Other Stock or Cash Based Awards. Other stock or cash-based awards are awards of cash, fully vested shares of our Class A common stock and other awards valued wholly or partially by referring to, or otherwise based on, shares of our Class A common stock or other property. Other stock or cash-based awards may be granted to participants and may also be available as a payment form in the settlement of other awards, as standalone payments and as payment in lieu of compensation to which a participant is otherwise entitled. The plan

administrator will determine the terms and conditions of other stock or cash-based awards, which may include any purchase price, performance goal, transfer restrictions and vesting conditions.

Performance criteria

The plan administrator may select performance criteria for an award to establish performance goals for a performance period. Performance criteria under the 2021 Plan may include, but are not limited to, the following: net earnings or losses (either before or after one or more of interest, taxes, depreciation, amortization, and non-cash equity-based compensation expense); gross or net sales or revenue or sales or revenue growth; net income (either before or after taxes) or adjusted net income; profits (including but not limited to gross profits, net profits, profit growth, net operation profit or economic profit), profit return ratios or operating margin; budget or operating earnings (either before or after taxes or before or after allocation of corporate overhead and bonus); cash flow (including operating cash flow and free cash flow or cash flow return on capital); return on assets; return on capital or invested capital; cost of capital; return on stockholders' equity; total stockholder return; return on sales; costs, reductions in costs and cost control measures; expenses; working capital; earnings or loss per share; adjusted earnings or loss per share; price per share or dividends per share (or appreciation in or maintenance of such price or dividends); regulatory achievements or compliance; implementation, completion or attainment of objectives relating to research, development, regulatory, commercial, or strategic milestones or developments; market share; economic value or economic value added models; division, group or corporate financial goals; customer satisfaction/growth; customer service; employee satisfaction; recruitment and maintenance of personnel; human resources management; supervision of litigation and other legal matters; strategic partnerships and transactions; financial ratios (including those measuring liquidity, activity, profitability or leverage); debt levels or reductions; sales-related goals; financing and other capital raising transactions; cash on hand; acquisition activity; investment sourcing activity; and marketing initiatives, any of which may be measured in absolute terms or as compared to any incremental increase or decrease. Such performance goals also may be based solely by reference to the company's performance or the performance of a subsidiary, division, business segment or business unit of the company or a subsidiary, or based upon performance relative to performance of other companies or upon comparisons of any of the indicators of performance relative to performance of other companies. When determining performance goals, the plan administrator may provide for exclusion of the impact of an event or occurrence which the plan administrator determines should appropriately be excluded, including, without limitation, non-recurring charges or events, acquisitions or divestitures, changes in the corporate or capital structure, events unrelated to the business or outside of the control of management, foreign exchange considerations, and legal, regulatory, tax or accounting changes.

Certain transactions

In connection with certain corporate transactions and events affecting our Class A common stock, including a change in control, or change in any applicable laws or accounting principles, the plan administrator has broad discretion to take action under the 2021 Plan to prevent the dilution or enlargement of intended benefits, facilitate the transaction or event or give effect to the change in applicable laws or accounting principles. This includes canceling awards for cash or property, accelerating the vesting of awards, providing for the assumption or substitution of awards by a successor entity, adjusting the number and type of shares subject to outstanding awards and/or with respect to which awards may be granted under the 2021 Plan and replacing or terminating awards under the 2021 Plan. In addition, in the event of certain non-reciprocal transactions with our stockholders, the plan administrator will make equitable adjustments to awards outstanding under the 2021 Plan as it deems appropriate to reflect the transaction.

Provisions of the 2021 plan relating to director compensation

The 2021 Plan provides that the plan administrator may establish compensation for non-employee directors from time to time subject to the 2021 Plan's limitations. In connection with this offering, we have approved and implemented a compensation program for our non-employee directors, which is described above under the heading "Director Compensation." Our board of directors (or its authorized committee) may modify the non-employee director compensation program from time to time in the exercise of its business judgment, taking into account such

factors, circumstances and considerations as it shall deem relevant from time to time, provided that the sum of any cash compensation or other compensation and the grant date fair value of any equity awards granted under the 2021 Plan as compensation for services as a non-employee director during any fiscal year may not exceed $1,000,000 in the fiscal year of the non-employee director's initial service or in the fiscal year in which the 2021 Plan's effective date occurs and $750,000 in any other fiscal year. The plan administrator may make exceptions to this limit for individual non-employee directors in extraordinary circumstances, as the plan administrator may determine in its discretion, subject to the limitations in the 2021 Plan.

Plan amendment and termination

Our board of directors may amend or terminate the 2021 Plan at any time; however, no amendment, other than an amendment that increases the number of shares available under the 2021 Plan, may materially and adversely affect an award outstanding under the 2021 Plan without the consent of the affected participant and stockholder approval will be obtained for any amendment to the extent necessary to comply with applicable laws. Further, the plan administrator may, without the approval of our stockholders, amend any outstanding stock option or SAR to reduce its price per share, other than in the context of corporate transactions or equity restructurings, as described above. The 2021 Plan will remain in effect until the tenth anniversary of its effective date, unless earlier terminated by our board of directors. No awards may be granted under the 2021 Plan after its termination.

Foreign participants, claw-back provisions, transferability and participant payments

The plan administrator may modify awards granted to participants who are foreign nationals or employed outside the United States or establish subplans or procedures to address differences in laws, rules, regulations or customs of such foreign jurisdictions. All awards will be subject to any company claw-back policy as set forth in such claw-back policy or the applicable award agreement. Except as the plan administrator may determine or provide in an award agreement, awards under the 2021 Plan are generally non-transferrable, except by will or the laws of descent and distribution, or, subject to the plan administrator's consent, pursuant to a domestic relations order, and are generally exercisable only by the participant. With regard to tax withholding obligations arising in connection with awards under the 2021 Plan and exercise price obligations arising in connection with the exercise of stock options under the 2021 Plan, the plan administrator may, in its discretion, accept cash, wire transfer or check, shares of our Class A common stock that meet specified conditions, a promissory note, a "market sell order," such other consideration as the plan administrator deems suitable or any combination of the foregoing.

2021 Employee stock purchase plan

Effective on the date of effectiveness of the registration statement for this offering, we have adopted, and our stockholders have approved, the 2021 ESPP, the material terms of which are summarized below.

Shares available for awards; administration

A total of 400,000 shares of our Class A common stock will initially be reserved for issuance under the 2021 ESPP. In addition, the number of shares available for issuance under the 2021 ESPP will be annually increased on January 1 of each calendar year beginning in 2022 and ending in and including 2031, by an amount equal to the lesser of (A) 1% of the shares outstanding on the final day of the immediately preceding calendar year and (B) such smaller number of shares as is determined by our board of directors, provided that no more than 6,300,000 shares of our Class A common stock may be issued under the 2021 ESPP. Our board of directors or a committee of our board of directors will administer and will have authority to interpret the terms of the 2021 ESPP and determine eligibility of participants. We expect that the compensation committee will be the initial administrator of the 2021 ESPP.

Eligibility

All of our employees and employees of participating subsidiaries designated by the administrator are eligible to participate in the 2021 ESPP, unless the administrator determines to limit participation in accordance with the

terms of the 2021 ESPP and provided that an employee may not be granted rights to purchase stock under our 2021 ESPP if the employee, immediately after the grant, would own (directly or through attribution) stock possessing 5% or more of the total combined voting power or value of all classes of our stock.

Grant of rights

The 2021 ESPP consists of two components: a Section 423 component, which is intended to qualify under Section 423 of the Code and a non-Section 423 component, which need not qualify under Section 423 of the Code. Stock will be offered under the 2021 ESPP during offering periods, which may be comprised of multiple purchase periods. The length of the offering periods under the 2021 ESPP will be determined by the plan administrator and may be up to twenty-seven months long. Employee payroll deductions will be used to purchase shares on each purchase date during an offering period. The purchase date for each offering period will be the final trading day of the applicable purchase period. Offering periods under the 2021 ESPP will commence when determined by the plan administrator. The plan administrator may, in its discretion, modify the terms of future offering periods.

The 2021 ESPP permits participants to purchase Class A common stock through payroll deductions of up to a specified percentage of their eligible compensation. The plan administrator will establish a maximum number of shares that may be purchased by a participant during any offering period or purchase period, which in the absence of a contrary designation, will be 100,000 shares. In addition, no employee will be permitted to accrue the right to purchase stock under the Section 423 component at a rate in excess of $25,000 worth of shares during any calendar year during which such a purchase right is outstanding (based on the fair market value per share of our Class A common stock as of the first day of the offering period).

On the first trading day of each offering period, each participant will automatically be granted an option to purchase shares of our Class A common stock. The option will expire at the end of the applicable purchase period, and will be exercised at that time to the extent of the payroll deductions accumulated during the purchase period. The purchase price of the shares, in the absence of a contrary designation, will be 85% of the lower of the fair market value of our Class A common stock on the first trading day of the offering period or on the purchase date. Participants may voluntarily end their participation in the 2021 ESPP at any time during a specified period prior to the end of the applicable purchase period, and will be paid their accrued payroll deductions that have not yet been used to purchase shares of Class A common stock. Participation ends automatically upon a participant's termination of employment or other cessation of eligibility.

A participant may not transfer options granted under the 2021 ESPP other than by will or the laws of descent and distribution, and options granted under the 2021 ESPP are generally exercisable only by the participant.

Certain transactions

In the event of certain non-reciprocal transactions or events affecting our Class A common stock, the plan administrator will make equitable adjustments to the 2021 ESPP and outstanding rights. In the event of certain unusual or non-recurring events or transactions, including a change in control, the plan administrator may provide for (1) either the replacement of outstanding rights with other rights or property or termination of outstanding rights in exchange for cash, (2) the assumption or substitution of outstanding rights by the successor or survivor corporation or parent or subsidiary thereof, if any, (3) the adjustment in the number and type of shares of stock subject to outstanding rights, (4) the use of participants' accumulated payroll deductions to purchase stock on a new purchase date prior to the next scheduled purchase date and termination of any rights under ongoing offering periods or (5) the termination of all outstanding rights.

Plan amendment

The plan administrator may amend, suspend or terminate the 2021 ESPP at any time. However, stockholder approval will be obtained for any amendment that increases the aggregate number or changes the type of shares that may be sold pursuant to rights under the 2021 ESPP or changes the corporations or classes of corporations whose employees are eligible to participate in the 2021 ESPP.

2010 Stock option and grant plan

Our board of directors adopted our 2010 Stock Option and Grant Plan, or the 2010 Plan, and our stockholders approved our 2010 Plan, in June 2010. The 2010 Plan has subsequently been amended and/or restated to increase the shares reserved under the plan, among other changes. Following the effectiveness of the 2021 Plan, we will cease granting additional awards under our 2010 Plan. However, our 2010 Plan will continue to govern the terms and conditions of the outstanding stock option awards previously granted thereunder.

Share Reserve. As of June 30, 2021, stock options covering 4,518,884 shares with a weighted-average exercise price of $3.30 per share and 266,069 restricted shares were outstanding under our 2010 Plan, and 162,337 shares of our Class A common stock remained available for the future grant of awards under our 2010 Plan.

Administration. Our board of directors or a committee delegated by our board of directors administers our 2010 Plan. Subject to the terms of our 2010 Plan, the administrator has the power to, among other things, determine who will be granted awards, determine the terms and conditions of each awards, accelerate the time(s) when an award may vest or be exercised and construe and interpret the terms of our 2010 Plan and awards granted thereunder.

Options. Options granted under our 2010 Plan are subject to terms and conditions generally similar to those described above with respect to options that may be granted under our 2021 Plan.

Restricted Stock. Restricted stock granted under our 2010 Plan is subject to terms and conditions generally similar to those described above with respect to restricted stock that may be granted under our 2021 Plan.

Changes to Capital Structure. If, as a result of any reorganization, recapitalization, reclassification, stock dividend, stock split, reverse stock split or other similar change in the company's capital stock, the outstanding shares of common stock of the company are increased or decreased or are exchanged for a different number or kind of shares or other securities of the company, or additional shares or new or different shares or other securities of the company or other non-cash assets are distributed with respect to such shares or other securities, or, if, as a result of any merger or consolidation, or sale of all or substantially all of the assets of the company, the outstanding shares of common stock are converted into or exchanged for securities of the company or any successor entity, the plan administrator will adjust the maximum number of shares reserved for issuance under the 2010 Plan, the number and kind of shares or other securities subject to outstanding awards under the 2010 Plan, and the exercise or repurchase price, as applicable of each outstanding award under the 2010 Plan.

Sale Event. In the event of a Sale Event (as defined in the 2010 Plan), the 2010 Plan and outstanding awards will terminate or be forfeited unless such awards assumed or substituted, provided that the company may provide for a cash payment in exchange for the cancellation of such awards. In the event of a termination of options, each holder of options will be permitted to exercise such options during a specified period of time prior to the consummation of the Sale Event.

Certain relationships and related party transactions

The following includes a summary of transactions since January 1, 2018 to which we have been a party in which the amount involved exceeded or will exceed the lesser of (i) $120,000 or (ii) one percent of the average of our total assets at fiscal year-end for our last two fiscal years, and in which any of our directors, executive officers or, to our knowledge, beneficial owners of more than 5% of our capital stock or any member of the immediate family of any of the foregoing persons had or will have a direct or indirect material interest. We also describe below certain other transactions with our directors, executive officers and stockholders.

Preferred stock financings

Series B1 Preferred Stock Financing. In April 2018 and July 2019, we issued and sold to investors in private placements an aggregate of 60,017,425 shares of our Series B1 preferred stock at a purchase price of $1.00 per share, for aggregate consideration of approximately $60.0 million.

Series C1/C2 Preferred Stock Financing. In April 2020, we issued and sold to investors in a private placement an aggregate of (i) 23,611,208 shares of our Series C1 preferred stock at a purchase price of $1.15 per share, (ii) 10,351,063 shares of Series C1 preferred stock in connection with the conversion of convertible promissory notes at a conversion price of $1.087 per share, and (iii) 20,301,829 shares of our Series C2 preferred stock at a purchase price of $1.15 per share, for aggregate consideration of approximately $60.0 million.

Series D1/D2 Preferred Stock Financing. In March 2021, we issued and sold to investors in a private placement an aggregate of 22,086,725 shares of our Series D1 preferred stock and an aggregate of 413,268 shares of our Series D2 preferred stock at a purchase price of $3.60 per share, for aggregate consideration of approximately $81.0 million.

The following table sets forth the aggregate number of shares of our capital stock acquired by beneficial owners of more than 5% of our capital stock in the financing transactions described above. Each share of our Series B1 preferred stock, Series C1 preferred stock, and Series D1 preferred stock will convert into 0.2 of a share of Class A common stock immediately prior to the closing of this offering. Each share of our Series C2 preferred stock and Series D2 preferred stock will convert into 0.2 of a share of Class B common stock immediately prior to the closing of this offering.

Participants	Series B1 Preferred Stock	Series C1 Preferred Stock	Series C2 Preferred Stock	Series D1 Preferred Stock	Series D2 Preferred Stock
5% or Greater Stockholders(1)					
Bain Capital Life Sciences Fund, L.P.	31,750,072	6,053,214	—	—	—
ABG WTT-Rapid Limited	—	—	31,739,130	—	—
Ally Bridge MedAlpha Master Fund L.P.	—	—	—	—	2,777,777
Longitude Venture Partners II, L.P.	5,654,529	2,291,665	—	—	—
Colony Harvest Ltd.	12,500,000	2,382,682	—	—	—
Endeavour Medtech Growth II LP	—	8,828,422	—	1,388,888	—

(1) Additional details regarding these stockholders and their equity holdings are provided in this prospectus under the caption "Principal Stockholders."

Some of our directors are associated with our principal stockholders as indicated in the table below:

Director	Principal Stockholder
Bruce Cohen	Colony Harvest Ltd.
Jeffrey Schwartz	Bain Capital Life Sciences Fund, L.P.
David Hirsch	Longitude Venture Partners II, L.P.
Alexander Schmitz	Endeavour Medtech Growth II LP

Exchange agreement

In June 2021, we entered into an exchange agreement with ABG WTT and Ally Bridge MedAlpha, pursuant to which we issued to ABG WTT 11,437,301 shares of our Series C2 preferred stock in exchange for an equal number of shares of Series C1 preferred stock and 2,364,509 shares of Series D2 preferred stock in exchange for an equal number of shares of Series D1 preferred stock.

Investor rights agreement

We entered into a Seventh Amended and Restated Investors' Rights Agreement in March 2021 with the holders of our preferred stock, including entities with which certain of our directors are related. The agreement provides for certain rights relating to the registration of such holders' common stock, including shares issuable upon conversion of preferred stock, and a right of first refusal to purchase future securities sold by us. See "Description of Capital Stock—Registration Rights" for additional information.

Voting agreement

We entered into a Seventh Amended and Restated Voting Agreement by and among us and certain of our stockholders, pursuant to which the following directors were elected to serve as members on our board of directors and, as of the date of this prospectus, continue to so serve: Robert Spignesi, Bruce Cohen, Richard Kollender, Jeffrey Schwartz, Natale Ricciardi, David Hirsch and Alexander Schmitz. Robert Spignesi was selected to serve on our board of directors in his capacity as our chief executive officer. Bruce Cohen, Jeffrey Schwartz, David Hirsch and Alexander Schmitz were initially selected to serve on our board of directors as representatives of holders of our preferred stock, as designated by entities affiliated with Colony Harvest Ltd., Bain Capital Life Sciences Fund, L.P., Longitude Venture Partners II, L.P. and Endeavour Medtech Growth II LP, respectively.

The voting agreement will terminate upon the closing of this offering, and members previously elected to our board of directors pursuant to this agreement will continue to serve as directors until they resign, are removed or their successors are duly elected by the holders of our common stock. The composition of our board of directors after this offering is described in more detail under "Management—Board Composition and Election of Directors."

Indemnification agreements

We intend to enter into indemnification agreements with each of our directors and executive officers. These agreements, among other things, require us or will require us to indemnify each director (and in certain cases their related venture capital funds) and executive officer to the fullest extent permitted by Delaware law, including indemnification of expenses such as attorneys' fees, judgments, fines and settlement amounts incurred by the director or executive officer in any action or proceeding, including any action or proceeding by or in right of us, arising out of the person's services as a director or executive officer.

Policies and procedures for related person transactions

Our board of directors has adopted a written related person transaction policy setting forth the policies and procedures for the review and approval or ratification of related person transactions. This policy will cover, with certain exceptions set forth in Item 404 of Regulation S-K under the Securities Act, any transaction, arrangement or relationship, or any series of similar transactions, arrangements or relationships, in which we were or are to be a participant, where the amount involved exceeds the lesser of (i) $120,000 or (ii) one percent of the average of our total assets at fiscal year-end for any fiscal year and a related person had, has or will have a direct or indirect material interest, including without limitation, purchases of goods or services by or from the related person or entities in which the related person has a material interest, indebtedness, guarantees of indebtedness and employment by us of a related person. In reviewing and approving any such transactions, our audit committee is tasked to consider all relevant facts and circumstances, including, but not limited to, whether the transaction is on terms comparable to those that could be obtained in an arm's length transaction and the extent of the related person's interest in the transaction. All of the transactions described in this section occurred prior to the adoption of this policy.

Principal stockholders

The following table sets forth information with respect to the beneficial ownership of our common stock, as of June 30, 2021 by:

- each person or group of affiliated persons known by us to beneficially own more than 5% of our common stock;
- each of our named executive officers;
- each of our directors; and
- all of our executive officers and directors as a group.

The number of shares beneficially owned by each stockholder is determined under rules issued by the Securities and Exchange Commission. Under these rules, beneficial ownership includes any shares as to which the individual or entity has sole or shared voting power or investment power. Applicable percentage ownership is based on 25,166,970 shares of Class A common stock and 6,903,379 shares of Class B common stock outstanding as of June 30, 2021, assuming the conversion of all outstanding shares of preferred stock into common stock. In computing the number of shares beneficially owned by an individual or entity and the percentage ownership of that person, shares of common stock subject to options, warrants or other rights held by such person that are currently exercisable or will become exercisable within 60 days of June 30, 2021 are considered outstanding, although these shares are not considered outstanding for purposes of computing the percentage ownership of any other person. Unless noted otherwise, the address of all listed stockholders is 100 Pawtucket Boulevard West, Suite 280, Lowell, Massachusetts 01854. Each of the stockholders listed has sole voting and investment power with respect to the shares beneficially owned by the stockholder unless noted otherwise, subject to community property laws where applicable.

				Beneficially Owned Prior to Offering		Beneficially Owned After Offering	
Name of Beneficial Owner	Number of Shares of Class A Common Stock Owned	Number of Shares of Class B Common Stock Owned	Number of Shares of Class A and Class B Common Stock Owned	Percentage of Class A Common Stock Owned	Percentage of Class A and Class B Common Stock Owned	Percentage of Class A Common Stock Owned	Percentage of Class A and Class B Common Stock Owned After Offering
Major Stockholders Including 5% or Greater Stockholders							
Entities affiliated with Bain Capital Life Sciences Investors, LLC(1)	8,334,560	—	8,334,560	33.12%	25.99%	25.19%	20.84%
Longitude Venture Partners II, L.P.(2)	4,042,547	—	4,042,547	15.67	12.36	11.99	9.95
Colony Harvest Ltd.(3)	2,976,536	—	2,976,536	11.83	9.28	9.00	7.44
Entities affiliated with Endeavour Medtech Growth II LP(4)	2,043,635	—	2,043,635	8.12	6.37	6.18	5.11
D1 Master Holdco I LLC(5)	1,944,444	—	1,944,444	7.73	6.06	5.88	4.86
Entities affiliated with ABG WTT-Rapid Limited(6)	1,298,000	6,903,379	6,903,379	4.90	21.53	4.90	17.26
Named Executive Officers and Directors							
Robert Spignesi(7)	1,112,383	—	1,112,383	4.24	3.36	3.26	2.71
Sean Wirtjes(8)	180,304	—	180,304	*	*	*	*

Name of Beneficial Owner	Number of Shares of Class A Common Stock Owned	Number of Shares of Class B Common Stock Owned	Number of Shares of Class A and Class B Common Stock Owned	Beneficially Owned Prior to Offering: Percentage of Class A Common Stock Owned	Beneficially Owned Prior to Offering: Percentage of Class A and Class B Common Stock Owned	Beneficially Owned After Offering: Percentage of Class A Common Stock Owned	Beneficially Owned After Offering: Percentage of Class A and Class B Common Stock Owned After Offering
Victoria Vezina(9)	1,266	—	1,266	*	*	*	*
Bruce Cohen(3)	2,976,536	—	2,976,536	11.83	9.28	9.00	7.44
David Hirsch, M.D., Ph.D.(2)	4,042,547	—	4,042,547	15.67	12.36	11.99	9.95
Richard Kollender(10)	1,648,151	—	1,648,151	6.48	5.10	4.94	4.09
Melinda Litherland	—	—	—	—	—	—	—
Natale Ricciardi(11)	52,221	—	52,221	*	*	*	*
Alexander Schmitz	—	—	—	—	—	—	—
Jeffrey Schwartz(1)	8,334,560	—	8,334,560	33.12	25.99	25.19	20.84
All executive officers and directors as a group(12) (12 persons)	18,349,875	—	18,349,875	72.27%	56.82%	55.08%	45.63%

* Represents beneficial ownership of less than 1%

(1) Consists of (i) 7,560,655 shares of Class A common stock issuable upon the conversion of preferred stock held by Bain Capital Life Sciences Fund, L.P., or BCLS, and (ii) 773,905 shares of Class A common stock issuable upon the conversion of shares of preferred stock held by BCIP Life Sciences Associates, LP, or BCIPLS, and together with BCLS, the Bain Capital Life Sciences Entities. Bain Capital Life Sciences Investors, LLC, or BCLSI, whose managers are Jeffrey Schwartz, who is the chairman of our Board, and Adam Koppel, is the ultimate general partner of BCLS and governs the investment strategy and decision-making process with respect to investments held by BCIPLS. As a result, BCLSI, Mr. Schwartz and Dr. Koppel may each be deemed to share voting and dispositive power with respect to the securities held by the Bain Capital Life Sciences Entities. The address of the Bain Capital Life Sciences Entities is 200 Clarendon Street, Boston, Massachusetts 02116.

(2) Consists of (i) 63,914 shares of Class A common stock, (ii) 3,344,038 shares of Class A common stock issuable upon the conversion of preferred stock and (iii) 634,595 shares of Class A common stock issuable upon the conversion of warrants held by Longitude Venture Partners II, L.P., or LVP II. Longitude Capital Partners II, LLC, or LCP II, is the general partner of LVP II and may be deemed to have voting and investment power over the shares held by LVP II. Patrick G. Enright and Juliet Tammenoms Bakker are managing members of LCP II and may be deemed to share voting and investment power over the shares held by LVP II. David Hirsch, one of our directors, is a member of LCP II and may be deemed to share voting and investment power over the shares of the company held by LVP II. LCP II and each of these individuals disclaim beneficial ownership of such shares except to the extent of their respective pecuniary interest therein. The mailing address for Longitude Venture Partners II, L.P. is 2740 Sand Hill Road, Menlo Park, California 94025.

(3) Consists of 2,976,536 shares of Class A common stock issuable upon the conversion of preferred stock held by Colony Harvest Ltd., or Colony Harvest. Colony Harvest is the Special Purpose Vehicle set up by Xeraya Capital, or Xeraya, for investment into Rapid Micro Biosystems, Inc. Xeraya may be deemed to be the beneficial owners of shares held by Colony Harvest. Fares Zahir is the Director of Xeraya and may be deemed to be the beneficial owner of the shares held by Colony Harvest. Mr. Zahir disclaims beneficial ownership except to the extent of his pecuniary interest therein. Bruce Cohen, a member of our board, is a Venture Partner at Xeraya. Mr. Cohen may be deemed to beneficially own the shares held by Colony Harvest and disclaims beneficial ownership except to the extent of his pecuniary interest therein. Mr. Cohen will resign as a member of our board prior to the offering. The mailing address for Colony Harvest Ltd. is 26.03-26.08, Level 26 GTower, No. 199, Jalan Tun Razak, 50400 Kuala Lumpur, Malaysia.

(4) Consists of (i) 2,007,501 shares of Class A common stock issuable upon the conversion of preferred stock held by Endeavour Medtech Growth II LP, or Growth, and (ii) 36,134 shares of Class A common stock issuable upon conversion of shares of preferred stock held by Endeavour Medtech Growth II Parallel LP, or Parallel. The general partner of Growth and Parallel is Endeavour Medtech II GP Limited, or Endeavour GP. Endeavour GP is controlled by a board of three directors that acts by majority approval and possesses sole voting and dispositive power with respect to the shares held by Growth and Parallel. The individual members of such board are: John Bridle, Nick Barton and Michel Davy. Each of Messrs. Bridle, Barton and Davy disclaim beneficial ownership of the shares held by Growth and Parallel except to the extent of his pecuniary interest therein. The mailing address for each of the entities and individuals above is c/o Endeavour Medtech Growth II LP, P.O. Box 656, East Wing Trafalgar Court, Les Banques, St Peter Port, Guernesy GY1 3PP.

(5) Consists of 1,944,444 shares of Class A common stock issuable upon the conversion of preferred stock held by D1 Master Holdco I LLC. D1 Capital Partners L.P. is a registered investment adviser and serves as the manager of private investment vehicles and accounts, including D1 Capital Partners Master LP, the sole and managing member of D1 Master Holdco I LLC, and may be deemed to beneficially own the shares of common stock held by D1 Master Holdco I LLC. Daniel Sundheim indirectly controls D1 Capital Partners L.P. and may be deemed to beneficially own the shares of common stock held by D1 Master Holdco I LLC. The business address of each of D1 Capital Partners Master LP, D1 Master Holdco I LLC, D1 Capital Partners L.P. and Daniel Sundheim is 9 West 57th Street, 36th Floor, New York, New York 10019.

(6) Consists of (i) 6,347,825 shares of Class B common stock issuable upon the conversion of preferred stock held by ABG WTT-Rapid Limited, or ABG-WTT and (ii) 555,554 shares of Class B common stock issuable upon the conversion of preferred stock held by Ally Bridge MedAlpha Master Fund L.P., or MedAlpha. ABG-WTT is wholly owned by Ally Bridge Group-WTT Global Life Science Capital Partners, L.P. Voting and investment decisions with respect to any securities owned by ABG-WTT are made by the investment committee of ABG-WTT Global Life Science Capital Partners GP Limited, the general partner of ABG-WTT Global Life Science Capital Partners GP, L.P., which is the general partner of Ally Bridge Group-WTT Global Life Science Capital Partners, L.P. As such, each of the foregoing entities may be deemed to share beneficial ownership of the shares held by ABG-WTT. Each of them disclaims

any such beneficial ownership. Mr. Fan Yu is the sole shareholder of ABG Management Ltd., which is the sole member of each of Ally Bridge MedAlpha Management GP, LLC and Ally Bridge Group (NY) LLC. Ally Bridge Group (NY) LLC and Ally Bridge MedAlpha Management L.P., acting through its general partner Ally Bridge MedAlpha Management GP, LLC manage MedAlpha's investments. As such, each of the foregoing entities and Mr. Fan Yu may be deemed to share beneficial ownership of the shares held by MedAlpha. Each of them disclaims any such beneficial ownership. We shall not effect any conversion of our Class B common stock, and a holder of our Class B common stock shall not have the right to convert any portion of such holder's Class B Common Stock, to the extent that, after giving effect to such conversion, such holder would beneficially own in excess of 4.9% of the total number of shares of our Class A common stock then issued and outstanding, or the Beneficial Ownership Limitation. As a result, the shares of Class A common stock beneficially owned by ABG-WTT and MedAlpha exclude shares issuable upon the conversion of Class B common stock that are not convertible within 60 days of June 30, 2021 by virtue of the Beneficial Ownership Limitation. The mailing address for ABG WTT is c/o Ally Bridge Group, Room 3002-4, 30/F Gloucester Tower, The Landmark, 15 Queen's Road Central, Hong Kong. The mailing address for MedAlpha is c/o Ally Bridge Group (NY) LLC, 430 Park Avenue, 12th Floor, New York, New York 10022.

(7) Includes (i) 50,277 shares of Class A common stock, (ii) 10 shares of Class A common stock issuable upon the conversion of warrants and (iii) 1,062,096 options which are exercisable within 60 days of June 30, 2021.

(8) Includes (i) 136,831 shares of Class A common stock and (ii) 43,473 options which are exercisable within 60 days of June 30, 2021.

(9) Includes 1,266 options which are exercisable within 60 days of June 30, 2021.

(10) Includes (i) 58,109 shares of Class A common stock held by Quaker Bioventures II, L.P., or Quaker, (ii) 1,315,084 shares of Class A common stock issuable upon the conversion of preferred stock held by Quaker, (iii) 112,873 shares of Class A common stock issuable upon the exercise of warrants held by Quaker, and (iv) 162,085 options which are exercisable within 60 days of June 30, 2021. Richard Kollender is an executive manager of Quaker and has shared voting and investment power over the securities held by Quaker. Mr. Kollender may be deemed to be a beneficial owner of the securities held by Quaker. Mr. Kollender disclaims beneficial ownership of the securities held by Quaker except to the extent of his pecuniary interest therein.

(11) Includes 52,221 options which are exercisable within 60 days of June 30, 2021.

(12) Includes (i) 309,131 shares of Class A common stock, (ii) 15,970,218 shares of Class A common stock issuable upon conversion of preferred stock, (iii) 747,478 shares of Class A common stock issuable upon the conversion of warrants and (iv) 1,323,048 options which are exercisable within 60 days of June 30, 2021.

Description of capital stock

General

The following description summarizes some of the terms of our restated certificate of incorporation and amended and restated bylaws that will become effective upon the closing of this offering, the investors' rights agreement and of the General Corporation Law of the State of Delaware. Because it is only a summary, it does not contain all the information that may be important to you. For a complete description, you should refer to our restated certificate of incorporation, amended and restated bylaws and investors' rights agreement, copies of which have been or will be filed as exhibits to the registration statement of which this prospectus is a part, as well as the relevant provisions of the General Corporation Law of the State of Delaware. The description of our common stock and preferred stock reflects changes to our capital structure that will occur immediately prior the closing of this offering.

Following the closing of this offering, our authorized capital stock will consist of 210,000,000 shares of Class A common stock, par value $0.01 per share, 10,000,000 shares of Class B common stock, par value $0.01 per share and 10,000,000 shares of preferred stock, par value $0.01 per share.

As of June 30, 2021, there were 966,312 shares of our Class A common stock outstanding, no shares of Class B common stock outstanding, 24,200,920 shares of our Class A common stock issuable upon the automatic conversion of all outstanding Series A1, B1, C1 and D1 preferred stock and 6,903,379 shares of our Class B common stock issuable upon the automatic conversion of all shares of Series C2 and D2 preferred stock, held of record by 78 stockholders.

Class A common stock and Class B common stock

Holders of our Class A common stock are entitled to one vote for each share held on all matters submitted to a vote of stockholders and do not have cumulative voting rights. An election of directors by our stockholders shall be determined by a plurality of the votes cast by the stockholders entitled to vote on the election. Subject to the supermajority votes for some matters, other matters shall be decided by the affirmative vote of our stockholders having a majority in voting power of the votes cast by the stockholders present or represented and voting on such matter. Our restated certificate of incorporation and amended and restated bylaws also provide that our directors may be removed only for cause and only by the affirmative vote of the holders of at least two-thirds in voting power of the outstanding shares of capital stock entitled to vote thereon. In addition, the affirmative vote of the holders of at least two-thirds in voting power of the outstanding shares of capital stock entitled to vote thereon is required to amend or repeal, or to adopt any provision inconsistent with, several of the provisions of our restated certificate of incorporation. See below under "— Anti-Takeover Effects of Delaware Law and Our Certificate of Incorporation and Bylaws—Amendment of Charter Provisions."

Holders of our Class B common stock have identical rights to holders of our Class A common stock as set forth in the preceding paragraph, other than as follows: (i) except as otherwise expressly provided in our restated certificate of incorporation or as required by applicable law, on any matter that is submitted to a vote by our stockholders, while holders of our Class A common stock are entitled to one vote per share of Class A common stock, holders of our Class B common stock are not entitled to any votes per share of Class B common stock, including for the election of directors, and (ii) while holders of our Class A common stock have no conversion rights, holders of our Class B common stock shall have the right to convert each share of our Class B common stock into one share of Class A common stock at such holder's election, provided that as a result of such conversion, such holder would not beneficially own in excess of 4.9% of any class of our securities registered under the Exchange Act. Accordingly, the holders of a majority of the outstanding shares of Class A common stock entitled to vote in any election can elect all of the directors standing for election, if they so choose, other than any directors that holders of any preferred stock we may issue may be entitled to elect.

Holders of common stock are entitled to receive proportionately any dividends as may be declared by our board of directors, subject to any preferential dividend rights of any series of preferred stock that we may designate and issue in the future.

In the event of our liquidation or dissolution, the holders of Class A common stock are entitled to receive proportionately our net assets available for distribution to stockholders after the payment of all debts and other liabilities and subject to the prior rights of any outstanding preferred stock. Holders of Class A common stock have no preemptive, subscription, redemption or conversion rights. Our outstanding shares of Class A common stock are, and the shares offered by us in this offering will be, when issued and paid for, validly issued, fully paid and nonassessable. The rights, preferences and privileges of holders of Class A common stock are subject to and may be adversely affected by the rights of the holders of shares of any series of preferred stock that we may designate and issue in the future.

Preferred stock

Under the terms of our restated certificate of incorporation that will become effective upon the closing of this offering, our board of directors is authorized to direct us to issue shares of preferred stock in one or more series without stockholder approval. Our board of directors has the discretion to determine the rights, preferences, privileges and restrictions, including voting rights, dividend rights, conversion rights, redemption privileges and liquidation preferences, of each series of preferred stock.

The purpose of authorizing our board of directors to issue preferred stock and determine its rights and preferences is to eliminate delays associated with a stockholder vote on specific issuances. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions, future financings and other corporate purposes, could have the effect of making it more difficult for a third party to acquire, or could discourage a third party from seeking to acquire, a majority of our outstanding voting stock. Upon the closing of this offering, there will be no shares of preferred stock outstanding, and we have no present plans to issue any shares of preferred stock.

Options and restricted stock

As of June 30, 2021, options to purchase 4,518,884 shares of our Class A common stock were outstanding under our 2010 Plan, of which 1,894,719 were exercisable and of which 2,624,165 were unvested as of that date. As of June 30, 2021, restricted stock covering 266,069 shares of our Class A common stock were outstanding under our 2010 Plan.

Warrants

As of June 30, 2021, warrants to purchase 55,835 shares of our Class A common stock at an exercise price of $0.05 per share were outstanding. Upon the closing of this offering, these warrants will automatically become exercisable for 55,835 shares of our Class A common stock at an exercise price of $137.08 per share.

As of June 30, 2021, warrants to purchase 764,703 shares of our Series A1 preferred stock at an exercise price of $0.05 per share were outstanding. Upon the closing of this offering, these warrants will automatically become exercisable for 764,703 shares of our Class A common stock at an exercise price of $0.05 per share.

As of June 30, 2021, warrants to purchase 239,994 shares of our Series B1 preferred stock at an exercise price of $0.05 per share were outstanding. Upon the closing of this offering, these warrants will automatically become exercisable for 239,994 shares of our Class A common stock at an exercise price of $0.05 per share.

As of June 30, 2021, warrants to purchase 239,130 shares of our Series C1 preferred stock at an exercise price of $5.75 per share were outstanding. Upon the closing of this offering, these warrants will automatically become exercisable for 239,130 shares of our Class A common stock at an exercise price of $5.75 per share.

Registration rights

Holders of 31,819,903 shares of our common stock are entitled to certain rights with respect to the registration of such shares for public resale under the Securities Act, pursuant to an amended and restated investors' rights agreement by and among us and certain of our stockholders, until the rights otherwise terminate pursuant to the terms of the investors' rights agreement. The registration of shares of common stock as a result of the

following rights being exercised would enable holders to trade these shares without restriction under the Securities Act when the applicable registration statement is declared effective.

Form S-1 registration rights

If at any time after the earlier of (i) three years after the date of our Seventh Amended and Restated Investors' Rights Agreement or (ii) 180 days after the effective date of the registration statement of which this prospectus is a part, the holders of a majority of our registrable securities request in writing that we effect a registration with respect to all or part of such registrable securities then outstanding and having an anticipated aggregate offering price of at least $50,000,000, we may be required to register their shares. We are obligated to effect at most two registrations in response to these demand registration rights. If the holders requesting registration intend to distribute their shares by means of an underwriting, the managing underwriter of such offering will have the right to limit the numbers of shares to be underwritten for reasons related to the marketing of the shares.

Piggyback registration rights

If at any time after this offering we propose to register any shares of our common stock under the Securities Act, subject to certain exceptions, the holders of registrable securities will be entitled to notice of the registration and to include their shares of registrable securities in the registration. If our proposed registration involves an underwriting, the managing underwriter of such offering will have the right to limit the number of shares to be underwritten for reasons related to the marketing of the shares.

Form S-3 registration rights

If, at any time after we become entitled under the Securities Act to register our shares on a registration statement on Form S-3, the holders of at least twenty percent of our registrable securities request in writing that we effect a registration with respect to registrable securities at an aggregate price to the public in the offering of at least $3,000,000, we will be required to effect such registration; provided, however, that we will not be required to effect such a registration if, within any twelve month period, we have already effected two registrations on Form S-3 for the holders of registrable securities.

Expenses and indemnification

Ordinarily, other than underwriting discounts and commissions, we will be required to pay all expenses incurred by us related to any registration effected pursuant to the exercise of these registration rights. These expenses may include all registration and filing fees, printing expenses, fees and disbursements of our counsel, reasonable fees and disbursements of a counsel for the selling securityholders and blue sky fees and expenses. Additionally, we have agreed to indemnify selling stockholders for damages, and any legal or other expenses reasonably incurred, arising from or based upon any untrue statement of a material fact contained in any registration statement, an omission or alleged omission to state a material fact in any registration statement or necessary to make the statements therein not misleading, or any violation or alleged violation by the indemnifying party of securities laws, subject to certain exceptions.

Termination of registration rights

The registration rights terminate upon the earlier of (i) the closing of a deemed liquidation event (as such term is defined in our restated certificate of incorporation) or a SPAC Transaction (as such term is defined in our Seventh Amended and Restated Investors' Rights Agreement), (ii) such time as Rule 144 of the Securities Act or another similar exemption under the Securities Act is available for the sale of all shares held by a holder of our registrable securities without limitation during a three-month period without registration, and (iii) three years after the effective date of the registration statement of which this prospectus is a part.

Anti-takeover effects of Delaware law and our certificate of incorporation and bylaws

Some provisions of Delaware law, our restated certificate of incorporation and our amended and restated bylaws could make the following transactions more difficult: an acquisition of us by means of a tender offer; an

acquisition of us by means of a proxy contest or otherwise; or the removal of our incumbent officers and directors. It is possible that these provisions could make it more difficult to accomplish or could deter transactions that stockholders may otherwise consider to be in their best interest or in our best interests, including transactions which provide for payment of a premium over the market price for our shares.

These provisions, summarized below, are intended to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors. We believe that the benefits of the increased protection of our potential ability to negotiate with the proponent of an unfriendly or unsolicited proposal to acquire or restructure us outweigh the disadvantages of discouraging these proposals because negotiation of these proposals could result in an improvement of their terms.

Undesignated preferred stock

The ability of our board of directors, without action by the stockholders, to issue up to 10,000,000 shares of undesignated preferred stock with voting or other rights or preferences as designated by our board of directors could impede the success of any attempt to change control of us. These and other provisions may have the effect of deferring hostile takeovers or delaying changes in control or management of our company.

Stockholder meetings

Our amended and restated bylaws provide that a special meeting of stockholders may be called only by our chairman of the board, chief executive officer or president (in the absence of a chief executive officer), or by a resolution adopted by a majority of our board of directors.

Requirements for advance notification of stockholder nominations and proposals

Our amended and restated bylaws establish advance notice procedures with respect to stockholder proposals to be brought before a stockholder meeting and the nomination of candidates for election as directors, other than nominations made by or at the direction of the board of directors or a committee of the board of directors.

Elimination of stockholder action by written consent

Our restated certificate of incorporation eliminates the right of stockholders to act by written consent without a meeting.

Staggered board

Our board of directors is divided into three classes. The directors in each class will serve for a three-year term, one class being elected each year by our stockholders. For more information on the classified board, see “Management—Board Composition and Election of Directors.” This system of electing and removing directors may tend to discourage a third-party from making a tender offer or otherwise attempting to obtain control of us, because it generally makes it more difficult for stockholders to replace a majority of the directors.

Removal of directors

Our restated certificate of incorporation provides that no member of our board of directors may be removed from office by our stockholders except for cause and, in addition to any other vote required by law, upon the approval of the holders of at least two-thirds in voting power of the outstanding shares of stock entitled to vote in the election of directors.

Stockholders not entitled to cumulative voting

Our restated certificate of incorporation does not permit stockholders to cumulate their votes in the election of directors. Accordingly, the holders of a majority of the outstanding shares of our Class A common stock entitled to vote in any election of directors can elect all of the directors standing for election, if they choose, other than any directors that holders of our preferred stock may be entitled to elect.

Delaware anti-takeover statute

We are subject to Section 203 of the General Corporation Law of the State of Delaware, which prohibits persons deemed to be "interested stockholders" from engaging in a "business combination" with a publicly held Delaware corporation for three years following the date these persons become interested stockholders unless the business combination is, or the transaction in which the person became an interested stockholder was, approved in a prescribed manner or another prescribed exception applies. Generally, an "interested stockholder" is a person who, together with affiliates and associates, owns, or within three years prior to the determination of interested stockholder status did own, 15% or more of a corporation's voting stock. Generally, a "business combination" includes a merger, asset or stock sale, or other transaction resulting in a financial benefit to the interested stockholder. The existence of this provision may have an anti-takeover effect with respect to transactions not approved in advance by the board of directors.

Choice of forum

Our restated certificate of incorporation provides that, unless we consent in writing to the selection of an alternative form, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for: (1) any derivative action or proceeding brought on our behalf; (2) any action asserting a claim of breach of a fiduciary duty or other wrongdoing by any of our directors, officers, employees or agents to us or our stockholders; (3) any action asserting a claim against us arising pursuant to any provision of the General Corporation Law of the State of Delaware or our certificate of incorporation or bylaws; (4) any action to interpret, apply, enforce or determine the validity of our certificate of incorporation or bylaws; or (5) any action asserting a claim governed by the internal affairs doctrine. Under our restated certificate of incorporation, this exclusive forum provision will not apply to claims which are vested in the exclusive jurisdiction of a court or forum other than the Court of Chancery of the State of Delaware, or for which the Court of Chancery of the State of Delaware does not have subject matter jurisdiction. For instance, the provision would not apply to actions arising under federal securities laws, including suits brought to enforce any liability or duty created by the Securities Act, Exchange Act, or the rules and regulations thereunder. Our restated certificate of incorporation further provides that, unless we consent in writing to the section of an alternative forum, the federal district courts of the United States of America, shall, to the fullest extent permitted by law, be the sole and exclusive forum for the resolution of any complaint asserting a cause of action arising under the Securities Act. Our restated certificate of incorporation also provides that any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock will be deemed to have notice of and to have consented to these choice of forum provisions. It is possible that a court of law could rule that either or both of the choice of forum provisions contained in our restated certificate of incorporation are inapplicable or unenforceable if they are challenged in a proceeding or otherwise.

Amendment of charter provisions

The amendment of any of the above provisions, except for the provision making it possible for our board of directors to issue preferred stock and the provision prohibiting cumulative voting, would require approval by holders of at least two-thirds in voting power of the outstanding shares of stock entitled to vote thereon.

The provisions of Delaware law, our restated certificate of incorporation and our amended and restated bylaws could have the effect of discouraging others from attempting hostile takeovers and, as a consequence, they may also inhibit temporary fluctuations in the market price of our Class A common stock that often result from actual or rumored hostile takeover attempts. These provisions may also have the effect of preventing changes in the composition of our board and management. It is possible that these provisions could make it more difficult to accomplish transactions that stockholders may otherwise deem to be in their best interests.

Transfer agent and registrar

The transfer agent and registrar for our Class A common stock and Class B common stock Computershare Trust Company, N.A.

Stock exchange listing

Our Class A common stock has been approved for listing on The Nasdaq Global Select Market under the symbol "RPID."

Shares eligible for future sale

Immediately prior to this offering, there was no public market for our Class A common stock. Future sales of substantial amounts of Class A common stock in the public market, or the perception that such sales may occur, could adversely affect the market price of our Class A common stock.

Upon the closing of this offering, based on the number of shares of our capital stock outstanding as of June 30, 2021, we will have outstanding 33,087,232 shares of Class A common stock and 6,903,379 shares of Class B common stock, assuming (i) the issuance of 7,920,000 shares of Class A common stock offered by us in this offering, (ii) the automatic conversion of all shares of our outstanding Series A1, B1, C1 and D1 preferred stock into an aggregate of 24,200,920 shares of our Class A common stock, (iii) the automatic conversion of all shares of our outstanding Series C2 and D2 preferred stock into an aggregate of 6,903,379 shares of our Class B common stock and (iv) no exercise of options after June 30, 2021. Of these shares, all shares sold in this offering will be freely tradable without restriction or further registration under the Securities Act, except for any shares purchased by our "affiliates," as that term is defined in Rule 144 under the Securities Act, whose sales would be subject to the Rule 144 resale restrictions described below, other than the holding period requirement.

The remaining 25,167,232 shares of Class A common stock and all of the shares of Class B common stock will be "restricted securities," as that term is defined in Rule 144 under the Securities Act. These restricted securities are eligible for public sale only if they are registered under the Securities Act or if they qualify for an exemption from registration under Rules 144 or 701 under the Securities Act, which are summarized below. We expect that substantially all of these shares will be subject to the 180-day lock-up period under the lock-up agreements described below. Upon expiration of the lock-up period, we expect that all 25,167,232 shares will be available for sale in the public market, subject in some cases to applicable volume limitations under Rule 144.

In addition, of the 4,518,884 shares of our Class A common stock that were subject to stock options outstanding as of June 30, 2021, options to purchase 1,894,719 shares of Class A common stock were vested as of June 30, 2021 and, upon exercise, these shares will be eligible for sale subject to the lock-up agreements described below and Rules 144 and 701 under the Securities Act.

Lock-up agreements

We and each of our directors and executive officers and holders of substantially all of our outstanding capital stock, have agreed that, without the prior written consent of J.P. Morgan Securities LLC and Morgan Stanley & Co. LLC, we and they will not, subject to certain exceptions, during the period ending 180 days after the date of this prospectus, offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, lend, or otherwise transfer or dispose of, directly or indirectly, any shares of our common stock or any securities convertible into or exercisable or exchangeable for common stock; or enter into any swap or other arrangement that transfers to another, in whole or in part, any of the economic consequences of ownership of our common stock, whether any transaction described above is to be settled by delivery of our common stock or such other securities, in cash or otherwise.

Upon the expiration of the applicable lock-up periods, substantially all of the shares subject to such lock-up restrictions will become eligible for sale, subject to the limitations discussed above. For a further description of these lock-up agreements, please see "Underwriting."

Rule 144

Affiliate resales of restricted securities

In general, beginning 90 days after the effective date of the registration statement of which this prospectus is a part, a person who is an affiliate of ours, or who was an affiliate at any time during the 90 days before a sale, who has beneficially owned shares of our Class A common stock for at least six months would be entitled to sell in "broker's transactions" or certain "riskless principal transactions" or to market makers, a number of shares within any three-month period that does not exceed the greater of:

- 1% of the number of shares of our Class A common stock then outstanding, which will equal 330,872 shares immediately after this offering; or
- the average weekly trading volume in our Class A common stock on The Nasdaq Global Select Market during the four calendar weeks preceding the filing of a notice on Form 144 with respect to such sale.

Affiliate resales under Rule 144 are also subject to the availability of current public information about us. In addition, if the number of shares being sold under Rule 144 by an affiliate during any three-month period exceeds 5,000 shares or has an aggregate sale price in excess of $50,000, the seller must file a notice on Form 144 with the Securities and Exchange Commission and Nasdaq concurrently with either the placing of a sale order with the broker or the execution directly with a market maker.

Non-affiliate resales of restricted securities

In general, beginning 90 days after the effective date of the registration statement of which this prospectus is a part, a person who is not an affiliate of ours at the time of sale, and has not been an affiliate at any time during the three months preceding a sale, and who has beneficially owned shares of our Class A common stock for at least six months but less than a year, is entitled to sell such shares subject only to the availability of current public information about us. If such person has held our shares for at least one year, such person can resell under Rule 144(b)(1) without regard to any Rule 144 restrictions, including the 90-day public company requirement and the current public information requirement.

Non-affiliate resales are not subject to the manner of sale, volume limitation or notice filing provisions of Rule 144.

Rule 701

In general, under Rule 701, any of an issuer's employees, directors, officers, consultants or advisors who purchases shares from the issuer in connection with a compensatory stock or option plan or other written agreement before the effective date of a registration statement under the Securities Act is entitled to sell such shares 90 days after such effective date in reliance on Rule 144. An affiliate of the issuer can resell shares in reliance on Rule 144 without having to comply with the holding period requirement, and non-affiliates of the issuer can resell shares in reliance on Rule 144 without having to comply with the current public information and holding period requirements.

The Securities and Exchange Commission has indicated that Rule 701 will apply to typical stock options granted by an issuer before it becomes subject to the reporting requirements of the Exchange Act, along with the shares acquired upon exercise of such options, including exercises after an issuer becomes subject to the reporting requirements of the Exchange Act.

Equity plans

We intend to file one or more registration statements on Form S-8 under the Securities Act to register all shares of Class A common stock subject to outstanding stock options and common stock issued or issuable under our stock plans. We expect to file the registration statement covering shares offered pursuant to our stock plans shortly after the date of this prospectus, permitting the resale of such shares by non-affiliates in the public market without restriction under the Securities Act and the sale by affiliates in the public market, subject to compliance with the resale provisions of Rule 144.

Registration rights

Upon the closing of this offering, the holders of 31,819,903 shares of common stock, which includes all of the shares of Class A common stock issuable upon the automatic conversion of our Series A1, B1, C1 and D1 preferred stock and all shares of our Class B common stock issuable upon automatic conversion of our Series C2 and D2 preferred stock upon the closing of this offering, or their transferees will be entitled to various rights with respect to the registration of these shares under the Securities Act. Registration of these shares under the

Securities Act would result in these shares becoming fully tradable without restriction under the Securities Act immediately upon the effectiveness of the registration, except for shares purchased by affiliates. See “Description of Capital Stock—Registration Rights” for additional information. Shares covered by a registration statement will be eligible for sale in the public market upon the expiration or release from the terms of the lock-up agreement described above.

Material U.S. federal income tax consequences to Non-U.S. holders

The following discussion is a summary of the material U.S. federal income tax consequences to Non-U.S. Holders (as defined below) of the purchase, ownership, and disposition of our Class A common stock issued pursuant to this offering, but does not purport to be a complete analysis of all potential tax effects. The effects of other U.S. federal tax laws, such as estate and gift tax laws, and any applicable state, local, or non-U.S. tax laws are not discussed. This discussion is based on the U.S. Internal Revenue Code of 1986, as amended, or the Code, Treasury Regulations promulgated thereunder, judicial decisions, and published rulings and administrative pronouncements of the U.S. Internal Revenue Service, or the IRS, in each case in effect as of the date hereof. These authorities may change or be subject to differing interpretations. Any such change or differing interpretation may be applied retroactively in a manner that could adversely affect a Non-U.S. Holder. We have not sought and will not seek any rulings from the IRS regarding the matters discussed below. There can be no assurance the IRS or a court will not take a contrary position to that discussed below regarding the tax consequences of the purchase, ownership, and disposition of our Class A common stock.

This discussion is limited to Non-U.S. Holders that hold our Class A common stock as a "capital asset" within the meaning of Section 1221 of the Code (generally, property held for investment). This discussion does not address all U.S. federal income tax consequences relevant to a Non-U.S. Holder's particular circumstances, including the impact of the Medicare contribution tax on net investment income and the alternative minimum tax. In addition, it does not address consequences relevant to Non-U.S. Holders subject to special rules, including, without limitation:

- U.S. expatriates and former citizens or long-term residents of the United States;
- persons holding our Class A common stock as part of a hedge, straddle, or other risk reduction strategy or as part of a conversion transaction or other integrated investment;
- banks, insurance companies, and other financial institutions;
- brokers, dealers, or traders in securities;
- "controlled foreign corporations," "passive foreign investment companies," and corporations that accumulate earnings to avoid U.S. federal income tax;
- partnerships or other entities or arrangements treated as partnerships for U.S. federal income tax purposes (and investors therein);
- tax-exempt organizations or governmental organizations;
- persons deemed to sell our Class A common stock under the constructive sale provisions of the Code;
- persons who hold or receive our Class A common stock pursuant to the exercise of any employee stock option or otherwise as compensation;
- tax-qualified retirement plans; and
- "qualified foreign pension funds" as defined in Section 897(l)(2) of the Code and entities all of the interests of which are held by qualified foreign pension funds.

If an entity treated as a partnership for U.S. federal income tax purposes holds our Class A common stock, the tax treatment of a partner in the partnership will depend on the status of the partner, the activities of the partnership, and certain determinations made at the partner level. Accordingly, partnerships holding our Class A common stock and the partners in such partnerships should consult their tax advisors regarding the U.S. federal income tax consequences to them.

THIS DISCUSSION IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TAX ADVICE. INVESTORS SHOULD CONSULT THEIR TAX ADVISORS WITH RESPECT TO THE APPLICATION OF THE U.S. FEDERAL INCOME TAX LAWS TO THEIR PARTICULAR SITUATIONS AS WELL AS ANY TAX CONSEQUENCES OF THE PURCHASE, OWNERSHIP, AND DISPOSITION OF OUR CLASS A COMMON STOCK ARISING UNDER THE U.S. FEDERAL ESTATE OR GIFT TAX

LAWS OR UNDER THE LAWS OF ANY STATE, LOCAL, OR NON-U.S. TAXING JURISDICTION OR UNDER ANY APPLICABLE INCOME TAX TREATY.

Definition of a Non-U.S. Holder

For purposes of this discussion, a "Non-U.S. Holder" is any beneficial owner of our Class A common stock that is neither a "U.S. person" nor an entity treated as a partnership for U.S. federal income tax purposes. A U.S. person is any person that, for U.S. federal income tax purposes, is or is treated as any of the following:

- an individual who is a citizen or resident of the United States;
- a corporation created or organized under the laws of the United States, any state thereof, or the District of Columbia;
- an estate, the income of which is subject to U.S. federal income tax regardless of its source; or
- a trust that (1) is subject to the primary supervision of a U.S. court and the control of one or more "United States persons" (within the meaning of Section 7701(a)(30) of the Code), or (2) has a valid election in effect to be treated as a United States person for U.S. federal income tax purposes.

Distributions

As described in the section entitled "Dividend policy," we do not anticipate declaring or paying any dividends to holders of our Class A common stock in the foreseeable future. However, if we make distributions of cash or property on our Class A common stock, such distributions will constitute dividends for U.S. federal income tax purposes to the extent paid from our current or accumulated earnings and profits, as determined under U.S. federal income tax principles. Amounts not treated as dividends for U.S. federal income tax purposes will constitute a return of capital and first be applied against and reduce a Non-U.S. Holder's adjusted tax basis in its Class A common stock, but not below zero. Any excess will be treated as capital gain and will be treated as described below under "—Sale or other taxable disposition."

Subject to the discussion below on effectively connected income, dividends paid to a Non-U.S. Holder will be subject to U.S. federal withholding tax at a rate of 30% of the gross amount of the dividends (or such lower rate specified by an applicable income tax treaty, provided the Non-U.S. Holder furnishes a valid IRS Form W-8BEN or W-8BEN-E (or other applicable documentation) certifying qualification for the lower treaty rate). A Non-U.S. Holder that does not timely furnish the required documentation, but that qualifies for a reduced treaty rate, may obtain a refund of any excess amounts withheld by timely filing an appropriate claim for refund with the IRS. Non-U.S. Holders should consult their tax advisors regarding their entitlement to benefits under any applicable income tax treaty.

If dividends paid to a Non-U.S. Holder are effectively connected with the Non-U.S. Holder's conduct of a trade or business within the United States (and, if required by an applicable income tax treaty, the Non-U.S. Holder maintains a permanent establishment in the United States to which such dividends are attributable), the Non-U.S. Holder will be exempt from the U.S. federal withholding tax described above. To claim the exemption, the Non-U.S. Holder must furnish to the applicable withholding agent a valid IRS Form W-8ECI, certifying that the dividends are effectively connected with the Non-U.S. Holder's conduct of a trade or business within the United States.

Any such effectively connected dividends will be subject to U.S. federal income tax on a net income basis at the regular rates. A Non-U.S. Holder that is a corporation also may be subject to a branch profits tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on such effectively connected dividends, as adjusted for certain items. Non-U.S. Holders should consult their tax advisors regarding any applicable tax treaties that may provide for different rules.

Sale or other taxable disposition

A Non-U.S. Holder will not be subject to U.S. federal income tax on any gain realized upon the sale or other taxable disposition of our Class A common stock unless:

- the gain is effectively connected with the Non-U.S. Holder's conduct of a trade or business within the United States (and, if required by an applicable income tax treaty, the Non-U.S. Holder maintains a permanent establishment in the United States to which such gain is attributable);
- the Non-U.S. Holder is a nonresident alien individual present in the United States for 183 days or more during the taxable year of the disposition and certain other requirements are met; or
- our Class A common stock constitutes a U.S. real property interest, or USRPI, by reason of our status as a U.S. real property holding corporation, or USRPHC, for U.S. federal income tax purposes.

Gain described in the first bullet point above generally will be subject to U.S. federal income tax on a net income basis at the regular rates. A Non-U.S. Holder that is a corporation also may be subject to a branch profits tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on such effectively connected gain, as adjusted for certain items.

A Non-U.S. Holder described in the second bullet point above will be subject to U.S. federal income tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on gain realized upon the sale or other taxable disposition of our Class A common stock, which may be offset by U.S. source capital losses of the Non-U.S. Holder (even though the individual is not considered a resident of the United States), provided the Non-U.S. Holder has timely filed U.S. federal income tax returns with respect to such losses.

With respect to the third bullet point above, we believe we currently are not, and do not anticipate becoming, a USRPHC. Because the determination of whether we are a USRPHC depends, however, on the fair market value of our USRPIs relative to the fair market value of our non-U.S. real property interests and our other business assets, there can be no assurance we currently are not a USRPHC or will not become one in the future. Even if we are or were to become a USRPHC, gain arising from the sale or other taxable disposition of our Class A common stock by a Non-U.S. Holder will not be subject to U.S. federal income tax if our Class A common stock is "regularly traded," as defined by applicable Treasury Regulations, on an established securities market and such Non-U.S. Holder owned, actually and constructively, 5% or less of our Class A common stock throughout the shorter of the five-year period ending on the date of the sale or other taxable disposition or the Non-U.S. Holder's holding period.

Non-U.S. Holders should consult their tax advisors regarding potentially applicable income tax treaties that may provide for different rules.

Information reporting and backup withholding

Payments of dividends on our Class A common stock will not be subject to backup withholding, provided the applicable withholding agent does not have actual knowledge or reason to know the holder is a United States person and the holder either certifies its non-U.S. status, such as by furnishing a valid IRS Form W-8BEN, W-8BEN-E, or W-8ECI, or otherwise establishes an exemption. However, information returns are required to be filed with the IRS in connection with any distributions on our Class A common stock paid to the Non-U.S. Holder, regardless of whether such distributions constitute dividends or whether any tax was actually withheld. In addition, proceeds of the sale or other taxable disposition of our Class A common stock within the United States or conducted through certain U.S.-related brokers generally will not be subject to backup withholding or information reporting if the applicable withholding agent receives the certification described above and does not have actual knowledge or reason to know that such holder is a United States person or the holder otherwise establishes an exemption. Proceeds of a disposition of our Class A common stock conducted through a non-U.S. office of a non-U.S. broker generally will not be subject to backup withholding or information reporting.

Copies of information returns that are filed with the IRS may also be made available under the provisions of an applicable treaty or agreement to the tax authorities of the country in which the Non-U.S. Holder resides or is established.

Backup withholding is not an additional tax. Any amounts withheld under the backup withholding rules may be allowed as a refund or a credit against a Non-U.S. Holder's U.S. federal income tax liability, provided the required information is timely furnished to the IRS.

Additional withholding tax on payments made to foreign accounts

Withholding taxes may be imposed under Sections 1471 to 1474 of the Code (such Sections commonly referred to as the Foreign Account Tax Compliance Act, or FATCA) on certain types of payments made to non-U.S. financial institutions and certain other non-U.S. entities. Specifically, a 30% withholding tax may be imposed on dividends on, or (subject to the proposed Treasury Regulations discussed below) gross proceeds from the sale or other disposition of, our Class A common stock paid to a "foreign financial institution" or a "non-financial foreign entity" (each as defined in the Code), unless (1) the foreign financial institution undertakes certain diligence and reporting obligations, (2) the non-financial foreign entity either certifies it does not have any "substantial United States owners" (as defined in the Code) or furnishes identifying information regarding each substantial United States owner, or (3) the foreign financial institution or non-financial foreign entity otherwise qualifies for an exemption from these rules. If the payee is a foreign financial institution and is subject to the diligence and reporting requirements in clause (1) above, it must enter into an agreement with the U.S. Department of the Treasury requiring, among other things, that it undertake to identify accounts held by certain "specified United States persons" or "United States owned foreign entities" (each as defined in the Code), annually report certain information about such accounts, and withhold 30% on certain payments to non-compliant foreign financial institutions and certain other account holders. Foreign financial institutions located in jurisdictions that have an intergovernmental agreement with the United States governing FATCA may be subject to different rules.

Under the applicable Treasury Regulations and administrative guidance, withholding under FATCA generally applies to payments of dividends on our Class A common stock. While withholding under FATCA would have applied also to payments of gross proceeds from the sale or other disposition of stock on or after January 1, 2019, proposed Treasury Regulations eliminate FATCA withholding on payments of gross proceeds entirely. Taxpayers generally may rely on these proposed Treasury Regulations until final Treasury Regulations are issued.

Prospective investors should consult their tax advisors regarding the potential application of withholding under FATCA to their investment in our Class A common stock.

Underwriting

We are offering the shares of Class A common stock described in this prospectus through a number of underwriters. J.P. Morgan Securities LLC, Morgan Stanley & Co. LLC, Cowen and Company, LLC and Stifel, Nicolaus & Company, Incorporated are acting as joint book-running managers of the offering and as representatives of the underwriters. We have entered into an underwriting agreement with the underwriters. Subject to the terms and conditions of the underwriting agreement, we have agreed to sell to the underwriters, and each underwriter has severally agreed to purchase, at the public offering price less the underwriting discounts and commissions set forth on the cover page of this prospectus, the number of shares of Class A common stock listed next to its name in the following table:

Name	Number of Shares
J.P. Morgan Securities LLC	3,247,200
Morgan Stanley & Co. LLC	2,851,200
Cowen and Company, LLC	1,188,000
Stifel, Nicolaus & Company, Incorporated	633,600
Total	7,920,000

The underwriters are committed to purchase all the common shares offered by us if they purchase any shares. The underwriting agreement also provides that if an underwriter defaults, the purchase commitments of non-defaulting underwriters may also be increased or the offering may be terminated.

The underwriters propose to offer the common shares directly to the public at the initial public offering price set forth on the cover page of this prospectus and to certain dealers at that price less a concession not in excess of $0.84 per share. After the initial offering of the shares to the public, if all of the common shares are not sold at the initial public offering price, the underwriters may change the offering price and the other selling terms. Sales of any shares made outside of the United States may be made by affiliates of the underwriters.

The underwriters have an option to buy up to 1,188,000 additional shares of Class A common stock from us to cover sales of shares by the underwriters which exceed the number of shares specified in the table above. The underwriters have 30 days from the date of this prospectus to exercise this option to purchase additional shares. If any shares are purchased with this option to purchase additional shares, the underwriters will purchase shares in approximately the same proportion as shown in the table above. If any additional shares of Class A common stock are purchased, the underwriters will offer the additional shares on the same terms as those on which the shares are being offered.

The underwriting fee is equal to the public offering price per share of Class A common stock less the amount paid by the underwriters to us per share of Class A common stock. The underwriting fee is $1.40 per share. The following table shows the per share and total underwriting discounts and commissions to be paid to the underwriters assuming both no exercise and full exercise of the underwriters' option to purchase additional shares.

	Without option to purchase additional shares exercise	With full option to purchase additional shares exercise
Per Share	$ 1.40	$ 1.40
Total	$11,088,000	$12,751,200

We estimate that the total expenses of this offering, including registration, filing and listing fees, printing fees and legal and accounting expenses, but excluding the underwriting discounts and commissions, will be

approximately $3.7 million. We have agreed to reimburse the underwriters for expenses of up to $40,000 related to clearance of this offering with the Financial Industry Regulatory Authority.

A prospectus in electronic format may be made available on the web sites maintained by one or more underwriters, or selling group members, if any, participating in the offering. The underwriters may agree to allocate a number of shares to underwriters and selling group members for sale to their online brokerage account holders. Internet distributions will be allocated by the representatives to underwriters and selling group members that may make Internet distributions on the same basis as other allocations.

We have agreed that we will not (i) offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, lend or otherwise transfer or dispose of, directly or indirectly, or submit to, or file with, the Securities and Exchange Commission a registration statement under the Securities Act relating to, any shares of our common stock or securities convertible into or exercisable or exchangeable for any shares of our common stock, or publicly disclose the intention to make any offer, sale, pledge, loan, disposition or filing, or (ii) enter into any swap or other arrangement that transfers all or a portion of the economic consequences associated with the ownership of any shares of common stock or any such other securities (regardless of whether any of these transactions are to be settled by the delivery of shares of common stock or such other securities, in cash or otherwise), in each case without the prior written consent of J.P. Morgan Securities LLC and Morgan Stanley & Co. LLC for a period of 180 days after the date of this prospectus, other than the shares of our common stock to be sold in this offering.

The restrictions on our actions, as described above, do not apply to certain transactions, including (i) the issuance of shares of common stock or securities convertible into or exercisable for shares of our common stock pursuant to the conversion or exchange of convertible or exchangeable securities or the exercise of warrants or options (including net exercise) or the settlement of RSUs (including net settlement), in each case outstanding on the date of the underwriting agreement and described in this prospectus; (ii) grants of stock options, stock awards, restricted stock, RSUs, or other equity awards and the issuance of shares of our common stock or securities convertible into or exercisable or exchangeable for shares of our common stock (whether upon the exercise of stock options or otherwise) to our employees, officers, directors, advisors, or consultants pursuant to the terms of an equity compensation plan in effect as of the closing of this offering and described in this prospectus; or (iii) our filing of any registration statement on Form S-8 relating to securities granted or to be granted pursuant to any plan in effect on the date of the underwriting agreement and described in this prospectus or any assumed benefit plan pursuant to an acquisition or similar strategic transaction.

Our directors and executive officers, and substantially all of our shareholders (such persons, the “lock-up parties”) have entered into lock-up agreements with the underwriters prior to the commencement of this offering pursuant to which each lock-up party, with limited exceptions, for a period of 180 days after the date of this prospectus (such period, the “restricted period”), may not (and may not cause any of their direct or indirect affiliates to), without the prior written consent of J.P. Morgan Securities LLC and Morgan Stanley & Co. LLC, (1) offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, lend or otherwise transfer or dispose of, directly or indirectly, any shares of our common stock or any securities convertible into or exercisable or exchangeable for our common stock (including, without limitation, common stock or such other securities which may be deemed to be beneficially owned by such lock-up parties in accordance with the rules and regulations of the SEC and securities which may be issued upon exercise of a stock option or warrant (collectively with the common stock, the “lock-up securities”)), (2) enter into any hedging, swap or other agreement or transaction that transfers, in whole or in part, any of the economic consequences of ownership of the lock-up securities, whether any such transaction described in clause (1) or (2) above is to be settled by delivery of lock-up securities, in cash or otherwise, (3) make any demand for, or exercise any right with respect to, the registration of any lock-up securities, or (4) publicly disclose the intention to do any of the foregoing. Such persons or entities have further acknowledged that these undertakings preclude them from engaging in any hedging or other transactions or arrangements (including, without limitation, any short sale or the purchase or sale of, or entry into, any put or call option, or combination thereof, forward, swap or any other derivative transaction or instrument, however described or defined) designed or

intended, or which could reasonably be expected to lead to or result in, a sale or disposition or transfer (by any person or entity, whether or not a signatory to such agreement) of any economic consequences of ownership, in whole or in part, directly or indirectly, of any lock-up securities, whether any such transaction or arrangement (or instrument provided for thereunder) would be settled by delivery of lock-up securities, in cash or otherwise.

The restrictions described in the immediately preceding paragraph and contained in the lock-up agreements between the underwriters and the lock-up parties do not apply, subject in certain cases to various conditions, to certain transactions, including (a) transfers or disposals of lock-up securities: (i) as bona fide gifts, or for bona fide estate planning purposes, (ii) by will or intestacy or other testamentary instrument, (iii) to any trust for the direct or indirect benefit of the lock-up party or any immediate family member, (iv) to a corporation, partnership, limited liability company, investment fund or other entity of which the lock-up party and its immediate family members are the legal and beneficial owner of all of the outstanding equity securities or similar interests or controlled by, or under common control with, the lock-up party or an immediate family member, (v) to a nominee or custodian of a person or entity to whom a disposition or transfer would be permissible under clauses (i) through (iv), (vi) in the case of a corporation, partnership, limited liability company, trust or other business entity, (A) to another corporation, partnership, limited liability company, trust or other business entity that is an affiliate of the lock-up party, or to any investment fund or other entity controlling, controlled by, managing or managed by or under common control or common investment management with the lock-up party or its affiliates or (B) as part of a distribution to limited partners, members, stockholders or other equity stakeholders of the lock-up party; (vii) by operation of law, (viii) to us upon death, disability or termination of employment or other service relationship, (ix) as part of a sale of lock-up securities acquired in this offering or in open market transactions after the completion of this offering, (x) to us in connection with the vesting, settlement or exercise of restricted stock units, options or other rights to purchase shares of our common stock (including “net” or “cashless” exercise), including for the payment of exercise price and tax and remittance payments, (xi) to us in connection with the exercise of warrants to purchase shares of our common stock (including “net” or “cashless” exercise), including for the payment of exercise price and tax and remittance payments or (xii) pursuant to a bona fide third-party tender offer, merger, consolidation or other similar transaction approved by our board of directors and made to all shareholders involving a change in control, provided that if such transaction is not completed, all such lock-up securities would remain subject to the restrictions in the immediately preceding paragraph; (b) exercise of the options, settlement of RSUs or other equity awards, or the exercise of warrants granted pursuant to plans described in this prospectus, provided that any lock-up securities received upon such exercise, vesting or settlement would be subject to restrictions similar to those in the immediately preceding paragraph; (c) the conversion of outstanding preferred stock, warrants to acquire preferred stock, or convertible securities into shares of our common stock or warrants to acquire shares of our common stock, provided that any common stock or warrant received upon such conversion would be subject to restrictions similar to those in the immediately preceding paragraph; and (d) the establishment by lock-up parties of trading plans under Rule 10b5-1 under the Exchange Act, provided that such plan does not provide for the transfer of lock-up securities during the restricted period.

J.P. Morgan Securities LLC and Morgan Stanley & Co. LLC in their sole discretion, may release the securities subject to any of the lock-up agreements with the underwriters described above, in whole or in part at any time.

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act of 1933.

Our Class A common stock has been approved for listing on The Nasdaq Global Select Market under the symbol “RPID”.

In connection with this offering, the underwriters may engage in stabilizing transactions, which involves making bids for, purchasing and selling shares of common stock in the open market for the purpose of preventing or retarding a decline in the market price of the common stock while this offering is in progress. These stabilizing transactions may include making short sales of common stock, which involves the sale by the underwriters of a greater number of shares of common stock than they are required to purchase in this offering, and purchasing shares of common stock on the open market to cover positions created by short sales. Short sales may be “covered” shorts, which are short positions in an amount not greater than the underwriters’ option to purchase additional

shares referred to above, or may be “naked” shorts, which are short positions in excess of that amount. The underwriters may close out any covered short position either by exercising their option to purchase additional shares, in whole or in part, or by purchasing shares in the open market. In making this determination, the underwriters will consider, among other things, the price of shares available for purchase in the open market compared to the price at which the underwriters may purchase shares through the option to purchase additional shares. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of the common stock in the open market that could adversely affect investors who purchase in this offering. To the extent that the underwriters create a naked short position, they will purchase shares in the open market to cover the position.

The underwriters have advised us that, pursuant to Regulation M of the Securities Act of 1933, they may also engage in other activities that stabilize, maintain or otherwise affect the price of the Class A common stock, including the imposition of penalty bids. This means that if the representatives of the underwriters purchase common stock in the open market in stabilizing transactions or to cover short sales, the representatives can require the underwriters that sold those shares as part of this offering to repay the underwriting discount received by them.

These activities may have the effect of raising or maintaining the market price of the common stock or preventing or retarding a decline in the market price of the common stock, and, as a result, the price of the common stock may be higher than the price that otherwise might exist in the open market. If the underwriters commence these activities, they may discontinue them at any time. The underwriters may carry out these transactions on The Nasdaq Global Select Market, in the over-the-counter market or otherwise.

Prior to this offering, there has been no public market for our Class A common stock. The initial public offering price will be determined by negotiations between us and the representatives of the underwriters. In determining the initial public offering price, we and the representatives of the underwriters expect to consider a number of factors including:

- the information set forth in this prospectus and otherwise available to the representatives;
- our prospects and the history and prospects for the industry in which we compete;
- an assessment of our management;
- our prospects for future earnings;
- the general condition of the securities markets at the time of this offering;
- the recent market prices of, and demand for, publicly traded common stock of generally comparable companies; and
- other factors deemed relevant by the underwriters and us.

Neither we nor the underwriters can assure investors that an active trading market will develop for our common shares, or that the shares will trade in the public market at or above the initial public offering price.

Other than in the United States, no action has been taken by us or the underwriters that would permit a public offering of the securities offered by this prospectus in any jurisdiction where action for that purpose is required. The securities offered by this prospectus may not be offered or sold, directly or indirectly, nor may this prospectus or any other offering material or advertisements in connection with the offer and sale of any such securities be distributed or published in any jurisdiction, except under circumstances that will result in compliance with the applicable rules and regulations of that jurisdiction. Persons into whose possession this prospectus comes are advised to inform themselves about and to observe any restrictions relating to the offering and the distribution of this prospectus. This prospectus does not constitute an offer to sell or a solicitation of an offer to buy any securities offered by this prospectus in any jurisdiction in which such an offer or a solicitation is unlawful.

Certain of the underwriters and their affiliates have provided in the past to us and our affiliates and may provide from time to time in the future certain commercial banking, financial advisory, investment banking and

other services for us and such affiliates in the ordinary course of their business, for which they have received and may continue to receive customary fees and commissions. J.P. Morgan Securities LLC, one of the underwriters, acted as placement agent in connection with our private placement of Series D1 and Series D2 preferred stock in March 2021, and received a placement fee in consideration for its services. In addition, from time to time, certain of the underwriters and their affiliates may effect transactions for their own account or the account of customers, and hold on behalf of themselves or their customers, long or short positions in our debt or equity securities or loans, and may do so in the future.

Selling restrictions

Other than in the United States, no action has been taken by us or the underwriters that would permit a public offering of the securities offered by this prospectus in any jurisdiction where action for that purpose is required. The securities offered by this prospectus may not be offered or sold, directly or indirectly, nor may this prospectus or any other offering material or advertisements in connection with the offer and sale of any such securities be distributed or published in any jurisdiction, except under circumstances that will result in compliance with the applicable rules and regulations of that jurisdiction. Persons into whose possession this prospectus comes are advised to inform themselves about and to observe any restrictions relating to the offering and the distribution of this prospectus. This prospectus does not constitute an offer to sell or a solicitation of an offer to buy any securities offered by this prospectus in any jurisdiction in which such an offer or a solicitation is unlawful.

European Economic Area

In relation to each Member State of the European Economic Area (each a "Relevant State"), no shares have been offered or will be offered pursuant to the offering to the public in that Relevant State prior to the publication of a prospectus in relation to the shares which has been approved by the competent authority in that Relevant State or, where appropriate, approved in another Relevant State and notified to the competent authority in that Relevant State, all in accordance with the Prospectus Regulation, except that offers of shares may be made to the public in that Relevant State at any time under the following exemptions under the Prospectus Regulation:

(a) to any legal entity which is a qualified investor as defined under Article 2 of the Prospectus Regulation;

(b) to fewer than 150 natural or legal persons (other than qualified investors as defined under Article 2 of the Prospectus Regulation), subject to obtaining the prior consent of the Representatives for any such offer; or

(c) in any other circumstances falling within Article 1(4) of the Prospectus Regulation,

provided that no such offer of shares shall require the Issuer or any underwriter to publish a prospectus pursuant to Article 3 of the Prospectus Regulation or supplement a prospectus pursuant to Article 23 of the Prospectus Regulation and each person who initially acquires any shares or to whom any offer is made will be deemed to have represented, acknowledged and agreed to and with each of the underwriters and the Issuer that it is a "qualified investor" within the meaning of Article 2(e) of the Prospectus Regulation. In the case of any shares being offered to a financial intermediary as that term is used in the Prospectus Regulation, each such financial intermediary will be deemed to have represented, acknowledged and agreed that the shares acquired by it in the offer have not been acquired on a non-discretionary basis on behalf of, nor have they been acquired with a view to their offer or resale to, persons in circumstances which may give rise to an offer of any shares to the public other than their offer or resale in a Relevant State to qualified investors as so defined or in circumstances in which the prior consent of the underwriters has been obtained to each such proposed offer or resale.

For the purposes of this provision, the expression an "offer to the public" in relation to the shares in any Relevant State means the communication in any form and by any means of sufficient information on the terms of the offer and any shares to be offered so as to enable an investor to decide to purchase or subscribe for any shares, and the expression "Prospectus Regulation" means Regulation (EU) 2017/1129.

United Kingdom

No shares have been offered or will be offered pursuant to the offering to the public in the United Kingdom prior to the publication of a prospectus in relation to the shares which has been approved by the Financial Conduct Authority, except that the shares may be offered to the public in the United Kingdom at any time:

(a) to any legal entity which is a qualified investor as defined under Article 2 of the U.K. Prospectus Regulation;

(b) to fewer than 150 natural or legal persons (other than qualified investors as defined under Article 2 of the U.K. Prospectus Regulation), subject to obtaining the prior consent of the Representatives for any such offer; or

(c) in any other circumstances falling within Section 86 of the FSMA;

provided that no such offer of the shares shall require the Issuer or any underwriter to publish a prospectus pursuant to Section 85 of the FSMA or supplement a prospectus pursuant to Article 23 of the U.K. Prospectus Regulation. For the purposes of this provision, the expression an "offer to the public" in relation to the shares in the United Kingdom means the communication in any form and by any means of sufficient information on the terms of the offer and any shares to be offered so as to enable an investor to decide to purchase or subscribe for any shares and the expression "U.K. Prospectus Regulation" means Regulation (EU) 2017/1129 as it forms part of domestic law by virtue of the European Union (Withdrawal) Act 2018.

In addition, in the United Kingdom, this document is being distributed only to, and is directed only at, and any offer subsequently made may only be directed at persons who are "qualified investors" (as defined in the U.K. Prospectus Regulation) (i) who have professional experience in matters relating to investments falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005, as amended, or the "Order," and/or (ii) who are high net worth companies (or persons to whom it may otherwise be lawfully communicated) falling within Article 49(2)(a) to (e) of the Order (all such persons together being referred to as "relevant persons") or otherwise in circumstances which have not resulted and will not result in an offer to the public of the shares in the United Kingdom within the meaning of the Financial Services and Markets Act 2000. In the United Kingdom, any investment or investment activity to which this document relates is only available to, and will be engaged in with, relevant persons. Any person in the UK who is not a relevant person must not act on or rely upon this document or any of its contents.

Notice to prospective investors in Canada

The shares may be sold only to purchasers purchasing, or deemed to be purchasing, as principal that are accredited investors, as defined in National Instrument 45-106 Prospectus Exemptions or subsection 73.3(1) of the Securities Act (Ontario), and are permitted clients, as defined in National Instrument 31-103 Registration Requirements, Exemptions and Ongoing Registrant Obligations. Any resale of the shares must be made in accordance with an exemption from, or in a transaction not subject to, the prospectus requirements of applicable securities laws.

Securities legislation in certain provinces or territories of Canada may provide a purchaser with remedies for rescission or damages if this prospectus (including any amendment thereto) contains a misrepresentation, provided that the remedies for rescission or damages are exercised by the purchaser within the time limit prescribed by the securities legislation of the purchaser's province or territory. The purchaser should refer to any applicable provisions of the securities legislation of the purchaser's province or territory for particulars of these rights or consult with a legal advisor.

Pursuant to section 3A.3 of National Instrument 33-105 Underwriting Conflicts (NI 33-105), the underwriters are not required to comply with the disclosure requirements of NI 33-105 regarding underwriter conflicts of interest in connection with this offering.

Notice to prospective investors in Switzerland

The shares may not be publicly offered in Switzerland and will not be listed on the SIX Swiss Exchange, or SIX, or on any other stock exchange or regulated trading facility in Switzerland. This document does not constitute a prospectus within the meaning of, and has been prepared without regard to the disclosure standards for issuance prospectuses under art. 652a or art. 1156 of the Swiss Code of Obligations or the disclosure standards for listing prospectuses under art. 27 ff. of the SIX Listing Rules or the listing rules of any other stock exchange or regulated trading facility in Switzerland. Neither this document nor any other offering or marketing material relating to the shares or the offering may be publicly distributed or otherwise made publicly available in Switzerland.

Neither this document nor any other offering or marketing material relating to the offering, the Company, the shares have been or will be filed with or approved by any Swiss regulatory authority. In particular, this document will not be filed with, and the offer of shares will not be supervised by, the Swiss Financial Market Supervisory Authority FINMA, or FINMA, and the offer of shares has not been and will not be authorized under the Swiss Federal Act on Collective Investment Schemes, or CISA. The investor protection afforded to acquirers of interests in collective investment schemes under the CISA does not extend to acquirers of shares.

Notice to prospective investors in Hong Kong

The shares have not been offered or sold and will not be offered or sold in Hong Kong, by means of any document, other than (a) to “professional investors” as defined in the Securities and Futures Ordinance (Cap. 571 of the Laws of Hong Kong), or the SFO, of Hong Kong and any rules made thereunder; or (b) in other circumstances which do not result in the document being a “prospectus” (as defined in the Companies (Winding Up and Miscellaneous Provisions) Ordinance (Cap. 32) of Hong Kong), or the CO, or which do not constitute an offer to the public within the meaning of the CO. No advertisement, invitation or document relating to the shares has been or may be issued or has been or may be in the possession of any person for the purposes of issue, whether in Hong Kong or elsewhere, which is directed at, or the contents of which are likely to be accessed or read by, the public of Hong Kong (except if permitted to do so under the securities laws of Hong Kong) other than with respect to shares which are or are intended to be disposed of only to persons outside Hong Kong or only to “professional investors” as defined in the SFO and any rules made thereunder.

Notice to prospective investors in Singapore

Each representative has acknowledged that this prospectus has not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, each representative has represented and agreed that it has not offered or sold any shares or caused the shares to be made the subject of an invitation for subscription or purchase and will not offer or sell any shares or cause the shares to be made the subject of an invitation for subscription or purchase, and has not circulated or distributed, nor will it circulate or distribute, this prospectus or any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of the shares, whether directly or indirectly, to any person in Singapore other than:

(a) to an institutional investor (as defined in Section 4A of the Securities and Futures Act (Chapter 289) of Singapore, as modified or amended from time to time, or the SFA) pursuant to Section 274 of the SFA;

(b) to a relevant person (as defined in Section 275(2) of the SFA) pursuant to Section 275(1) of the SFA, or any person pursuant to Section 275(1A) of the SFA, and in accordance with the conditions specified in Section 275 of the SFA; or

(c) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA.

Where the shares are subscribed or purchased under Section 275 of the SFA by a relevant person which is:

(a) a corporation (which is not an accredited investor (as defined in Section 4A of the SFA)) the sole business of which is to hold investments and the entire share capital of which is owned by one or more individuals, each of whom is an accredited investor; or

(b) a trust (where the trustee is not an accredited investor) whose sole purpose is to hold investments and each beneficiary of the trust is an individual who is an accredited investor,

securities or securities-based derivatives contracts (each term as defined in Section 2(1) of the SFA) of that corporation or the beneficiaries' rights and interest (howsoever described) in that trust shall not be transferred within six months after that corporation or that trust has acquired the shares pursuant to an offer made under Section 275 of the SFA except:

(i) to an institutional investor or to a relevant person, or to any person arising from an offer referred to in Section 275(1A) or Section 276(4)(i)(B) of the SFA;

(ii) where no consideration is or will be given for the transfer;

(iii) where the transfer is by operation of law;

(iv) as specified in Section 276(7) of the SFA; or

(v) as specified in Regulation 37A of the Securities and Futures (Offers of Investments) (Securities and Securities-based Derivatives Contracts) Regulations 2018.

Notice to prospective investors in Japan

The shares have not been and will not be registered pursuant to Article 4, Paragraph 1 of the Financial Instruments and Exchange Act. Accordingly, none of the shares nor any interest therein may be offered or sold, directly or indirectly, in Japan or to, or for the benefit of, any "resident" of Japan (which term as used herein means any person resident in Japan, including any corporation or other entity organized under the laws of Japan), or to others for re-offering or resale, directly or indirectly, in Japan or to or for the benefit of a resident of Japan, except pursuant to an exemption from the registration requirements of, and otherwise in compliance with, the Financial Instruments and Exchange Act and any other applicable laws, regulations and ministerial guidelines of Japan in effect at the relevant time.

Notice to prospective investors in the United Arab Emirates

The shares have not been, and are not being, publicly offered, sold, promoted or advertised in the United Arab Emirates (including the Dubai International Financial Centre) other than in compliance with the laws of the United Arab Emirates (and the Dubai International Financial Centre) governing the issue, offering and sale of securities. Further, this prospectus does not constitute a public offer of securities in the United Arab Emirates (including the Dubai International Financial Centre) and is not intended to be a public offer. This prospectus has not been approved by or filed with the Central Bank of the United Arab Emirates, the Securities and Commodities Authority or the Dubai Financial Services Authority.

Notice to prospective investors in Israel

In the State of Israel this prospectus shall not be regarded as an offer to the public to purchase shares of common stock under the Israeli Securities Law, 5728-1968, which requires a prospectus to be published and authorized by the Israel Securities Authority, if it complies with certain provisions of Section 15 of the Israeli Securities Law, 5728-1968, including, inter alia, if: (i) the offer is made, distributed or directed to not more than 35 investors, subject to certain conditions, or the Addressed Investors, or (ii) the offer is made, distributed or directed to certain qualified investors defined in the First Addendum of the Israeli Securities Law, 5728-1968, subject to certain conditions, or the Qualified Investors. The Qualified Investors shall not be taken into account in the count of the Addressed Investors and may be offered to purchase securities in addition to the 35 Addressed Investors. The company has not and will not take any action that would require it to publish a prospectus in accordance with and subject to the Israeli Securities Law, 5728-1968. We have not and will not distribute this prospectus or make, distribute or direct an offer to subscribe for our common stock to any person within the State of Israel, other than to Qualified Investors and up to 35 Addressed Investors.

Qualified Investors may have to submit written evidence that they meet the definitions set out in of the First Addendum to the Israeli Securities Law, 5728-1968. In particular, we may request, as a condition to be offered common stock, that Qualified Investors will each represent, warrant and certify to us and/or to anyone acting on our behalf: (i) that it is an investor falling within one of the categories listed in the First Addendum to the Israeli Securities Law, 5728-1968; (ii) which of the categories listed in the First Addendum to the Israeli Securities Law, 5728-1968 regarding Qualified Investors is applicable to it; (iii) that it will abide by all provisions set forth in the Israeli Securities Law, 5728-1968 and the regulations promulgated thereunder in connection with the offer to be issued common stock; (iv) that the shares of common stock that it will be issued are, subject to exemptions available under the Israeli Securities Law, 5728-1968: (a) for its own account; (b) for investment purposes only; and (c) not issued with a view to resale within the State of Israel, other than in accordance with the provisions of the Israeli Securities Law, 5728-1968; and (v) that it is willing to provide further evidence of its Qualified Investor status. Addressed Investors may have to submit written evidence in respect of their identity and may have to sign and submit a declaration containing, inter alia, the Addressed Investor's name, address and passport number or Israeli identification number.

Legal matters

The validity of the shares of Class A common stock offered hereby will be passed upon for us by Latham & Watkins LLP. Certain legal matters will be passed upon for the underwriters by Goodwin Procter LLP.

Experts

The financial statements as of December 31, 2020 and 2019 and for the years then ended included in this Prospectus have been so included in reliance on the report of PricewaterhouseCoopers LLP, an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.

Where you can find more information

We have filed with the Securities and Exchange Commission, or SEC, a registration statement on Form S-1 under the Securities Act with respect to the shares of Class A common stock offered hereby. This prospectus, which constitutes a part of the registration statement, does not contain all of the information set forth in the registration statement or the exhibits and schedules filed therewith. For further information about us and the Class A common stock offered hereby, we refer you to the registration statement and the exhibits and schedules filed thereto. Statements contained in this prospectus regarding the contents of any contract or any other document that is filed as an exhibit to the registration statement are not necessarily complete, and each such statement is qualified in all respects by reference to the full text of such contract or other document filed as an exhibit to the registration statement.

You may read our SEC filings, including this registration statement, over the Internet at the SEC's website at www.sec.gov. Upon the completion of this offering, we will be subject to the information reporting requirements of the Exchange Act and we will file reports, proxy statements and other information with the SEC. These reports, proxy statements and other information will be available for review at the SEC's website referred to above. We also maintain a website at www.rapidmicrobio.com, at which, following the completion of this offering, you may access these materials free of charge as soon as reasonably practicable after they are electronically filed with, or furnished to, the SEC. Information contained on or accessible through our website is not a part of this prospectus or the registration statement of which it forms a part, and the inclusion of our website address in this prospectus is an inactive textual reference only. You should not consider the contents of our website in making an investment decision with respect to our Class A common stock.

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Audited Annual Consolidated Financial Statements

Unaudited Interim Condensed Consolidated Financial Statements

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Rapid Micro Biosystems, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Rapid Micro Biosystems, Inc. and its subsidiaries (the "Company") as of December 31, 2020 and 2019, and the related consolidated statements of operations, comprehensive loss, redeemable convertible preferred stock and stockholders' deficit and cash flows for the years then ended, including the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2020 and 2019, and the results of its operations and its cash flows for the years then ended in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion

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

We conducted our audits of these consolidated financial statements in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud.

Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/PricewaterhouseCoopers LLP
Boston, Massachusetts
March 22, 2021, except for the effects of the revision discussed in Note 1, as to which the date is May 6, 2021, and except for the effects of the reverse stock split discussed in Note 18, as to which the date is July 12, 2021

We have served as the Company's auditor since 2010.

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

	December 31, 2019	December 31, 2020
Assets		
Current assets:		
Cash and cash equivalents	$ 12,459	$ 30,079
Short-term investments	—	14,998
Accounts receivable	3,627	4,988
Inventory	5,752	8,965
Prepaid expenses and other current assets	1,774	3,120
Total current assets	23,612	62,150
Property and equipment, net	7,592	7,052
Other long-term assets	332	695
Restricted cash	152	100
Total assets	$ 31,688	$ 69,997
Liabilities, Redeemable Convertible Preferred Stock and Stockholders' Deficit		
Current liabilities:		
Accounts payable	$ 3,211	$ 4,468
Accrued expenses and other current liabilities	5,436	6,654
Deferred revenue	1,881	4,423
Total current liabilities	10,528	15,545
Preferred stock warrant liability	3,396	4,117
Notes payable, net of unamortized discount	17,806	24,810
Deferred rent, long term	683	705
Total liabilities	32,413	45,177
Commitments and contingencies (Note 16)		
Redeemable convertible preferred stock (Series A1, B1, C1 and C2), $0.01 par value; 83,781,064 shares and 161,455,689 share authorized at December 31, 2019 and 2020, respectively; 78,757,540 shares and 133,021,640 shares issued and outstanding at December 31, 2019 and 2020, respectively; liquidation preference of $204,808 at December 31, 2020	81,850	151,826
Stockholders' equity (deficit):		
Common stock, $0.01 par value; 22,000,000 shares and 35,000,000 shares authorized at December 31, 2019 and 2020, respectively; 353,465 shares and 612,850 shares issued and outstanding at December 31, 2019 and 2020, respectively	4	6
Additional paid-in capital	121,931	114,575
Accumulated deficit	(204,510)	(241,588)
Accumulated other comprehensive income	—	1
Total stockholders' deficit	(82,575)	(127,006)
Total liabilities, redeemable convertible preferred stock and stockholders' deficit	$ 31,688	$ 69,997

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

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

	Year ended December 31,	
	2019	2020
Revenue:		
Product revenue	$ 9,328	$ 10,992
Service revenue	2,128	3,091
Non-commercial revenue	5,056	1,994
Total revenue	16,512	16,077
Costs and operating expenses:		
Cost of product revenue	10,627	18,642
Cost of service revenue	3,021	3,386
Cost of non-commercial revenue	3,098	2,120
Research and development	5,429	6,531
Sales and marketing	4,047	5,962
General and administrative	8,924	9,976
Total costs and operating expenses	35,146	46,617
Loss from operations	(18,634)	(30,540)
Other income (expense):		
Interest expense	(2,375)	(3,447)
Change in fair value of preferred stock warrant liability	249	(69)
Loss on extinguishment of debt	—	(2,910)
Other income	16	22
Total other income (expense), net	(2,110)	(6,404)
Loss before income taxes	(20,744)	(36,944)
Income tax expense	427	134
Net loss	(21,171)	(37,078)
Accretion of redeemable convertible preferred stock to redemption value	(2,745)	(3,745)
Cumulative redeemable convertible preferred stock dividends	(2,704)	(4,398)
Net loss attributable to common stockholders — basic and diluted	$ (26,620)	$ (45,221)
Net loss per share attributable to common stockholders — basic and diluted	$ (76.72)	$ (126.11)
Weighted average common shares outstanding — basic and diluted	346,978	358,582

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

RAPID MICRO BIOSYSTEMS, INC.
Consolidated statements of comprehensive loss
(In thousands)

	Year ended December 31,	
	2019	2020
Net loss	$ (21,171)	$ (37,078)
Other comprehensive income:		
Unrealized gain on short-term investments, net of tax	—	1
Comprehensive loss	$ (21,171)	$ (37,077)

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

RAPID MICRO BIOSYSTEMS, INC.
Consolidated statements of redeemable convertible preferred stock and stockholders' deficit
(In thousands, except share amounts)

	Redeemable convertible preferred stock		Common stock		Additional paid-in capital	Accumulated deficit	Accumulated other comprehensive income	Total stockholders' deficit
	Shares	Amount	Shares	Amount				
Balances at December 31, 2018	63,882,540	$ 61,542	343,153	$ 3	$ 126,897	$ (183,451)	$ —	$ (56,551)
Issuance of Series B1 redeemable convertible preferred stock, net of issuance costs of $16	14,875,000	14,859	—	—	—	—	—	—
Issuance of common stock upon exercise of stock options	—	—	10,312	1	10	—	—	11
Accretion of redeemable convertible preferred stock to redemption value	—	2,745	—	—	(2,745)	—	—	(2,745)
Cumulative redeemable convertible preferred stock dividends	—	2,704	—	—	(2,704)	—	—	(2,704)
ASC 606 cumulative-effect adjustment	—	—	—	—	—	112	—	112
Stock-based compensation expense	—	—	—	—	473	—	—	473
Net loss	—	—	—	—	—	(21,171)	—	(21,171)
Balances at December 31, 2019	78,757,540	81,850	353,465	4	121,931	(204,510)	—	(82,575)
Issuance of Series C1 redeemable convertible preferred stock, net of issuance costs of $261	23,611,208	26,891	—	—	—	—	—	—
Issuance of Series C2 redeemable convertible preferred stock, net of issuance costs of $303	20,301,829	23,044	—	—	—	—	—	—
Conversion of bridge notes to C1 redeemable convertible preferred stock	10,351,063	11,898	—	—	—	—	—	—
Accretion of redeemable convertible preferred stock to redemption value	—	3,745	—	—	(3,745)	—	—	(3.745)
Cumulative redeemable convertible preferred stock dividends	—	4,398	—	—	(4,398)	—	—	(4,398)
Issuance of common stock upon exercise of stock options	—	—	259,385	2	254	—	—	256
Stock-based compensation expense	—	—	—	—	533	—	—	533
Net loss	—	—	—	—	—	(37,078)	—	(37,078)
Other comprehensive income	—	—	—	—	—	—	1	1
Balances at December 31, 2020	133,021,640	$ 151,826	612,850	$ 6	$ 114,575	$ (241,588)	$ 1	$ (127,006)

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

RAPID MICRO BIOSYSTEMS, INC.
Consolidated statements of cash flows
(In thousands)

	Year ended December 31,	
	2019	2020
Cash flows from operating activities:		
Net loss	$ (21,171)	$ (37,078)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization expense	1,460	1,509
Stock-based compensation expense	473	533
Change in fair value of preferred stock warrant liability	(249)	69
Provision recorded for inventory	—	154
Noncash interest expense	467	2,023
Loss on extinguishment of debt	—	2,910
Other, net	(18)	(17)
Changes in operating assets and liabilities		
Accounts receivable	(511)	(1,361)
Inventory	(3,924)	(3,367)
Prepaid expenses and other current assets	(1,316)	(1,325)
Other long-term assets	(332)	(363)
Accounts payable	1,035	978
Accrued expenses and other current liabilities	1,039	1,775
Deferred revenue	1,395	2,542
Deferred rent, long term	505	22
Net cash used in operating activities	(21,147)	(30,996)
Cash flows from investing activities:		
Purchases of property and equipment	(1,695)	(690)
Purchases of short-term investments	—	(24,980)
Maturity of investments	—	10,000
Net cash used in investing activities	(1,695)	(15,670)
Cash flows from financing activities:		
Proceeds from issuance of redeemable convertible preferred stock, net of issuance costs	14,859	49,935
Proceeds from issuance of common stock upon option exercise	11	72
Proceeds from issuance of convertible notes	—	9,500
Proceeds from issuance of notes payable	—	25,000
Payments of debt issuance costs	—	(875)
Repayment of term loans	—	(18,000)
Payment of debt extinguishment fees	—	(1,398)
Net cash provided by financing activities	14,870	64,234
Net increase (decrease) in cash, cash equivalents and restricted cash	(7,972)	17,568
Cash, cash equivalents and restricted cash at beginning of period	20,583	12,611
Cash, cash equivalents and restricted cash at end of period	$ 12,611	$ 30,179

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

RAPID MICRO BIOSYSTEMS, INC.
Consolidated statements of cash flows
(In thousands)

	Year ended December 31,	
	2019	2020
Supplemental disclosure of cash flow information		
Cash paid for interest	$1,910	$1,977
Supplemental disclosure of non-cash investing activities		
Purchases of property and equipment in accounts payable	$ —	$ 279
Supplemental disclosure of non-cash financing activities		
Conversion of convertible notes to Series C1 preferred stock	$ —	$9,523
Issuance of preferred stock warrants in connection with redeemable convertible preferred stock	$ —	$ 652
Issuance of common stock in connection with stock option exercises not settled	$ —	$ 184
Initial fair value of derivative liability	$ —	$2,375
Deferred offering costs included in accounts payable and accrued expenses	$ —	$ 62
Accretion of redeemable convertible preferred stock to redemption value	$2,745	$3,745
Cumulative redeemable convertible preferred stock dividends	$2,704	$4,398

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

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

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.

The Company is subject to risks and uncertainties common to companies in the pharmaceutical and biotech quality control laboratory testing and instrumentation industry including, but not limited to, the successful development, commercialization, marketing and sale of products, fluctuations in operating results and financial risks, protection of proprietary knowledge and patent risks, dependence on key personnel, competition, technological and medical risks, customer demand, compliance with governmental regulations and management of growth. Potential risks and uncertainties also include, without limitation, uncertainties regarding the duration and magnitude of the impact of the COVID-19 pandemic on the Company’s business and the economy in general. Products currently under development will require additional research and development efforts prior to commercialization and will require additional capital and adequate personnel and infrastructure. The Company’s research and development may not be successfully completed, adequate protection for the Company’s technology may not be obtained, the Company may not obtain necessary government regulatory approval, and approved products may not prove commercially viable. The Company operates in an environment of rapid change in technology and competition.

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 will likely continue to be extensive in many aspects of society, which has resulted in and will likely 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 COVID-19 coronavirus outbreak 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 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 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, a prolonged pandemic could lead to shortages in the raw materials necessary to manufacture its products.

Basis of presentation

The consolidated financial statements have been prepared in accordance with accounting principles generally accepted 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. 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").

Revision of prior period financial statements

During the three months ended March 31, 2021, an error was identified by the Company related to the accretion of redeemable convertible preferred stock in prior periods. Specifically, the Company had understated the annual accretion of the Series B1, C1 and C2 redeemable convertible preferred stock for the years ended December 31, 2019 and 2020 and prior periods, which resulted in an understatement of the carrying value of the redeemable convertible preferred stock, net loss attributable to common stockholders and net loss per share attributable to common stockholders. The Company concluded that the impacts of the error were not material to the consolidated financial statements for the years ended December 31, 2019 and 2020. While not material, the Company has elected to revise the previously issued consolidated financial statements for the years ended December 31, 2019 and 2020 for the impacts of the error. In addition, the applicable notes to the accompanying financial statements have also been revised to correct for these misstatements.

The following table reflects the impacts of the error on the consolidated financial statements (in thousands except per share amounts):

Revisions to consolidated balance sheets and consolidated statements of redeemable convertible preferred stock and stockholders' deficit:

	As of December 31, 2018			As of December 31, 2019			As of December 31, 2020		
	As previously reported	Adjustment	As revised	As previously reported	Adjustment	As revised	As previously reported	Adjustment	As revised
Redeemable convertible preferred stock	$ 60,342	$ 1,200	$ 61,542	$ 78,862	$ 2,988	$ 81,850	$ 146,155	$ 5,671	$ 151,826
Additional paid-in capital	$ 128,097	$ (1,200)	$ 126,897	$ 124,919	$ (2,988)	$ 121,931	$ 120,246	$ (5,671)	$ 114,575
Total stockholders' deficit	$ (55,351)	$ (1,200)	$ (56,551)	$ (79,587)	$ (2,988)	$ (82,575)	$ (121,335)	$ (5,671)	$ (127,006)

Revisions to consolidated statements of operations:

	For the year ended December 31, 2019			For the year ended December 31, 2020		
	As previously reported	Adjustment	As revised	As previously reported	Adjustment	As revised
Accretion of redeemable convertible preferred stock to redemption value	$ (957)	$ (1,788)	$ (2,745)	$ (1,062)	$ (2,683)	$ (3,745)
Net loss attributable to common stockholders — basic and diluted	$ (24,832)	$ (1,788)	$ (26,620)	$ (42,538)	$ (2,683)	$ (45,221)
Net loss per share attributable to common stockholders — basic and diluted	$ (71.57)	$ (5.15)	$ (76.72)	$ (118.63)	$ (7.48)	$ (126.11)

Revisions to consolidated statements of cash flows:

	For the year ended December 31, 2019			For the year ended December 31, 2020		
	As previously reported	Adjustment	As revised	As previously reported	Adjustment	As revised
Supplemental disclosure of non-cash financing activities:						
Accretion of redeemable convertible preferred stock to redemption value	$ 957	$ 1,788	$ 2,745	$ 1,062	$ 2,683	$ 3,745

Going concern

The Company has evaluated whether there are certain conditions and events, considered in the aggregate, that raise substantial doubt about the Company's ability to continue as a going concern within one year after the date that the consolidated financial statements are issued.

Through December 31, 2020, the Company has funded its operations primarily with proceeds from product, service and non-commercial revenue, proceeds from sales of its redeemable convertible preferred stock, including borrowings under convertible debt arrangements that subsequently converted into redeemable convertible preferred stock, and proceeds from the issuance of term loans. The Company has incurred recurring losses since its inception, including net losses of $21.2 million and $37.1 million for the years ended December 31, 2019 and 2020, respectively. As of December 31, 2020, the Company had an accumulated deficit of $241.6 million. The Company expects to continue to generate significant operating losses for the foreseeable future. As of March 22, 2021, the date these consolidated financial statements were available for issuance, the Company expects that its existing cash and cash equivalents, and short-term investments, including $81.0 million raised in a Series D1 and D2 Preferred Stock financing completed in March 2021, will be sufficient to fund its operating expenses and capital expenditure requirements for at least twelve months following the date these consolidated financial statements were available to be issued. The future viability of the Company beyond that point is dependent on its ability to raise additional capital to finance its operations.

The Company is seeking to complete an initial public offering (“IPO”) of its common stock. In the event the Company does not complete an IPO, the Company expects to seek additional funding through private equity financing, debt financing, or other capital sources, including government funding arrangements or other strategic transactions. The Company may not be able to obtain financing on acceptable terms, or at all, and the terms of any financing may adversely affect the holdings or the rights of the Company’s stockholders.

If the Company is unable to obtain funding, the Company will be required to delay, reduce or eliminate some or all of its research and development programs, product expansion or commercialization efforts, or the Company may be unable to continue operations. Although management continues to pursue these financing plans, there is no assurance that the Company will be successful in obtaining sufficient funding on terms acceptable to the Company to fund continuing operations, if at all.

The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty. Accordingly, the consolidated financial statements have been prepared on a basis that assumes the Company will continue as a going concern and which contemplates the realization of assets and satisfaction of liabilities and commitments in the ordinary course of business.

2. Summary of significant accounting policies

Use of estimates

The preparation of the Company’s 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 consolidated financial statements, and the reported amounts of revenue and expenses during the reporting periods. Significant estimates and assumptions reflected in these 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 as of March 22, 2021, the date the consolidated financial statements were available to be issued. These estimates may change as new events occur and additional information is obtained.

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 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 with financial institutions that management believes to be of high credit quality. The Company has not experienced any losses on such accounts and does not believe it is exposed to any unusual credit risk beyond the normal credit risk associated with commercial banking relationships. 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:

	Year ended December 31,	
	2019	2020
Customer A	30.6%	12.4%
Customer B	15.2%	*
Customer C	*	10.5%
Customer D	*	23.2%
	45.8%	46.1%

* – less than 10%

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

	December 31,	
	2019	2020
Customer D	*	41.9%
Customer E	31.9%	10.1%
Customer F	22.7%	*
Customer G	13.6%	*
Customer H	12.9%	*
Customer I	*	18.7%
Customer J	*	13.4%
	81.1%	84.1%

* – less than 10%

The Company relies on third parties for the supply and manufacture of its products as well as third-party logistics providers. In instances where these parties fail to perform their obligations, the Company may be unable to find alternative suppliers to satisfactorily deliver its products to its customers on time, if at all, which could have a material adverse effect on the Company's operating results, financial condition and cash flows and damage its customer relationships. There are no significant concentrations around a single third-party supplier or manufacturer for the year ended December 31, 2019 or 2020.

Deferred offering costs

The Company capitalizes certain legal, accounting and other third-party fees that are directly associated with in-process equity financings as deferred offering costs until such financings are consummated. After consummation of an equity financing, these costs are recorded in stockholders' equity (deficit) as a reduction of additional paid-in capital generated as a result of the offering or as a reduction to the carrying value of redeemable convertible preferred stock. If the in-process equity financing is abandoned, the deferred offering costs will be expensed

immediately as a charge to operating expenses in the consolidated statements of operations. As of December 31, 2019 and 2020, the Company had zero and $0.1 million, respectively, in deferred offering costs in the consolidated balance sheets.

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 consolidated balance sheets and amortized as interest expense on the consolidated statement of operations using the effective interest method, which approximates straight-line method. As of December 31, 2019 and 2020, debt issuance costs totaled $0.2 million and $1.3 million, respectively. During the year ended December 31, 2019 and 2020, the Company recorded $0.5 million and $0.9 million, respectively in amortization of the debt issuance costs recorded within interest expense in the consolidated statement 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 both December 31, 2019 and 2020, the Company held cash of $0.1 million in banks located outside of the U.S.

Restricted cash

As of December 31, 2019 and 2020, the Company was required to maintain guaranteed investment certificates of $0.2 million and $0.1 million, respectively, 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.

Short-term investments

The Company's short-term investments are classified as available-for-sale and recorded at fair value based upon market prices at period end. Unrealized gains and losses are recorded in accumulated other comprehensive income as a separate component of stockholders' deficit. Realized gains and losses and declines in value of investments determined to be other than temporary are included as a component of interest income in the consolidated statements of operations. The costs of investments for purposes of computing realized and unrealized gains and losses is based on the specific identification method.

The Company evaluates its short-term investments with unrealized losses for other-than-temporary impairment. When assessing short-term investments for other-than-temporary declines in value, the Company considers such factors as, among other things, how significant the decline in value is as a percentage of the original cost, how long the market value of the investment has been less than its original cost, the Company's ability and intent to retain the short-term investment for a period of time sufficient to allow for any anticipated recovery in fair value and market conditions in general. If any adjustment to fair value reflects a decline in the value of the short-term investment that the Company considers to be other-than-temporary, the Company reduces the short-term investment to fair value through a charge to the consolidated statements of operations. No such adjustments were necessary during the periods presented.

The Company's short-term investments as of December 31, 2020 had maturities of less than one year.

Accounts receivable

Accounts receivables are customer obligations that are unconditional. Accounts receivables are presented net of an allowance for doubtful accounts, which represents an estimate of amounts that may not be collectible. The Company performs ongoing credit evaluations of its customers and, if necessary, provides an allowance for

doubtful accounts and expected losses. The Company writes off accounts receivable against the allowance when it determines a balance is uncollectible and no longer actively pursues collection of the receivable. The Company does not have any off-balance-sheet credit exposure related to customers. As of December 31, 2019 and 2020, the Company did not record an allowance for doubtful accounts.

Inventory

Inventory is valued at the lower of cost or net realizable value. Cost is computed using the first-in, first-out method. The Company regularly reviews inventory quantities on-hand for excess and obsolete inventory and, when circumstances indicate, records charges to write down inventories to their estimated net realizable value, after evaluating historical sales, future demand, market conditions and expected product life cycles. Such charges are classified as cost of product revenue in the statements of operations. Any write-down of inventory to net realizable value creates a new cost basis.

Property and equipment

Property and equipment are stated at cost less accumulated depreciation and amortization. Depreciation and amortization expense is recognized using the straight-line method over the estimated useful life of each asset, as follows:

	Estimated Useful Life
Manufacturing and laboratory equipment	5-10 years
Computer hardware and software	3 years
Office furniture and fixtures	5-7 years
Leasehold improvements	Shorter of remaining life of lease or useful life

Estimated useful lives are periodically assessed to determine if changes are appropriate. Maintenance and repairs are charged to expense as incurred. When assets are retired or otherwise disposed of, the cost of these assets and related accumulated depreciation or amortization are eliminated from the consolidated balance sheet and any resulting gains or losses are included in the consolidated statement of operations in the period of disposal. Costs for capital assets not yet placed into service are capitalized as construction-in-progress and depreciated once placed into service.

Impairment of long-lived assets

Long-lived assets consist of property and equipment. Long-lived assets to be held and used are tested for recoverability whenever events or changes in business circumstances indicate that the carrying amount of the assets may not be fully recoverable. Factors that the Company considers in deciding when to perform an impairment review include significant underperformance of the business in relation to expectations, significant negative industry or economic trends and significant changes or planned changes in the use of the assets. If an impairment review is performed to evaluate a long-lived asset group for recoverability, the Company compares forecasts of undiscounted cash flows expected to result from the use and eventual disposition of the long-lived asset group to its carrying value. An impairment loss would be recognized in loss from operations when estimated undiscounted future cash flows expected to result from the use of an asset group are less than its carrying amount. The impairment loss is based on the excess of the carrying value of the impaired asset group over its fair value, determined based on discounted cash flows. The Company did not record any impairment losses on long-lived assets during the years ended December 31, 2019 or 2020.

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 investments, derivative liability and its redeemable convertible preferred stock warrant liability 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. The carrying value of the Company's long-term debt approximates its fair value (a level 2 measurement) at each balance sheet date due to its variable interest rate, which approximates a market interest rate.

Product warranties

The Company offers a one-year limited assurance warranty on System sales, which is included in the selling price. Product warranties provide assurance that the Company's product functions in accordance with agreed specifications. Warranties cover for repairs and replacements when the product does not function in accordance with agreed specifications. The standard assurance warranty does not cover, and no warranty is provided for, parts which by their nature are normally required to be replaced periodically. The accrued warranty cost is based on estimated material, labor and other costs that the Company expects to incur to fulfill the warranty obligation. Estimates are primarily based on historical information, current cost data and future forecast. The Company periodically assesses the adequacy of the warranty accrual and adjusts the amount as necessary. If the historical data used to calculate the adequacy of the warranty accrual are not indicative of future requirements, additional or reduced warranty accrual may be required. The warranty accrual is included in accrued expenses and other current liabilities in the consolidated balance sheets. The following table presents a summary of changes in the amount reserved for warranty cost (in thousands):

	Year ended December 31,	
	2019	**2020**
Balance, beginning of the year	$ 890	$ 848
Warranty provisions	41	14
Warranty repairs	(83)	(225)
Balance, end of the year	$ 848	$ 637

Classification and accretion of redeemable convertible preferred stock

The Company has classified redeemable convertible preferred stock outside of stockholders' deficit because the shares contain certain redemption features that are not solely within the control of the Company. Costs incurred in connection with the issuance of each series of redeemable convertible preferred stock are recorded as a reduction of gross proceeds from issuance. The Company records periodic accretion to the carrying values of its outstanding redeemable convertible preferred stock such that the carrying value of the redeemable convertible preferred stock will be equal to the redemption value at the earliest date of redemption. Adjustments to the carrying values of the redeemable convertible preferred stock to record this accretion at each reporting date are

considered deemed dividends, which adjust retained earnings (or in the absence of retained earnings, additional paid-in capital) and increases or decreases net loss attributable to common stockholders in computing basic and diluted earnings per share.

Preferred stock warrant liability

The Company classifies warrants for the purchase of shares of its redeemable convertible preferred stock (see Notes 3 and 10) as a liability on its consolidated balance sheets as these warrants are freestanding financial instruments that may require the Company to transfer assets upon exercise. The warrant liability is initially recorded at fair value on the issuance date of each warrant and is subsequently remeasured to fair value at each reporting date using the Black-Scholes pricing model. Changes in the fair value of the warrant liability are recognized as a component of other income (expense) in the consolidated statements of operations. Changes in the fair value of the preferred stock warrant liability will continue to be recognized until the warrants are exercised, expire or qualify for equity classification.

Derivative liability

In February 2020, the Company issued convertible notes to several investors (see Note 9) that provided a conversion option whereby upon the closing of a specified financing event the notes would automatically convert into shares of the same class and series of capital stock of the Company issued to other investors in the financing at a conversion price equal to 80% of the price per share of the securities paid by the other investors. This conversion option was determined to be an embedded derivative that required to be bifurcated and accounted for separately from the notes. The derivative liability was initially recorded at fair value upon entering into the agreement. In April 2020, the specified financing event was consummated, as such the notes were converted into shares of Series C1 Preferred Stock (see Note 10), and the derivative liability was extinguished.

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

Effective January 1, 2019, the Company adopted ASC 606, *Revenue from Contracts with Customers* ("ASC 606"), using the modified retrospective approach. The adoption of this guidance had an immaterial impact on the Company's financial statements.

Under ASC 606, revenue is recognized when a customer obtains control of promised goods or services, in an amount that reflects the consideration which the entity expects to receive in exchange for those goods or services. In order to achieve this core principle, the Company applies the following five steps when recording revenue: (1) identify the contract, or contracts, with the customer, (2) identify the performance obligations in the contract, (3) determine the transaction price, (4) allocate the transaction price to the performance obligations in the contract and (5) recognize revenue when, or as, performance obligations are satisfied.

The Company derives revenue from the sale of its products and services through direct sale representatives. The Company's arrangements are generally noncancelable and nonrefundable after ownership passes to the customer.

Product revenue

The Company derives product revenue primarily from the sale of its Systems, optional LIMS connection software, which facilitates the transfer of data captured by the System to the customer's existing LIMS software, and proprietary consumables. Revenue is recognized when control of the products is transferred to the customer. Transfer of control is generally at shipment or delivery, depending on contractual terms, and occurs when title and risk of loss transfers to the customer, which represents the point in time when the customer obtains the use of and substantially all of the benefits of the product. Upon delivery, the System is fully functional for use by the customer. As such, the Company's performance obligation related to product sales is satisfied at a point in time.

The Company's principal terms of sale are free carrier ("FCA") shipping point. Occasionally, when customer acceptance of the product is required and is other than perfunctory, revenue for the entire customer arrangement is deferred until the acceptance has been received.

Service revenue

The Company derives service revenue primarily from validation services, service contracts and field service (including installation). The Company's validation services include validation and documentation services performed utilizing Systems purchased by the customer. Service contracts are around the clock maintenance support which can be purchased by the customer after the expiration of the one-year assurance warranty included with each System purchase. Field service revenue primarily consists of services provided by field service engineers to install the System at the customer site and two preventative maintenance services performed during the warranty period. Service revenue is recognized over time using an input method based on time lapsed for service contracts and output method based on milestone achieved for validation services and field service.

Performance obligations

A performance obligation is a promise in a contract to transfer a distinct product or service to a customer that are both capable of being distinct, whereby the customer can benefit from the product or service either on its own or together with other resources that are readily available, and are distinct in the context of the contract, whereby the transfer of the product or service is separately identifiable from other promises in the contract. The Company's main performance obligations in customer arrangements are Systems, LIMS connection software, consumables, validation services, service contracts, and field service.

Payment terms

Payment terms for customer orders are typically between 30 to 90 days after the shipment or delivery of the product. For certain products, services and customer types, the Company requires payment before the products or services are delivered to, or performed for, the customer. None of the Company's contracts contain a significant financing component.

Multiple performance obligations with an arrangement

The Company's contracts may include multiple performance obligations when customers purchase a combination of products and services such as System sold together with the LIMS connection software, consumables or services. For these arrangements, the Company allocates the contract's transaction price to each performance obligation on a relative standalone selling price basis using the Company's best estimate of the standalone selling price of each distinct product or service in the contract. The primary methods used to estimate standalone selling prices are based on the prices observed in standalone sales to customers or cost-plus margin depending on the nature of the obligation and available evidence of fair value. Allocation of the transaction price is determined at contract's inception.

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 $0.8 million and $0.5 million in contract assets as of December 31, 2019 and 2020, respectively, included in prepaid expenses and other current assets. These balances relate to BARDA agreement.

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 December 31, 2019 or 2020. Deferred revenue was $1.9 million and $4.4 million at December 31, 2019 and 2020, respectively. Revenue recognized during the year ended December 31, 2019 that was included in deferred revenue at the prior year end was $0.6 million. Revenue recognized during the year ended December 31, 2020, that was included in deferred revenue at the prior year end was $1.0 million.

Non-commercial revenue

The Company generates 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 reduce the cost share reimbursement rate. Modifications were accounted for prospectively. 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. Revenue on the BARDA contract is recognized over time using an input method based on cost incurred to date in relation to total estimated cost. Due to the structure of the arrangement, the transaction price is variable in nature based on actual cost incurred. As such the amount included in the transaction price is constrained to the amount for which it is probable that a significant reversal of cumulative revenue recognized will not occur.

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):

	Year ended December 31,	
	2019	2020
Product and service revenue — recurring	$ 2,294	$ 3,908
Product and service revenue — non-recurring	9,162	10,175
Non-commercial revenue — non-recurring	5,056	1,994
Total revenue	$ 16,512	$ 16,077

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

	Year ended December 31,	
	2019	2020
United States	$ 11,708	$ 7,304
Germany	2,041	1,920
Switzerland	1,622	4,111
All other countries	1,141	2,742
Total revenue	$ 16,512	$ 16,077

Contract acquisition costs

The Company incurs and pays commissions on Systems, LIMS connection software, validation services, and field service arrangements. The period of the related revenue stream is typically less than one year in duration, and as such, the Company applies the practical expedient to expense the costs in the period in which they were incurred. The Company does not pay commissions on non-commercial revenue with BARDA, service contracts or consumables.

Shipping and handling fees

Shipping and handling fees billed to customers for product shipments are recorded in product revenue in the consolidated statements of operations. Shipping and handling costs incurred for inventory purchases and product shipments are recorded in cost of product revenue in the consolidated statements of operations.

Cost of revenue

Cost of product revenue primarily consists of costs for raw material parts and associated freight, shipping and handling costs, royalties, contract manufacturer costs, salaries and other personnel costs including stock-based compensation expense, depreciation and amortization expense, scrap, warranty cost, inventory reserves, 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 associated with training and other expenses related to service revenue recognized in the period. Cost of non-commercial revenue primarily consists of salaries and other personnel costs including stock-based compensation expense, consulting expense, materials, travel and other costs related to revenue recognized as non-commercial revenue during the period.

Research and development costs

Research and development costs are expensed as incurred. Research and development expenses consist of costs incurred in performing research and development activities including, employee-related expenses, such as

salaries, bonuses and other personnel costs including stock-based compensation expense, the cost of developing maintaining and improving new and existing products designs, the cost of hardware and software engineering, the cost of research materials and supplies, external costs of outside consultants engaged to conduct research and development services associated with the Company's 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. The costs incurred for the development of system software that will be sold are capitalized when technological feasibility has been established. The Company has continued to develop the software associated with its platform and products, and the associated costs have been expensed as incurred, as the nature of improvements did not significantly improve the performance or functionality of the software.

Advertising costs

Advertising costs are expensed as incurred and are included in sales and marketing expenses in the consolidated statements of operations. Advertising costs were $0.1 million during each of the years ended December 31, 2019 and 2020.

Patent costs

All patent-related costs incurred in connection with filing and prosecuting patent applications are expensed as incurred due to the uncertainty about the recovery of the expenditures. Amounts incurred are classified within general and administrative expense in the consolidated statement of operations.

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 as they occur. The Company has not issued any stock-based awards with performance-based vesting conditions.

The Company classifies stock-based compensation expense in its consolidated statement of operations in the same manner in which the award recipient's payroll costs are classified or in which the award recipient's service payments are classified.

The fair value of each stock option grant is estimated on the date of grant using the Black-Scholes option-pricing model, which uses the following inputs: (i) the fair value per share of the common stock issuable upon exercise of the option, (ii) the expected term of the option, (iii) expected volatility of the price of the common stock, (iv) the risk-free interest rate, and (v) the expected dividend yield. The Company values its common stock taking into consideration its most recently available valuation of common stock performed by third parties as well as additional factors which may have changed since the date of the most recent contemporaneous valuation through the date of grant. The exercise price of the option cannot be less than the fair market value of a share of common stock on the date of grant. The expected term of the Company's stock options has been determined utilizing the "simplified" method for awards that qualify as "plain-vanilla". The Company historically has been a private company and lacks company-specific historical and implied volatility information for its stock. Therefore, the Company estimates its expected stock price volatility based on the historical volatility of publicly traded peer companies and expects to continue to do so until such time as it has adequate historical data regarding the volatility of its own traded stock price. The risk-free interest rate is determined by reference to the U.S. Treasury yield curve in effect at the time of grant of the award for time periods approximately equal to the expected term of the award. Expected dividend yield is based on the fact that the Company has never paid cash dividends on its common stock and does not expect to pay any cash dividends in the foreseeable future.

Income taxes

The Company accounts for income taxes using the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been recognized in the consolidated financial statements or in the Company's tax returns. Deferred tax assets and liabilities are determined on the basis of the differences between the consolidated financial statements and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. Changes in deferred tax assets and liabilities are recorded in the provision for income taxes. The Company assesses the likelihood that its deferred tax assets will be recovered from future taxable income and, to the extent it believes, based upon the weight of available evidence, that it is more likely than not that all or a portion of the deferred tax assets will not be realized, a valuation allowance is established through a charge to income tax expense. Potential for recovery of deferred tax assets is evaluated by estimating the future taxable profits expected and considering prudent and feasible tax planning strategies.

The Company accounts for uncertainty in income taxes recognized in the consolidated financial statements by applying a two-step process to determine the amount of tax benefit to be recognized. First, the tax position must be evaluated to determine the likelihood that it will be sustained upon external examination by the taxing authorities. If the tax position is deemed more-likely-than-not to be sustained, the tax position is then assessed to determine the amount of benefit to recognize in the consolidated financial statements. The amount of the benefit that may be recognized is the largest amount that has a greater than 50% likelihood of being realized upon ultimate settlement. The provision for income taxes includes the effects of any resulting tax reserves, or unrecognized tax benefits, that are considered appropriate as well as the related net interest and penalties.

Foreign currency translation and transactions

The Company has determined that the functional and reporting currency for its operations in Germany and Switzerland is the U.S. Dollar. Gains and losses arising from currency exchange rate fluctuations on transactions denominated in a currency other than the local functional currency are included in other income.

Comprehensive loss

Comprehensive loss includes net loss as well as other changes in stockholders' deficit that result from transactions and economic events other than those with stockholders. For the years ended December 31, 2019 and 2020, comprehensive loss included $0 and less than $0.1 million, respectively, of unrealized gains on short-term investments, net of tax.

Net loss per share attributable to common stockholders

The Company follows the two-class method when computing net income (loss) per share as the Company has issued shares that meet the definition of participating securities. The two-class method determines net income (loss) per share for each class of common and participating securities according to dividends declared or accumulated and participation rights in undistributed earnings. The two-class method requires income available to common stockholders for the period to be allocated between common and participating securities based upon their respective rights to receive dividends as if all income for the period had been distributed.

Basic net income (loss) per share attributable to common stockholders is computed by dividing the net income (loss) attributable to common stockholders by the weighted average number of common shares outstanding for the period. Diluted net income (loss) attributable to common stockholders is computed by adjusting net income (loss) attributable to common stockholders to reallocate undistributed earnings based on the potential impact of dilutive securities. Diluted net income (loss) per share attributable to common stockholders is computed by dividing the diluted net income (loss) attributable to common stockholders by the weighted average number of common shares outstanding for the period, including potential dilutive common shares. For purpose of this calculation, outstanding stock options, redeemable convertible preferred stock and warrants to purchase preferred stock are considered potential dilutive common shares.

The Company's redeemable convertible preferred stock contractually entitles the holders of such shares to participate in dividends but does not contractually require the holders of such shares to participate in losses of the Company. Accordingly, in periods in which the Company reports a net loss attributable to common stockholders such losses are not allocated to such participating securities. In periods in which the Company reports a net loss attributable to common stockholders diluted net loss per share attributable to common stockholders is the same as basic net loss per share attributable to common stockholders since dilutive common shares are not assumed to have been issued if their effect is anti-dilutive. The Company reported a net loss attributable to common stockholders for the years ended December 31, 2019 and 2020, as such basic net loss per share attributable to common stockholders was the same as diluted net loss per share attributable to common stockholders.

Recently adopted accounting pronouncements

In November 2016, the FASB issued ASU No. 2016-18, *Statement of Cash Flows (Topic 230)* ("ASU 2016-18"), which requires that amounts generally described as restricted cash and restricted cash equivalents should be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. For public business entities, ASU 2016-18 is effective for fiscal years beginning after December 15, 2017. For all other entities, the amendments are effective for fiscal years beginning after December 15, 2018, and interim periods within fiscal years beginning after December 15, 2019. The Company adopted ASU 2016-18 as of the required effective date of January 1, 2019. Adoption impacted the presentation of restricted cash and related disclosures in the consolidated statement of cash flows only.

In July 2017, the FASB issued ASU No. 2017-11, *Earnings Per Share (Topic 260), Distinguishing Liabilities from Equity (Topic 480), Derivatives and Hedging (Topic 815) (Part I) Accounting for Certain Financial Instruments with Down Round Features (Part II) Replacement of the Indefinite Deferral for Mandatorily Redeemable Financial Instruments of Certain Nonpublic Entities and Certain Mandatorily Redeemable Noncontrolling Interests with a Scope Exception* ("ASU 2017-11"). Part I applies to entities that issue financial instruments such as warrants, convertible debt or convertible preferred stock that contain down-round features. Part II replaces the indefinite deferral for certain mandatorily redeemable noncontrolling interests and mandatorily redeemable financial instruments of nonpublic entities contained within Accounting Standards Codification ("ASC") Topic 480 with a scope exception and does not impact the accounting for these mandatorily redeemable instruments. For public business entities, ASU 2017-11 is effective for annual reporting periods beginning after December 15, 2018, including interim periods within those fiscal years. For all other entities, the amendments in are effective for fiscal years beginning after December 15, 2019, and interim periods within fiscal years beginning after December 15, 2020. Early adoption is permitted for all entities, including adoption in an interim period. The Company early adopted ASU 2017-11 effective January 1, 2019, and its adoption had an immaterial impact on the Company's financial position, results of operations or cash flows.

In June 2018, the FASB issued ASU No. 2018-07, *Compensation — Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting* ("ASU 2018-07"). These amendments expand the scope of *Topic 718, Compensation—Stock Compensation* (which currently only includes share-based payments to employees) to include share-based payments issued to non-employees for goods or services. Consequently, the accounting for share-based payments to non-employees and employees will be substantially aligned. The ASU supersedes *Subtopic 505-50, Equity — Equity-Based Payments to Non-Employees*. This standard is effective for public business entities for annual periods beginning after December 15, 2018, including interim periods within those fiscal years, with early adoption permitted as long as ASU 2014-09 has been adopted by the Company. For all other entities, the amendments are effective for fiscal years beginning after December 15, 2019, and interim periods within fiscal years beginning after December 15, 2020. The Company early adopted this guidance, effective January 1, 2019, and its adoption had no material impact on the Company's financial position, results of operations or cash flows.

In August 2018, the FASB issued ASU No. 2018-13, *Fair Value Measurement (Topic 820): Disclosure Framework—Changes to the Disclosure Requirements for Fair Value Measurement* ("ASU 2018-13"), which removes, adds and modifies certain disclosure requirements for fair value measurements in Topic 820. The Company will no longer

be required to disclose the amount of and reasons for transfers between Level 1 and Level 2 of the fair value hierarchy as well as the valuation processes of Level 3 fair value measurements. However, the Company will be required to additionally disclose the changes in unrealized gains and losses included in other comprehensive income for recurring Level 3 fair value measurements and the range and weighted average of assumptions used to develop significant unobservable inputs for Level 3 fair value measurements. ASU 2018-13 is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019. The amendments relating to additional disclosure requirements will be applied prospectively for only the most recent interim or annual period presented in the initial year of adoption. All other amendments will be applied retrospectively to all periods presented upon their effective date. The Company early adopted this guidance, effective January 1, 2019, and its adoption had no material impact on the Company's financial position, results of operations or cash flows.

Recently issued accounting pronouncements

The Company qualifies as "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. For public business entities except smaller reporting companies, the guidance is effective for annual reporting periods beginning after December 15, 2019 and for interim periods within those fiscal years. For non-public entities and smaller reporting companies, the guidance was effective for annual reporting periods beginning after December 15, 2021. In November 2019, the FASB issued ASU No. 2019-10, which deferred the effective date for non-public entities to annual reporting periods beginning after December 15, 2022, including interim periods within those fiscal years. Early application is allowed. The Company expects to adopt this guidance effective January 1, 2023, and it is currently evaluating the impact on its consolidated financial statements and related disclosures.

In February 2016, the FASB issued ASU No. 2016-02*, Leases (Topic 842)* ("ASU 2016-02"), which sets out the principles for the recognition, measurement, presentation and disclosure of leases for both parties to a contract (i.e., lessees and lessors). The new standard requires lessees to apply a dual approach, classifying leases as either finance or operating leases based on the principle of whether or not the lease is effectively a financed purchase by the lessee. This classification will determine whether lease expense is recognized based on an effective interest method or on a straight-line basis over the term of the lease. A lessee is also required to record a right-of-use asset and a lease liability for all leases with a term of greater than 12 months regardless of their classification. Leases with a term of 12 months or less may be accounted for similar to existing guidance for operating leases today. For public business entities, ASU 2016-02 is effective for annual reporting periods beginning after December 15, 2018, including interim periods within those fiscal years, and early adoption is permitted. ASU 2016-02 initially required adoption using a modified retrospective approach, under which all years presented in the financial statements would be prepared under the revised guidance. For nonpublic entities, this guidance is effective for annual periods beginning after December 15, 2021. In July 2018, the FASB issued *ASU No. 2018-11, Leases (Topic 842)*, which added an optional transition method under which financial statements may be prepared under the revised guidance for the year of adoption, but not for prior years. Under the latter method, entities will recognize a cumulative catch-up adjustment to the opening balance of retained earnings in the period

of adoption. The Company expects to adopt this guidance effective January 1, 2022, and it is currently evaluating the impact on its consolidated financial statements and related disclosures.

In August 2018, the FASB issued ASU No. 2018-15, *Intangibles — Goodwill and Other — Internal-Use Software (Topic 35)*: *Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement that is a Service Contract*, which requires capitalizing implementation costs incurred to develop or obtain internal-use software (and hosting arrangements that include an internal-use software license). For public business entities the guidance is effective for fiscal years beginning after December 15, 2020 including interim periods within those fiscal years. The Company expects to adopt this guidance effective on January 1, 2021 and is currently evaluating the impact, if any, adoption will have on its consolidated financial statements and related disclosure.

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. For public business entities the guidance is effective for annual reporting periods beginning after December 15, 2020 and for interim periods within those fiscal years. For non-public entities, the guidance is effective for annual reporting periods beginning after December 15, 2021 and for interim periods within years beginning after December 15, 2022, with early adoption permitted. The Company expects to adopt this guidance effective January 1, 2022, and it is currently evaluating the impact on its consolidated financial statements and related disclosures.

In August 2020, the FASB issued ASU 2020-06, "*Debt—Debt with Conversion and Other Options (Subtopic 470-20)*" and "*Derivatives and Hedging-Contracts in Entity's Own Equity (Subtopic 815-40): Accounting for Convertible instruments and contracts in an Entity's Own Equity*", which simplifies the accounting for certain financial instruments with characteristics of liabilities and equity, including convertible instruments and contracts on an entity's own equity. ASU 2020-06 is effective for the Company for fiscal years beginning after December 15, 2023, and interim periods within those fiscal years. Early adoption is permitted for fiscal years beginning after December 15, 2020, and interim periods within those fiscal years. Adoption is applied on a modified or full retrospective transition approach. The Company is currently evaluating the adoption date and impact, if any, adoption will have on its consolidated financial statements and related disclosure.

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 December 31, 2019			
	Level 1	Level 2	Level 3	Total
Assets				
Cash equivalents	$ 6,364	$ —	$ —	$ 6,364
	$ 6,364	$ —	$ —	$ 6,364
Liabilities				
Preferred stock warrant liability	$ —	$ —	$ 3,396	$ 3,396
	$ —	$ —	$ 3,396	$ 3,396

	Fair value measurements at December 31, 2020			
	Level 1	Level 2	Level 3	Total
Assets				
Cash equivalents	$ 23,456	$ —	$ —	$ 23,456
Short-term investments	14,998	—	—	14,998
	$ 38,454	$ —	$ —	$ 38,454
Liabilities				
Preferred stock warrant liability	$ —	$ —	$ 4,117	$ 4,117
	$ —	$ —	$ 4,117	$ 4,117

During the years ended December 31, 2019 and 2020, respectively, there were no transfers between Level 1, Level 2 and Level 3.

Valuation of short-term investments

U.S. Treasury bonds 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.

Valuation of preferred stock warrant liability

The warrant liability is related to the warrants (the “Warrants”) to purchase shares of the Company’s Series A1, B1, and C1 redeemable convertible preferred stock (see Note 11). 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 (iv) 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:

	Year ended December 31,	
	2019	2020
Fair value of Series A1 preferred stock	$ 0.57	$ 0.50
Fair value of Series B1 preferred stock	$ 1.05	$ 1.26
Fair value of Series C1 preferred stock	$ —	$ 1.23
Remaining contractual term (in years)	7.7	7.3
Risk-free interest rate	2.0%	0.6%
Expected dividend yield	0%	0%
Expected volatility	25.8%	40.0%

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

	Year ended December 31,	
	2019	2020
Balance, beginning of year	$ 3,645	$ 3,396
Initial fair value of warrants issued during the period	—	652
Change in fair value	(249)	69
Balance, end of the year	$ 3,396	$ 4,117

Valuation of derivative liability

The derivative liability is related to the conversion option included within the Unsecured Subordinated Convertible Promissory Notes ("Convertible Notes") issued in February 2020 (see Note 9). The Convertible Notes provided a conversion option whereby upon the closing of a specified financing event the Convertible Notes would automatically convert into shares of the same class and series of capital stock of the Company issued to other investors in the financing at a conversion price equal to 80% of the price per share of the securities paid by the other investors. This conversion option was determined to be an embedded derivative required to be bifurcated and accounted for separately from the notes. The fair value of the derivative liability was determined based on inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy.

Upon the closing of the Convertible Notes management determined that the probability of completing the specified financing event was 100%; thus, the value of the automatic conversion option was deemed to be 20% of the fair value of the capital stock to be issued upon conversion of the Convertible Notes, or $2.4 million. This amount represented the fair value of the embedded derivative at issuance (see Note 9).

Upon the occurrence of the specified financing event in April 2020, the Convertible Notes were converted into 10,351,063 shares of Series C1 Preferred Stock, as defined (see Note 9), and the derivative liability of $2.4 million was extinguished.

4. Short-term investments

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

	December 31, 2020			
	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
US Treasury bonds	$ 14,997	$1	$—	$ 14,998
	$ 14,997	$1	$—	$ 14,998

5. Inventory

Inventory consisted of the following (in thousands):

	December 31,	
	2019	2020
Raw materials	$4,477	$6,754
Work in process	299	1,190
Finished goods	976	1,021
Total	$5,752	$8,965

Raw materials, work in process and finished goods were net of adjustments to net realizable value of $0.5 million and $1.0 million, as of December 31, 2019 and 2020, respectively.

6. Prepaid expenses and other current assets

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

	December 31,	
	2019	2020
Prepaid commitment fee	$ —	$ 275
Prepaid financing fees	—	62
Contract asset	810	471
Deposits	146	1,148
Lease receivables, current portion	482	325
Other	336	839
	$1,774	$3,120

7. Property and equipment, net

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

	December 31,	
	2019	2020
Manufacturing and laboratory equipment	$12,298	$ 12,961
Computer hardware and software	921	1,088
Office furniture and fixtures	282	343
Leasehold improvements	2,922	2,996
	16,423	17,388
Less: Accumulated depreciation	(8,831)	(10,336)
	$ 7,592	$ 7,052

Depreciation and amortization expense related to property and equipment was $1.5 million for the years ended December 31, 2019 and 2020. The Company had less than $0.1 million fully depreciated assets disposed of during the year ended December 31, 2020 and none in the year ended December 31, 2019.

8. Accrued expenses and other current liabilities

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

	December 31,	
	2019	2020
Accrued employee compensation and benefits expense	$2,246	$3,083
Vendor accrual	797	1,685
Accrued warranty expense	848	637
Accrued interest	771	330
Deferred rent, current portion	79	118
Accrued taxes	613	688
Other	82	113
	$5,436	$6,654

9. Long-term debt

The components of the Company's long-term debt consisted of the following (in thousands):

	December 31,	
	2019	2020
Notes Payable	$18,000	$25,000
Payment in kind interest	—	1,145
Less: Unamortized discount	(194)	(1,335)
Long-term debt, net of discount	$17,806	$24,810

Term loan agreements

2018 Term Loan

In April 2018, the Company entered into an $18.0 million term loan with a lender (the "2018 Term Loan"), which was paid in full in May 2020. The 2018 Term Loan bore interest at a rate equal to the greater of (i) the prime rate as reported by The Wall Street Journal plus 5.15%, and (ii) 9.65% per annum. The 2018 Term Loan was to be repaid in 48 monthly payments consisting of 23 monthly payments of interest only followed by 25 equal monthly payments of principal and interest. The 2018 Term Loan maturity date was April 1, 2022. In accordance with the terms of the 2018 Term Loan, if certain covenants were satisfied, such as (a) no event of default and (b) borrower completed equity financing in excess of $14.9 million prior to August 15, 2019 (See Note 10), the interest-only payment period of the loan was extended for an additional six months. The extension of the interest-only period resulted in a reduction of the number of principal and interest payments from 25 to 19.

The Company incurred debt issuance costs of $0.4 million in connection with the 2018 Term Loan. These costs were recorded as debt discount and were amortized to interest expense, using the effective interest method, over the term of the loan. The unamortized discount associated with the 2018 Term Loan was $0.2 million and $0 as of December 31, 2019 and 2020, respectively.

In addition to monthly interest payments, upon early termination of the loan, a non-refundable, end-of-term charge of $1.3 million was due and payable to the lender. The end-of-term charge was accrued as interest expense, using the effective interest method, over the term of the loan and was included in accrued expenses and other current liabilities on the Company's consolidated balance sheets.

In the event of prepayment, the 2018 Term Loan provided for a prepayment fee equal to the following percentages of the amount being prepaid: (i) if such amounts are prepaid prior to the one-year anniversary of the closing date, 3.0%; (ii) after the first anniversary of the closing date, through the second anniversary of the closing date, 2.0% and (iii) after the third anniversary of the closing date; 0.5%. The Company's obligations under the 2018 Term Loan agreement were secured by a first-priority security interest in all of its assets, including intellectual property.

The Company was required to comply with certain financial and non-financial covenants as defined in the 2018 Term Loan agreement, including a minimum liquidity requirement of the lesser of $7.0 million and the aggregate amount of any revolving indebtedness and outstanding obligations as of any date. In the event this requirement was not met, the Company was subject to a six-month rolling minimum revenue requirement. The Company was in compliance with all financial and non-financial covenants as of December 31, 2019.

The Company repaid the 2018 Term Loan in full in May 2020 using the proceeds from the 2020 Term Loan as discussed below. The Company paid $19.4 million to extinguish the outstanding principal and accrued interest owed, including the non-refundable end-of-term exit fee of $1.3 million (out of which $0.6 million was accrued for in prior years as interest expense) and an early termination fee of $0.1 million.

The loss on extinguishment of debt was $0.8 million which included the write-off of unamortized financing and end-of-term exit fee costs of $0.7 million and $0.1 million in early payment and documentation fees, and was

included as a component of other income (expense) in the consolidated statements of operations. Interest expense on the 2018 Term Loan totaled $2.4 million and $0.9 million for the years ended December 31, 2019 and 2020, respectively, which includes amortization of the debt discount of $0.5 million and $0.3 million during the years ended December 31, 2019 and 2020, respectively.

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") subject to certain milestones. The milestone entitling the Company to draw on the Term B Loan is achieved when the Company has received, on a cumulative basis, a predefined number of new system orders during a consecutive twelve month period between January 1, 2020 and November 14, 2021. The milestone entitling the Company to draw down the Term C Loan is achieved when the Company has received, on a cumulative basis, a predefined number of new system orders during a consecutive eighteen month period between January 1, 2020 and May 14, 2022. 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 is obligated to issue additional warrants to the lender with an aggregate exercise value, based on the fair market value of the preferred stock at the time of the draw down, equal to $1.1 million and $0.8 million upon drawing down the Term B Loan and Term C Loan, respectively. 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 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 consolidated statement of operations. Additionally, the Company allocated $0.3 million to Term B Loan and $0.2 million to Term C Loan and recorded within prepaid expenses and other current assets on the consolidated balance sheet and amortized on a straight-line basis over the debt access period within interest expense on the consolidated statement of operations.

The 2020 Term Loan's interest rate can be elected each quarter by the Company as either (a) 12%, up to 7% of which may be Payment in Kind ("PIK") interest or (b) 13% PIK interest. Accrued interest on the 2020 Term Loans is payable quarterly. All outstanding principal, including any and all accrued PIK interest, is due and payable in full on May 14, 2025, the maturity date. The Company has the option to prepay all or a portion of the principal balance prior to the maturity date, subject to a prepayment premium equal to a percentage of the principal amount of the loan prepaid, as follows: (i) if such amount is prepaid prior to the one-year anniversary of the closing date, 8.0%; (ii) after the first anniversary through the second anniversary, 7.0%; (iii) after the second anniversary through the third anniversary, 5.0%; (iv) after the third anniversary through the fourth anniversary, 3.0%; and (v) after the fourth anniversary outstanding fees and no prepayment premium.

In the event of a change of control, defined as (a) any person or group having acquired (i) beneficial ownership of 49.0% or more of the voting equity interests, or (ii) the power to elect a majority of the members of the board of directors of the Company or (b) the Company ceasing to beneficially own and control 100% of the economic and voting equity interests of each of its wholly-owned subsidiaries, the Company must immediately pay the lender all the outstanding principal of the 2020 Term Loan, the prepayment premium, and any other outstanding fees.

The 2020 Term Loan agreement includes certain financial and non-financial covenants. These covenants include exceeding certain minimum revenue thresholds on a trailing twelve-month basis, maintaining a minimum balance of $1.5 million in cash and cash equivalents, maintain all inventory in good and marketable condition, and reporting requirements for any material adverse changes in the Company's financial condition. As of December 31, 2020, the Company was in compliance with all covenants under the 2020 Term Loan.

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 warrants issued with the debt. Interest expense on the 2020 Term Loan totaled $2.2 million for the year ended December 31, 2020, which includes the

amortization of the debt discount of $0.2 million and non-cash PIK interest of $1.1 million. As of December 31, 2020, the unamortized debt discount was $1.3 million. The accrued interest on the 2020 Term Loan totals $0.3 million at December 31, 2020, which is included in accrued expenses and other current liabilities in consolidated balance sheets.

As of December 31, 2020, the aggregate future principal payments on the Company's outstanding 2020 Term Loan for the next five years were as follows (in thousands):

2021	$ —
2022	—
2023	—
2024	—
2025	26,145
	26,145
Less: Unamortized discount	(1,335)
Long-term debt, net of discount	$24,810

Convertible Notes

In February 2020, the Company issued Convertible Notes to several investors in the aggregate amount of $9.5 million with a stated interest rate of 1.5% per annum and a maturity date of February 28, 2021. The Convertible Notes provided a conversion option whereby upon the closing of a financing event, in which the aggregate gross proceeds of the issuance of preferred stock totaled at least $20.0 million, the notes would automatically convert into shares of the same class and series of capital stock of the Company issued to other investors in the financing at a conversion price equal to 80% of the price per share paid by the other investors. The conversion option met the definition of an embedded derivative and was required to be bifurcated and accounted for separately from the notes. The proceeds from the Convertible Notes were allocated between the derivative liability, with a fair value at issuance of $2.4 million, and the notes, with an initial carrying value of $7.1 million, included in long-term liabilities on the Company's consolidated balance sheets. The difference between the initial carrying value of the notes and the stated value of the notes represented a discount and that was accreted to interest expense over the term of the Convertible Notes using the effective interest method.

In April 2020, the Convertible Notes, including outstanding principal and accrued interest totaling $9.5 million, were automatically converted into 10,351,063 shares of Series C1 Preferred Stock. Upon conversion, the remaining unamortized discount was recognized as loss on extinguishment of debt in the consolidated statement of operations.

Interest expense on the Convertible Notes totaled $0.4 million for the year ended December 31, 2020, which includes amortization of the debt discount of $0.3 million.

10. Redeemable convertible preferred stock

The Company has 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"), and Series C2 redeemable convertible preferred stock (the "Series C2 Preferred Stock"). The Series A1 Preferred Stock, Series B1 Preferred Stock, Series C1 Preferred Stock, and Series C2 Preferred Stock are collectively referred to as the "Preferred Stock".

In April 2018, the Company closed the first tranche of a Series B1 Preferred Stock Agreement (the "Series B1 Agreement") with several new investors and a select group of its current investors. The Company issued and sold 45,142,425 shares of Series B1 Preferred Stock at $1.00 per share for gross proceeds of $37.1 million and the conversion of $8.0 million of principal and accrued interest from the notes issued in December 2017. The

Series B1 Agreement obligated investors to participate in the second tranche closing of Series B1 Preferred Stock (the “Milestone Closing”).

In August 2019, the holders of Series B1 Preferred Stock elected to exercise the Milestone Closing in advance of the achievement of the Milestone Closing provisions to purchase 11,750,000 shares of Series B1 Preferred Stock at a purchase price of $1.00 per share. The Company also had a supply-related milestone with one of the Series B1 Preferred Stock investors (“Second Milestone Closing”). The Second Milestone Closing was achieved in August 2019, and the investor purchased 3,125,000 shares of Series B1 Preferred Stock at a price of $1.00 per share. The gross proceeds under the Milestone Closing and Second Milestone totaled $14.9 million with issuance costs of less than $0.1 million.

In April 2020, the Company issued and sold 23,611,208 shares of Series C1 Preferred Stock and 20,301,829 shares of Series C2 Preferred Stock to new and existing investors at a price of $1.15 per share for gross proceeds of $27.2 million and $23.3 million, respectively. Additionally, the Company’s Convertible Notes, including outstanding principal and accrued interest totaling $9.5 million (see Note 9), were automatically converted into 10,351,063 shares of Series C1 Preferred Stock. The Company incurred issuance costs in connection with this transaction of $0.6 million and recorded them as a reduction to the carrying value of the Series C1 Preferred Stock and Series C2 Preferred Stock.

As of each balance sheet date, the Preferred Stock consisted of the following (in thousands, except for share data):

	December 31, 2019				
	Preferred stock authorized	Preferred stock issued and outstanding	Carrying value	Liquidation preference	Common stock issuable upon conversion
Series A1 Preferred Stock	22,563,639	18,740,115	$ 17,282	$ 20,427	3,748,022
Series B1 Preferred Stock	61,217,425	60,017,425	64,568	90,026	12,003,474
	83,781,064	78,757,540	$ 81,850	$ 110,453	15,751,496

	December 31, 2020				
	Preferred stock authorized	Preferred stock issued and outstanding	Carrying value	Liquidation preference	Common stock issuable upon conversion
Series A1 Preferred Stock	22,563,639	18,740,115	$ 18,542	$ 21,176	3,748,022
Series B1 Preferred Stock	61,217,425	60,017,425	68,511	90,026	12,003,474
Series C1 Preferred Stock	57,372,796	33,962,271	40,632	58,585	6,792,445
Series C2 Preferred Stock	20,301,829	20,301,829	24,141	35,021	4,060,365
	161,455,689	133,021,640	$ 151,826	$ 204,808	26,604,306

The holders of the Preferred Stock have the following rights and preferences:

Voting

The holders of the Preferred Stock, except for Series C2 Preferred Stock which are non-voting shares, are entitled to vote, together with the holders of common stock voting as a single class, on all matters submitted to the stockholders for a vote. Each holder of Preferred Stock, except for Series C2 Preferred Stock which are non-voting shares, is entitled to the number of votes equal to the number of shares of common stock into which each share of Preferred Stock is convertible as of the record date for determining stockholders entitled to vote on such matter.

Conversion

Each share of Preferred Stock, except for the Series C2 Preferred Stock, is convertible into shares of common stock at the option of the holder at any time after the date of issuance and without the payment of additional

consideration by the holder. Each share of the Series C2 Preferred Stock shall be convertible, at the option of the holder thereof, at any time after the date of issuance, into an equal number of shares of Series C1 Preferred Stock; provided, that, after conversion, each initial holder of Series C2 Preferred Stock would represent less than ten percent of the combined voting power of the Company's outstanding voting securities.

Each share of the Preferred Stock will be mandatorily converted upon the closing of a firm commitment underwritten public offering of the Company's common stock with gross proceeds to the Company of at least $100.0 million and at a price per share of not less than $18.00.

Notwithstanding the previous provision, no shares of Series C2 Preferred Stock shall automatically convert into any other class of capital stock of the Company unless and until the Company has authorized a sufficient number of shares of non-voting common stock to support the conversion of all such shares of Series C2 Preferred Stock into non-voting common stock. Upon the sale, assignment, transfer or other disposition of any shares of Series C2 Preferred Stock to a person or entity other than the initial holder of the Series C2 Preferred Stock, each such outstanding share of Series C2 Preferred Stock shall be automatically converted into one fully paid and non-assessable share of Series C1 Preferred Stock. Upon the occurrence of a Restriction Removal Event, defined as the holder of Series C2 Preferred Stock and the Company submitting a specified U.S. governmental body a notice or declaration concerning the proposed conversion and the governmental body takes no issue or the initial holder of the Series C2 Preferred Stock and the Company agree that such filing to with such governmental body is not necessary, each share of Series C2 Preferred Stock then outstanding shall be automatically converted into one fully paid and non-assessable share of Series C1 Preferred Stock.

The conversion ratio of each series of Preferred Stock is determined by dividing the Original Issue Price of each series by the Conversion Price of each series. The Original Issue Price per share is $1.00 for Series A1 Preferred Stock, $1.00 for Series B1 Preferred Stock, $1.15 for Series C1 Preferred Stock and $1.15 for Series C2 Preferred Stock. The Conversion Price per share is $5.00 for Series A1 Preferred Stock, $5.00 for Series B1 Preferred Stock, $5.75 for Series C1 Preferred Stock and $5.75 for Series C2 Preferred Stock, each subject to appropriate adjustment in the event of any stock split, stock dividend, combination or other similar recapitalization and other adjustments as set forth in the Company's certificate of incorporation, as amended and restated.

Dividends

From and after the date of issuance, each share of Series A1 Preferred Stock accrues a dividend at the rate of $0.04 per annum. The dividends accrue ratably on a quarterly basis, whether or not declared. The Preferred Stock accruing dividends shall be payable only when, as, and if declared by the Board of Directors and the Company shall be under no obligation to pay such Preferred Stock accruing dividends.

From and after the date of issuance, each share of Series B1 Preferred Stock accrues a dividend at the rate of $0.04 per annum. If the Series B1 Preferred Stock is not redeemed on any of the three eligible annual installments, per the redemption rights, the rate the dividend accrues is increased to $0.10 per share per annum. The dividends accrue ratably on a quarterly basis, whether or not declared. The Preferred Stock accruing dividends shall be payable only when, as, and if declared by the Board of Directors and the Company shall be under no obligation to pay such Preferred Stock accruing dividends.

From and after the date of issuance, each share of Series C1 and Series C2 Preferred Stock accrues a dividend at the rate of $0.046 per annum. If the Series C1 Preferred Stock is not redeemed on any of the three eligible annual installments, per the redemption rights, the rate the dividend accrues is increased to $0.115 per share per annum. The dividends accrue ratably on a quarterly basis, whether or not declared. The Preferred Stock accruing dividends shall be payable only when, as, and if declared by the Board of Directors and the Company shall be under no obligation to pay such Preferred Stock accruing dividends.

The holders of any Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock shall be entitled to be paid, on an equal basis, the amount due for any accrued dividends before any payment shall be made to the holders of Series A1 Preferred Stock.

Through December 31, 2020, no dividends have been declared on any series or class of stock.

Liquidation

In the event of any voluntary or involuntary liquidation, dissolution or winding up of the Company, the holders of Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock then outstanding shall be entitled to be paid out of the assets of the Company available for distribution to its stockholders, and before any payment shall be made to the holders of Series A1 Preferred Stock or common stock or any other class or series of capital stock ranking on liquidation junior to the Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock by reason of their ownership thereof, an amount equal to the greater of (i) $1.725 per share for Series C1 Preferred Stock and Series C2 Preferred Stock and $1.50 per share for Series B1 Preferred Stock, all subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the applicable series of Preferred Stock, and (ii) the sum of (x) the Original Issue Price of the applicable series of Preferred Stock, (y) any accruing dividends accrued but unpaid on the applicable series of Preferred Stock, and (z) any other dividends declared but unpaid on the applicable series of Preferred Stock (the greater of clauses (i) and (ii) for the Series C1 Preferred Stock and Series C2 Preferred Stock, the “Series C Liquidation Preference” and the greater of clauses (i) and (ii) for the Series B1 Preferred Stock, the “Series B1 Liquidation Preference”). If upon any such liquidation, dissolution or winding up of the Company, the assets of the Company available for distribution to its stockholders shall be insufficient to pay the holders of shares of Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock the full amount to which they shall be entitled, the holders of shares of Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock shall share ratably in any distribution of the assets available for distribution in proportion to the respective amounts which would otherwise be payable in respect of the shares held by them upon such distribution if all amounts payable on or with respect to such shares were paid in full.

Following the aforementioned payments to the holders of Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock, and before any payment shall be made to the holders of common stock by reason of their ownership thereof, the holders of Series A1 Preferred Stock then outstanding shall be entitled to be paid out of the assets of the Company available for distribution to its stockholders an amount equal to the sum of (x) $1.00 per share, subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the Series A1 Preferred Stock, (y) any accruing dividends accrued but unpaid on the shares of Series A1 Preferred Stock, and (z) any other dividends declared but unpaid on the Series A1 Preferred Stock (the “Series A1 Liquidation Preference” and, together with the Series B1 Liquidation Preference and Series C Liquidation Preference, the “Liquidation Preferences”). If upon any such liquidation, dissolution or winding up of the Company, the assets of the Company available for distribution to its stockholders shall be insufficient to pay the holders of shares of Series A1 Preferred Stock the full amount to which they shall be entitled, the holders of shares of Series A1 Preferred Stock shall share ratably in any distribution of the assets available for distribution in proportion to the respective amounts which would otherwise be payable in respect of the shares held by them upon such distribution if all amounts payable on or with respect to such shares were paid in full.

After the payment of the applicable Liquidation Preferences to the holders of Preferred Stock, the assets of the Company available for the distribution to it stockholders shall be distributed among such holders in the following order: (1) the Series A1 Preferred Stock and common stock, pro rata based on the number of shares held by each such holder, on an as-converted basis, until the holders of shares of Series A1 Preferred Stock have received an aggregate per share amount in respect of the Series A1 Preferred Stock equal to the Series B1 Liquidation Preference;(2) among the holders of the Series B1 Preferred Stock, Series A1 Preferred Stock and common stock, pro rata based on the number of shares held by each such holder, on an as-converted basis, , until the holders of shares of Series B1 Preferred Stock have received an aggregate per share amount in respect of the Series B1 Preferred Stock equal to the Series C Liquidation Preference; and (3) among the holders of the Series C1 Preferred Stock, Series C2 Preferred Stock, Series B1 Preferred Stock, Series A1 Preferred Stock and common stock, pro rata based on the number of shares held by each such holder, on an as-converted basis.

Redemption

Unless otherwise prohibited by Delaware law governing distribution to stockholders, shares of Preferred Stock shall be redeemed by the Company at a price equal to the Liquidation Preference applicable to each series of Preferred Stock in three annual installments commencing not more than 60 days after the receipt by the Company of written notice, at any time on or after the fifth anniversary of the Series C1 original issue date, from the requisite holders, requesting redemption of all shares of Preferred Stock. The Preferred Stock shall be redeemed in the following amounts: one-third of the amount payable based on the Liquidation Preference shall be redeemed on the first installment, 50% of the aggregate amount of the amount unpaid calculated as of the second installment, and the remaining amount due on the third installment. On each installment, holders of Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock shall receive the amounts due based on the respective Liquidation Preferences per share before any payment is made to the holders of Series A1 Preferred Stock.

The Company entered into an agreement with a holder of Series B1 Preferred Stock that includes a special redemption right in the event the Company breaches specified conditions set forth in the agreement, including covenants around specified business activities the Company may participate in, specified business activity ratios and financial ratios related to investments and indebtedness. If the Company breaches the terms of the agreement, and does not cure such breach by the date that is one year following written notice of such breach, such holder of Series B1 Preferred Stock shall have the right to redeem all shares of Preferred Stock outstanding and held by such holder at a price equal to two times the applicable original issue price, plus any applicable dividends accrued but unpaid on such shares of Preferred Stock, plus any other dividends declared but unpaid on such shares of Preferred Stock. In such event, shares of Preferred Stock shall be redeemed by the Company in three annual installments commencing not more than 60 days after the receipt by the Company of written notice, at any time on or after the fifth anniversary of the special redemption date. In the event such holder of Series B1 Preferred Stock requests such special redemption, all other holders of Preferred Stock may elect to participate in such special redemption alongside the holders of Series B1 Preferred Stock. If any holder of Preferred Stock elects not to participate in the special redemption, their shares shall not be redeemed in accordance with the special redemption.

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 has outstanding warrants to purchase shares of Preferred Stock issued in connection with previous financing agreements.

As of December 31, 2019 and 2020, warrants to purchase the following classes of preferred stock outstanding consisted of the following (in thousands, except for share and per share data):

	December 31, 2019					
Issuance date	Contractual term (in years)	Series of redeemable convertible preferred stock	Balance sheet classification	Preferred shares issuable upon exercise of warrant	Weighted average exercise price	Warrant fair value
April 24, 2017	10	Series A1	Liability	3,823,524	$ 0.01	$ 2,146
April 12, 2018	10	Series B1	Liability	1,199,994	$ 0.01	1,250
				5,023,518		$ 3,396

	December 31, 2020					
Issuance date	Contractual term (in years)	Series of redeemable convertible preferred stock	Balance sheet classification	Preferred shares issuable upon exercise of warrant	Weighted average exercise price	Warrant fair value
April 24, 2017	10	Series A1	Liability	3,823,524	$ 0.01	$ 1,875
April 12, 2018	10	Series B1	Liability	1,199,994	$ 0.01	1,501
May 14, 2020	10	Series C1	Liability	1,195,652	$ 1.15	741
				6,219,170		$ 4,117

12. Common stock and common stock warrants

As of December 31, 2019 and 2020, the Company's amended certificate of incorporation authorized the issuance of 110,000,000 shares and 175,000,000 shares, respectively, of $0.01 par value common stock.

Each share of common stock entitles the holder to one vote on all matters submitted to a vote of the Company's stockholders. The holders of common stock, voting exclusively and as a separate class, are entitled to elect one director of the Company. 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 December 31, 2019 and 2020, no cash dividends had been declared or paid.

As of December 31, 2019 and 2020, the Company had reserved 19,832,077 and 32,574,029 shares, respectively, of common stock for the conversion of the outstanding Preferred Stock, exercise of outstanding stock options, the number of shares remaining available for grant under the Company's 2010 Stock Incentive Plan (see Note 13) and the exercise of outstanding warrants to purchase shares of common stock (see Note 11).

In prior years the Company issued warrants to purchase common stock in conjunction with previous financing arrangements. As of December 31, 2019 and 2020, warrants to purchase the common stock outstanding consisted of the following (in thousands, except for share and per share data):

	December 31, 2019			
Issuance date	Contractual term	Balance sheet classification	Shares of common stock issuable upon exercise of warrant	Weighted average exercise price
	(in years)			
July 24, 2017	10	Equity	25,838	$ 295.95
April 12, 2018	10	Equity	30,000	$ 1.00
			55,838	

	December 31, 2020			
Issuance date	Contractual term	Balance sheet classification	Shares of common stock issuable upon exercise of warrant	Weighted average exercise price
	(in years)			
July 24, 2017	10	Equity	25,835	$ 295.15
April 12, 2018	10	Equity	30,000	$ 1.00
			55,835	

13. Stock-based compensation

2010 stock option and grant plan

The Company's 2010 Stock Option and Grant Plan (the "2010 Plan") provides 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.

At December 31, 2019, shares of common stock that may be issued under the 2010 Plan was 3,036,362. In April 2020, the Board of Directors approved an increase to the 2010 Plan shares by 1,909,421 shares. At December 31, 2020, shares of common stock that may be issued under the 2010 Plan shares was 4,945,783. As of December 31, 2019 and 2020, 240,463 shares and 1,065,501 shares, respectively, remained available for future grant under the 2010 Plan. Shares that are expired, forfeited, canceled or otherwise terminated without having been fully exercised will be available for future grant under the 2010 Plan. In addition, shares of common stock that are tendered to the Company by a participant to exercise an award are added to the number of shares of common stock available for future grants.

The 2010 Plan is administered by the Board of Directors or, at the discretion of the Board of Directors, by a committee of the board of directors. The exercise prices, vesting and other restrictions are determined at the discretion of the Board of Directors, or its committee if so delegated, except that the exercise price per share of stock options may not be less than 100% of the fair market value of a share of common stock on the date of grant and the term of the stock option may not be greater than ten years. Stock options granted to employees, officers, members of the Board of Directors and consultants typically vest over a four-year period. The Company's board of directors values the Company's common stock, taking into consideration its most recently available valuation of common stock performed by third parties as well as additional factors which may have changed since the date of the most recent contemporaneous valuation through the date of grant.

During the years ended December 31, 2019 and 2020, the Company granted to employees, officers and directors options to purchase 383,131 shares and 1,347,000 shares, respectively, of common stock. The Company recorded stock-based compensation expense for options granted to employees, officers, and directors of $0.5 million during each of the years ended December 31, 2019 and 2020.

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:

	Year ended December 31,	
	2019	**2020**
Risk-free interest rate	2.0%	0.4%
Expected term (in years)	6.0	6.0
Expected volatility	36.8%	42.4%
Expected dividend yield	0%	0%

Stock options

The following table summarizes the Company's stock option activity since December 31, 2019 (in thousands, except for share and per share data):

	Number of shares	Weighted average exercise price	Weighted average remaining contractual term (in years)	Aggregate intrinsic value
Outstanding as of December 31, 2019	2,779,583	$ 1.15	8.48	$ —
Granted	1,347,000	0.76		
Exercised	(259,385)	0.99		
Expired	(54,373)	1.38		
Forfeited	(208,241)	0.95		
Outstanding as of December 31, 2020	3,604,584	$ 0.91	8.12	$ 4,272
Options vested and expected to vest as of December 31, 2019	2,779,583	$ 1.15	8.48	$ 260
Options exercisable as of December 31, 2019	1,105,236	$ 1.35	8.25	$ 108
Options vested and expected to vest as of December 31, 2020	3,604,584	$ 0.91	8.12	$ 4,272
Options exercisable as of December 31, 2020	1,591,655	$ 0.98	7.24	$ 1,777

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 common stock for those options that had exercise prices lower than the fair value of the Company's common stock.

The intrinsic value of stock options exercised during the years ended December 31, 2019 and 2020 was less than $0.1 million and zero, respectively.

The weighted average grant-date fair value per share of stock options granted during the year ended December 31, 2019 and 2020 was $0.72 and $0.55, respectively.

Stock-based compensation

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

	Year ended December 31,	
	2019	2020
Cost of revenue	$ —	$ 47
General and administrative	473	378
Sales and marketing	—	58
Research and development	—	50
Total stock-based compensation expense	$ 473	$ 533

As of December 31, 2020, total unrecognized compensation expense related to unvested stock options held by employees and directors was $1.2 million, which is expected to be recognized over weighted average period of 1.4 years.

14. Income taxes

The components of the Company's loss before income tax expense are as follows (in thousands):

	Year ended December 31,	
	2019	2020
United States	$ (20,854)	$ (37,049)
Foreign	110	105
Loss before income tax provision	$ (20,744)	$ (36,944)

The components of income tax expense are as follows (in thousands):

	Year ended December 31,	
	2019	2020
Current income tax provision:		
Federal	$ —	$ —
State	—	54
Foreign	427	80
Total current income tax provision	427	134
Deferred income tax benefit:		
Federal	(4,532)	(7,455)
State	(2,510)	(282)
Foreign	—	—
Total deferred income tax benefit	(7,042)	(7,737)
Change in deferred tax asset valuation allowance	7,042	7,737
Total provision for income taxes	$ 427	$ 134

During the years ended December 31, 2019 and 2020, the Company did not record income tax benefits for the net operating losses incurred or for the research and development tax credits generated in each year, due to its uncertainty of realizing a benefit from those items. A reconciliation of the U.S. federal statutory income tax rate to the Company's effective income tax rate is as follows:

	Year ended December 31,	
	2019	2020
Federal statutory income tax rate	21.0%	21.0%
State income taxes, net of federal benefit	9.4	0.5
Federal and state research and development tax credits	1.2	0.9
Unrecognized tax benefits reserve and interest change	(2.1)	(0.2)
Change in valuation allowance	(31.4)	(20.8)
Permanent differences	(0.2)	(0.3)
Loss on extinguishment of debt	—	(1.2)
Other	(0.1)	(0.3)
Effective income tax rate	(2.2)%	(0.4)%

Net deferred tax assets consisted of the following (in thousands):

	December 31,	
	2019	2020
Deferred tax assets:		
Net loss carryforwards	$ 45,065	$ 52,624
Research and development tax credit carryforwards	5,019	5,425
Research and development capitalized costs	3,568	3,636
Inventory	171	148
Accrued expenses	540	644
Depreciation	317	—
Other	96	88
Total deferred tax assets	54,776	62,565
Deferred tax liabilities:		
Depreciation	—	(52)
Total deferred tax liabilities	—	(52)
Net deferred tax assets	54,776	62,513
Valuation allowance	(54,776)	(62,513)
Net deferred tax assets	$ —	$ —

As of December 31, 2020, the Company had U.S. federal and state net operating loss (“NOL”) carryforwards of $212.5 million and $106.7 million, respectively, which may be available to offset future taxable income and begin to expire at various dates beginning in 2027 and 2025, respectively. Additionally, the Company had federal NOLs of $78.2 million generated since 2018 that will never expire. The Tax Cuts and Jobs Act (TCJA) enacted on December 22, 2017 limits a taxpayer’s ability to utilize an NOL deduction in a year to 80% taxable income for federal NOL arising in tax years beginning after 2017. The Coronavirus Aid, Relief, and Economic Security (CARES) Act enacted on March 27, 2020 removes the 80% taxable income limitation for federal NOL deductions in taxable years before January 1, 2021.

As of December 31, 2020, the Company also had U.S. federal and state research and development tax credit carryforwards of $3.1 million and $2.0 million, respectively, which may be available to offset future tax liabilities and begin to expire in 2028 and 2024, respectively.

Utilization of the U.S. federal and state NOL carryforwards and research and development tax credit carryforwards may be subject to a substantial annual limitation under Sections 382 and 383 of the Internal Revenue Code of 1986, and corresponding provisions of state law, due to ownership changes that have occurred previously or that could occur in the future. These ownership changes may limit the amount of carryforwards that can be utilized annually to offset future taxable income or tax liabilities. In general, an ownership change, as defined by Section 382, results from transactions increasing the ownership of certain stockholders or public groups in the stock of a corporation by more than 50% over a three-year period. The Company is in the process of conducting a study to assess whether a change of control has occurred or whether there have been multiple changes of control since inception due to the significant complexity and cost associated with such a study. If the Company has experienced a change of control, as defined by Section 382, at any time since inception, utilization of the NOL carryforwards or research and development tax credit carryforwards would be subject to an annual limitation under Section 382, which is determined by first multiplying the value of the Company’s stock at the time of the ownership change by the applicable long-term tax-exempt rate, and then could be subject to additional adjustments, as required. Any limitation may result in expiration of a portion of the net operating loss NOL carryforwards or research and development tax credit carryforwards before utilization. Further, until a study is completed by the Company and any limitation is known, no amounts are being presented as an uncertain tax position.

The Company has evaluated the positive and negative evidence bearing upon its ability to realize the deferred tax assets. The Company considered its history of cumulative net operating losses incurred since inception and has concluded that it is more likely than not that the Company will not realize the benefits of the deferred tax assets. Accordingly, a full valuation allowance has been established against the net deferred tax assets as of December 31, 2019 and 2020. The Company reevaluates the positive and negative evidence at each reporting period.

Changes in the valuation allowance for deferred tax assets relates primarily to the increase in NOL carryforwards and research and development tax credit carryforwards and were as follows (in thousands):

	December 31,	
	2019	2020
Valuation allowance as of beginning of year	$47,733	$54,776
Increases recorded to income tax provision	8,502	8,802
Decreases recorded as a benefit to income tax provision	(1,459)	(1,065)
Valuation allowance as of end of year	$54,776	$62,513

A reconciliation of the beginning and ending amount of unrecognized tax benefits is as follows (in thousands):

	December 31,	
	2019	2020
Unrecognized tax benefits as of beginning of year	$151	$532
Additions for tax positions of prior years	425	37
Reductions for tax positions of prior years	(44)	—
Unrecognized tax benefits as of end of year	$532	$569

The Company recognizes interest and penalties related to unrecognized tax benefits in U.S. Federal, state, and foreign income tax expense. For the each of years ended December 31, 2019, and 2020, the Company recognized less than $0.1 million in interest and penalties. The Company had approximately $0.1 million of interest and penalties accrued as of both December 31, 2019 and 2020.

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 is under examination in its local country for the years ended December 31, 2016 through the year ended December 31, 2018. Any adjustments that may result from the examinations are not expected to have a material impact on the financial position, liquidity, or results of operations of the Company.

15. Net loss per share

Net loss per share attributable to the common stockholders.

Basic and diluted net loss per share attributable to common stockholders was calculated as follow (in thousands, except share and per share amounts):

	Year ended December 31,	
	2019	2020
Numerator:		
Net loss	$ (21,171)	$ (37,078)
Accretion of redeemable convertible preferred stock to redemption value	(2,745)	(3,745)
Cumulative redeemable convertible preferred stock dividends	(2,704)	(4,398)
Net loss attributable to common stockholders—basic and diluted	$ (26,620)	$ (45,221)
Denominator:		
Weighted average common shares outstanding—basic and diluted	346,978	358,582
Net loss per share attributable common stockholders—basic and diluted	$ (76.72)	$ (126.11)

The Company's potentially dilutive securities, which include stock options, 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:

	Year ended December 31,	
	2019	2020
Options to purchase common stock	2,779,583	3,604,581
Warrants to purchase common stock	55,838	55,835
Redeemable convertible preferred stock (as converted to common stock)	15,751,496	26,604,306
Warrants to purchase preferred stock (as converted to warrants to purchase common stock)	1,004,697	1,243,827
	19,591,614	31,508,549

16. Commitments and contingencies

Lease agreements

In October 2013, the Company entered into an operating lease for office and manufacturing space in in Lowell, Massachusetts, which expires in July 2026. The terms of the lease include options for a one-time, five-year extension of the lease and early termination of the lease in July 2024 as well as a $0.7 million tenant improvement allowance, which was fully utilized as of December 31, 2020.

The Company recognizes rent expense on a straight-line basis over the respective lease period. The Company has recorded deferred rent for rent expense incurred but not yet paid. Rent expense was $0.5 million and $0.4 million for the years ended December 31, 2019 and 2020, respectively.

Future minimum lease commitments under operating leases as of December 31, 2020 are as follows (in thousands):

Year ending December 31,	
2021	$ 441
2022	454
2023	468
2024	481
2025	494
Thereafter	293
Total	$2,631

Exit fee

In December 2016, in connection with the amendment of a then-outstanding loan agreement with the lender, the Company entered into an agreement under which it is obligated to pay the lender an exit fee in the amount of $0.8 million in the event of a qualifying exit event prior to December 31, 2026. A qualifying event is defined as any (i) liquidation, dissolution or winding up whether voluntary or involuntary; (ii) consolidation, merger or reverse merger; (iii) sale, lease, transfer, exclusive license, exchange, dividend or other disposition of all or substantially all of the Company's assets; (iv) issuance and/or sale of the Company's stock that is greater than 50% of the shares of common stock immediately following such issuance; (v) any other form of acquisition or business combination that results in a change of control at the Company; or (vi) the consummation of any public offering of shares of common stock. There were no amounts accrued for the exit fee as of December 31, 2019 or 2020, as the occurrence of a qualifying exit event was not deemed probable.

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 December 31, 2020, the Company had committed to minimum payments under these arrangements totaling $0.9 million through December 31, 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 $0.1 million accrued for the supply agreement as of December 31, 2020.

Software subscription

During the year-ended December 31, 2020, the Company entered into a non-cancelable agreement with a service provider for software as a service and cloud hosting services. As of December 31, 2020, the Company had committed to minimum payments under these arrangements totaling $1.1 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. There were no amounts accrued for the software subscription as of December 31, 2020.

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 consolidated financial statements as of December 31, 2019 or 2020.

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 such legal proceedings.

17. 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 $0.1 million and $0.2 million to the plan during the years ended December 31, 2019 and 2020, respectively.

18. Subsequent events

For its consolidated financial statements as of December 31, 2020, and for the year then ended, the Company evaluated subsequent events through March 22, 2021, the date on which those financial statements were issued and, with respect to the reverse share split described below, through July 12, 2021.

In March 2021, the Company closed a Series D1 and D2 Preferred Stock Purchase Agreement with new investors and current investors. The Company raised $81.0 million and issued 22,086,725 shares of Series D1 Preferred Stock and 413,268 shares of Series D2 Preferred Stock at a purchase price of $3.60 per share. Dividends will be paid on the Series D1 and D2 preferred stock on an as converted basis when, as, and if paid on the Common Stock. In the event of a liquidation, the Series D1 and D2 stockholders earn dividends on an as converted basis if paid on common stock. The Series D1 and Series D2 preferred stockholders have liquidation preferences equal to Series B1, C1, and C2 preferred stock and senior to existing Series A1 Preferred Stock and Common Stock. Series D1 preferred stockholders are entitled to the voting rights consistent with those of the Series A1, Series B1, and Series C1 preferred stockholders. The Series D2 preferred stockholders do not have voting rights.

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 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.

Events subsequent to original issuance of consolidated financial statements (unaudited)

In April 2021, the Company's contract with BARDA was modified resulting in an increase in the contract value of up to $1.0 million, an increase in the cost share reimbursement rate and specification of various developmental milestones.

In June 2021, the Company entered into a Sublease agreement for office and manufacturing space in Lexington, Massachusetts, which expires in June 2029. The Sublease agreement includes an option to terminate the sublease in July 2026, subject to an early termination fee. Monthly rent payments are fixed and future minimum lease payments over the term of the sublease is $5.6 million. The Company also has the right to use furniture and equipment specified in the Sublease agreement for $0.6 million in future payments over the term of the sublease with the option to purchase the furniture and equipment at the end of the sublease term. Concurrent with entering into the Sublease agreement, the Company executed an Option Agreement with the property owner

which provides the Company the option to enter into a new direct lease for the Lexington facility for an additional five-years following expiration of the sublease.

On June 25, 2021, the Company filed an amended and restated certificate of incorporation, which effected 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. Additionally, on June 25, 2021, a certain number of investors exchanged Series C1 and D1 Preferred Stock to Series C2 and D2 Preferred Stock.

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

	December 31, 2020	March 31, 2021
Assets		
Current assets:		
Cash and cash equivalents	$ 30,079	$ 108,635
Short-term investments	14,998	5,000
Accounts receivable	4,988	3,724
Inventory	8,965	9,777
Prepaid expenses and other current assets	3,120	2,733
Total current assets	62,150	129,869
Property and equipment, net	7,052	6,959
Other long-term assets	695	682
Deferred offering costs	—	1,306
Restricted cash	100	100
Total assets	$ 69,997	$ 138,916
Liabilities, Redeemable Convertible Preferred Stock and Stockholders' Deficit		
Current liabilities:		
Accounts payable	$ 4,468	$ 2,871
Accrued expenses and other current liabilities	6,654	6,474
Deferred revenue	4,423	5,140
Total current liabilities	15,545	14,485
Preferred stock warrant liability	4,117	15,565
Notes payable, net of unamortized discount	24,810	24,884
Deferred rent, long term	705	674
Other long-term liabilities	—	523
Total liabilities	45,177	56,131
Commitments and contingencies (Note 16)		
Redeemable convertible preferred stock (Series A1, B1, C1, C2, D1, and D2), $0.01 par value; 161,455,689 shares and 184,368,950 shares authorized at December 31, 2020 and March 31, 2021, respectively; 133,021,640 shares and 155,521,633 shares issued and outstanding at December 31, 2020 and March 31, 2021, respectively; liquidation preference of $285,995 at March 31, 2021	151,826	233,832
Stockholders' equity (deficit):		
Common stock, $0.01 par value; 35,000,000 shares and 40,000,000 shares authorized at December 31, 2020 and March 31, 2021, respectively; 612,850 shares and 929,171 shares issued and outstanding at December 31, 2020 and March 31, 2021, respectively	6	9
Additional paid-in capital	114,575	112,632
Accumulated deficit	(241,588)	(263,689)
Accumulated other comprehensive income	1	1
Total stockholders' deficit	(127,006)	(151,047)
Total liabilities, redeemable convertible preferred stock and stockholders' deficit	$ 69,997	$ 138,916

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

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

	Three months ended March 31,	
	2020	2021
Revenue:		
Product revenue	$ 1,188	$ 3,718
Service revenue	410	1,067
Non-commercial revenue	1,401	210
Total revenue	2,999	4,995
Costs and operating expenses:		
Cost of product revenue	3,212	5,510
Cost of service revenue	951	1,137
Cost of non-commercial revenue	797	414
Research and development	1,438	2,147
Sales and marketing	1,466	2,275
General and administrative	2,371	3,203
Total costs and operating expenses	10,235	14,686
Loss from operations	(7,236)	(9,691)
Other income (expense):		
Interest expense	(763)	(932)
Change in fair value of preferred stock warrant liability	5	(11,448)
Other income (expense), net	7	(11)
Total other income (expense), net	(751)	(12,391)
Loss before income taxes	(7,987)	(22,082)
Income tax expense	20	19
Net loss	(8,007)	(22,101)
Accretion of redeemable convertible preferred stock to redemption value	(818)	(787)
Cumulative redeemable convertible preferred stock dividends	(788)	(1,411)
Net loss attributable to common stockholders — basic and diluted	$ (9,613)	$ (24,299)
Net loss per share attributable to common stockholders — basic and diluted	$ (27.20)	$ (37.89)
Weighted average common shares outstanding — basic and diluted	353,465	641,371

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

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

	Three months ended March 31,	
	2020	2021
Net loss	$ (8,007)	$ (22,101)
Other comprehensive income:		
Unrealized gain on short-term investments, net of tax	—	—
Comprehensive loss	$ (8,007)	$ (22,101)

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

RAPID MICRO BIOSYSTEMS, INC.
Condensed consolidated statements of redeemable convertible preferred stock and stockholders' deficit
(In thousands, except share amounts)
(Unaudited)

	Redeemable convertible preferred stock		Common stock		Additional paid-in capital	Accumulated deficit	Accumulated other comprehensive income	Total stockholders' deficit
	Shares	Amount	Shares	Amount				
Balances at January 1, 2020	78,757,540	$ 81,850	353,465	$ 4	$ 121,931	$ (204,510)	—	$ (82,575)
Accretion of redeemable convertible preferred stock to redemption value	—	818	—	—	(818)	—	—	(818)
Cumulative redeemable convertible preferred stock dividends	—	788	—	—	(788)	—	—	(788)
Stock-based compensation expense	—	—	—	—	120	—	—	120
Net loss	—	—	—	—	—	(8,007)	—	(8,007)
Balances at March 31, 2020	78,757,540	$ 83,456	353,465	$ 4	$ 120,445	$ (212,517)	$—	$ (92,068)
Balances at January 1, 2021	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 $1,174	22,086,725	78,338	—	—	—	—	—	—
Issuance of Series D2 redeemable convertible preferred stock, net of issuance costs of $18	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 common stock upon exercise of stock options	—	—	67,418	1	66	—	—	67
Issuance of restricted common stock award	—	—	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)

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

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

	Three months ended March 31,	
	2020	2021
Cash flows from operating activities:		
Net loss	$ (8,007)	$ (22,101)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization expense	474	344
Stock-based compensation expense	120	191
Change in fair value of preferred stock warrant liability	(5)	11,448
Noncash interest expense	316	139
Other, net	—	(3)
Changes in operating assets and liabilities		
Accounts receivable	1,209	1,264
Inventory	(1,004)	(812)
Prepaid expenses and other current assets	(166)	324
Other long-term assets	(1,002)	13
Accounts payable	(1,095)	(1,974)
Accrued expenses and other current liabilities	58	(781)
Deferred revenue	749	717
Deferred rent, long-term	38	(31)
Net cash used in operating activities	(8,315)	(11,262)
Cash flows from investing activities:		
Purchases of property and equipment	(79)	(251)
Maturity of investments	—	10,000
Net cash (used in) provided by investing activities	(79)	9,749
Cash flows from financing activities:		
Proceeds from issuance of redeemable convertible preferred stock, net of issuance costs	—	79,808
Proceeds from issuance of common stock upon option exercise	—	67
Proceeds from issuance of restricted stock award	—	523
Proceeds from issuance of convertible notes	9,500	—
Payments of debt issuance costs	—	—
Payment of deferred offering costs	—	(329)
Net cash provided by financing activities	9,500	80,069
Net increase in cash, cash equivalents and restricted cash	1,106	78,556
Cash, cash equivalents and restricted cash at beginning of period	12,611	30,179
Cash, cash equivalents and restricted cash at end of period	$ 13,717	$ 108,735

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

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

	Three months ended March 31,	
	2020	2021
Supplemental disclosure of cash flow information		
Cash paid for interest	$ 297	$ 339
Supplemental disclosure of non-cash investing activities		
Purchases of property and equipment in accounts payable	$ 99	$ —
Supplemental disclosure of non-cash financing activities		
Initial fair value of derivative liability	$ 2,375	$ —
Deferred offering costs included in accounts payable and accrued expenses	$ —	$ 978
Accretion of redeemable convertible preferred stock to redemption value	$ 818	$ 787
Cumulative redeemable convertible preferred stock dividends	$ 788	$ 1,411

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.

The Company is subject to risks and uncertainties common to companies in the pharmaceutical and biotech quality control laboratory testing and instrumentation industry including, but not limited to, the successful development, commercialization, marketing and sale of products, fluctuations in operating results and financial risks, protection of proprietary knowledge and patent risks, dependence on key personnel, competition, technological and medical risks, customer demand, compliance with governmental regulations and management of growth. Potential risks and uncertainties also include, without limitation, uncertainties regarding the duration and magnitude of the impact of the COVID-19 pandemic on the Company's business and the economy in general. Products currently under development will require additional research and development efforts prior to commercialization and will require additional capital and adequate personnel and infrastructure. The Company's research and development may not be successfully completed, adequate protection for the Company's technology may not be obtained, the Company may not obtain necessary government regulatory approval, and approved products may not prove commercially viable. The Company operates in an environment of rapid change in technology and competition.

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 will likely continue to be extensive in many aspects of society, which has resulted in and will likely 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 COVID-19 coronavirus outbreak 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 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 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, a prolonged pandemic could lead to shortages in the raw materials necessary to manufacture its products.

Basis of presentation

The accompanying unaudited condensed consolidated financial statements have been prepared in accordance with generally accepted accounting principles in the United States ("GAAP") regarding interim financial reporting

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, 2020. 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 accompanying condensed consolidated balance sheet as of March 31, 2021 and the condensed consolidated statements of operations, comprehensive loss, redeemable convertible preferred shares and shareholders' deficit, and of cash flows for the three months ended March 31, 2020 and 2021 are unaudited. 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 March 31, 2021 and the results of its operations and its cash flows for the three months ended March 31, 2020 and 2021. The financial data and other information disclosed in these notes related to the three months ended March 31, 2020 and 2021 are also unaudited. The results for the three months ended March 31, 2021 are not necessarily indicative of results to be expected for the year ending December 31, 2021, any other interim periods, or any future year or period.

These unaudited interim condensed consolidated financial statements should be read in conjunction with the audited annual consolidated financial statements as of December 31, 2019 and 2020 and for each of the two years in the period ended December 31, 2020.

Going concern

The Company has evaluated whether there are certain conditions and events, considered in the aggregate, that raise substantial doubt about the Company's ability to continue as a going concern within one year after the date that the condensed consolidated financial statements are issued.

Through March 31, 2021, the Company has funded its operations primarily with proceeds from product, service and non-commercial revenue, proceeds from sales of its redeemable convertible preferred stock, including borrowings under convertible debt arrangements that subsequently converted into redeemable convertible preferred stock, and proceeds from the issuance of term loans. The Company has incurred recurring losses since its inception, including net losses of $8.0 million and $22.1 million for three months ended March 31, 2020 and 2021, respectively. As of March 31, 2021, the Company had an accumulated deficit of $263.7 million. The Company expects to continue to generate significant operating losses for the foreseeable future. As of May 6, 2021, the date these interim condensed consolidated financial statements were available for issuance, the Company expects that its existing cash and cash equivalents, and short-term investments, will be sufficient to fund its operating expenses and capital expenditure requirements for at least twelve months following the date these condensed consolidated financial statements were available to be issued. The future viability of the Company beyond that point is dependent on its ability to raise additional capital to finance its operations.

The Company is seeking to complete an initial public offering ("IPO") of its common stock. In the event the Company does not complete an IPO, the Company expects to seek additional funding through private equity financing, debt financing, or other capital sources, including government funding arrangements or other strategic transactions. The Company may not be able to obtain financing on acceptable terms, or at all, and the terms of any financing may adversely affect the holdings or the rights of the Company's stockholders.

If the Company is unable to obtain funding, the Company will be required to delay, reduce or eliminate some or all of its research and development programs, product expansion or commercialization efforts, or the Company may be unable to continue operations. Although management continues to pursue these financing plans, there is

no assurance that the Company will be successful in obtaining sufficient funding on terms acceptable to the Company to fund continuing operations, if at all.

The condensed consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty. Accordingly, the condensed consolidated financial statements have been prepared on a basis that assumes the Company will continue as a going concern and which contemplates the realization of assets and satisfaction of liabilities and commitments in the ordinary course of business.

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 as of May 6, 2021, the date the condensed consolidated financial statements were available to be issued. 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 disclosed in Note 2 of the audited consolidated financial statements as of December 31, 2019 and 2020 and for the years ended December 31, 2019 and 2020.

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 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 with financial institutions that management believes to be of high credit quality. The Company has not experienced any losses on such accounts and does not believe it is exposed to any unusual credit risk beyond the normal credit risk associated with commercial banking relationships. 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 March 31,	
	2020	2021
Customer A	46.7%	18.7%
Customer B	20.5%	*
Customer C	*	17.5%
Customer D	*	16.1%
	67.2%	52.3%

* – less than 10%

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

	December 31, 2020	March 31, 2021
Customer A	10.1%	23.6%
Customer B	*	*
Customer C	*	14.9%
Customer D	18.7%	12.9%
Customer E	41.9%	*
Customer F	13.4%	*
Customer G	*	18.0%
	84.1%	69.4%

* – less than 10%

The Company relies on third parties for the supply and manufacture of its products as well as third-party logistics providers. In instances where these parties fail to perform their obligations, the Company may be unable to find alternative suppliers to satisfactorily deliver its products to its customers on time, if at all, which could have a material adverse effect on the Company's operating results, financial condition and cash flows and damage its customer relationships. There are no significant concentrations around a single third-party supplier or manufacturer for the year ended December 31, 2020 or the three months ended March 31, 2021.

Deferred offering costs

The Company capitalizes certain legal, accounting and other third-party fees that are directly associated with in-process equity financings as deferred offering costs until such financings are consummated. After consummation of an equity financing, these costs are recorded in stockholders' deficit as a reduction of additional paid-in capital generated as a result of the offering or as a reduction to the carrying value of redeemable convertible preferred stock. If the in-process equity financing is abandoned, the deferred offering costs will be expensed immediately as a charge to operating expenses in the consolidated statements of operations. As of December 31, 2020 and March 31, 2021, the Company had $0.1 million and $1.3 million, respectively, in deferred offering costs in the consolidated balance sheets.

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 consolidated balance sheets and amortized as interest expense on the consolidated statement of operations using the effective interest method, which approximates straight-line method. As of December 31, 2020 and March 31, 2021, debt issuance costs totaled $1.3 million. During the three months ended March 31, 2020 and 2021, the Company recorded $0.2 million and $0.1 million, respectively in amortization of the debt issuance costs recorded within interest expense in the consolidated statement 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 both December 31, 2020 and March 31, 2021, the Company held cash of $0.1 million in banks located outside of the U.S.

Restricted cash

As of December 31, 2020 and March 31, 2021, the Company was required to maintain guaranteed investment certificates of $0.1 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.

Accounts receivable

Accounts receivables are customer obligations that are unconditional. Accounts receivables are presented net of an allowance for doubtful accounts, which represents an estimate of amounts that may not be collectible. The Company performs ongoing credit evaluations of its customers and, if necessary, provides an allowance for doubtful accounts and expected losses. The Company writes off accounts receivable against the allowance when it determines a balance is uncollectible and no longer actively pursues collection of the receivable. The Company does not have any off-balance-sheet credit exposure related to customers. As of December 31, 2020 and March 31, 2021, the Company did not record an allowance for doubtful accounts.

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 investments, and its redeemable convertible preferred stock warrant liability 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. The carrying value of the Company's long-term debt approximates its fair value (a level 2 measurement) at each balance sheet date due to its variable interest rate, which approximates a market interest rate.

Product warranties

The Company offers a one-year limited standard assurance warranty on System sales, which is included in the selling price. The accrued warranty cost is based on estimated material, labor and other costs that the Company

expects to incur to fulfill the warranty obligation. The warranty accrual is included in accrued expenses and other current liabilities in the consolidated balance sheets. The following table presents a summary of changes in the amount reserved for warranty cost (in thousands):

	Three months ended March 31,	
	2020	2021
Balance, beginning of the period	$ 848	$ 637
Warranty provisions	1	—
Warranty repairs	(86)	(19)
Balance, end of the period	$ 763	$ 618

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 $0.5 million in contract assets as of December 31, 2020 and March 31, 2021, included in prepaid expenses and other current assets. These balances primarily relate to the BARDA agreement.

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 December 31, 2020 or March 31, 2021. Deferred revenue was $4.4 million and $5.1 million at December 31, 2020 and March 31, 2021, respectively. Revenue recognized during the three months ended March 31, 2020 and 2021, that was included in deferred revenue at the prior year end was $0.4 million and $1.2 million, respectively.

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 March 31,	
	2020	2021
Product and service revenue — recurring	$ 859	$ 1,606
Product and service revenue — non-recurring	739	3,179
Non-commercial revenue — non-recurring	1,401	210
Total revenue	$ 2,999	$ 4,995

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

	Three months ended March 31,	
	2020	2021
United States	$ 1,678	$ 2,329
Germany	502	325
Switzerland	406	1,041
Rest of world	413	1,300
Total revenue	$ 2,999	$ 4,995

Advertising costs

Advertising costs are expensed as incurred and are included in sales and marketing expenses in the consolidated statements of operations. Advertising costs were less than $0.1 million during each of the three months ended March 31, 2020 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.

The Company measures all restricted common stock 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 December 31, 2020 and March 31, 2021, the Company has zero and $0.5 million, respectively, in unvested restricted common stock liability included in other long-term liabilities.

Comprehensive loss

Comprehensive loss includes net loss as well as other changes in stockholders' deficit that result from transactions and economic events other than those with stockholders. The Company did not have comprehensive income or loss for the three months ended March 31, 2020 and 2021.

Recently adopted accounting pronouncements

In August 2018, the FASB issued ASU No. 2018-15, Intangibles — Goodwill and Other — Internal-Use Software (Topic 35): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement that is a Service Contract, which requires capitalizing implementation costs incurred to develop or obtain internal-use software (and hosting arrangements that include an internal-use software license). For public business entities

the guidance is effective for fiscal years beginning after December 15, 2020, and all interim periods beginning after December 15, 2021. The Company adopted this guidance effective on January 1, 2021 and adoption did not have an impact on the condensed consolidated financial statements and related disclosure.

Recently issued accounting pronouncements

The Company qualifies as “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. For public business entities except smaller reporting companies, the guidance is effective for annual reporting periods beginning after December 15, 2019 and for interim periods within those fiscal years. For non-public entities and smaller reporting companies, the guidance was effective for annual reporting periods beginning after December 15, 2021. In November 2019, the FASB issued ASU No. 2019-10, which deferred the effective date for non-public entities to annual reporting periods beginning after December 15, 2022, including interim periods within those fiscal years. Early application is allowed. 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.

In February 2016, the FASB issued ASU No. 2016-02, Leases (Topic 842) (“ASU 2016-02”), which sets out the principles for the recognition, measurement, presentation and disclosure of leases for both parties to a contract (i.e., lessees and lessors). The new standard requires lessees to apply a dual approach, classifying leases as either finance or operating leases based on the principle of whether or not the lease is effectively a financed purchase by the lessee. This classification will determine whether lease expense is recognized based on an effective interest method or on a straight-line basis over the term of the lease. A lessee is also required to record a right-of-use asset and a lease liability for all leases with a term of greater than 12 months regardless of their classification. Leases with a term of 12 months or less may be accounted for similar to existing guidance for operating leases today. For public business entities, ASU 2016-02 is effective for annual reporting periods beginning after December 15, 2018, including interim periods within those fiscal years, and early adoption is permitted.

For nonpublic entities, this guidance is effective for annual periods beginning after December 15, 2021. The Company expects to adopt this guidance effective January 1, 2022, and it is currently evaluating the impact on its condensed consolidated financial statements and related disclosures.

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. For public business entities the guidance is effective for annual reporting periods beginning after December 15, 2020 and for interim periods within those fiscal years. For non-public entities, the guidance is effective for annual reporting periods beginning after December 15, 2021 and for interim periods within years beginning after December 15, 2022, with early adoption permitted. The Company expects to adopt this guidance effective January 1, 2022, and it is currently evaluating the impact on its condensed consolidated financial statements and related disclosures.

In August 2020, the FASB issued ASU 2020-06, "Debt — Debt with Conversion and Other Options (Subtopic 470-20)" and "Derivatives and Hedging-Contracts in Entity's Own Equity (Subtopic 815-40): Accounting for Convertible instruments and contracts in an Entity's Own Equity", which simplifies the accounting for certain financial instruments with characteristics of liabilities and equity, including convertible instruments and contracts on an entity's own equity. ASU 2020-06 is effective for the Company for fiscal years beginning after December 15, 2023, and interim periods within those fiscal years. Early adoption is permitted for fiscal years beginning after December 15, 2020, and interim periods within those fiscal years. Adoption is applied on a modified or full retrospective transition approach. The Company is currently evaluating the adoption date and impact, if any, adoption will have 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 December 31, 2020			
	Level 1	Level 2	Level 3	Total
Assets				
Cash equivalents	$ 23,456	$ —	$ —	$ 23,456
Short-term investments	14,998	—	—	14,998
	$ 38,454	$ —	$ —	$ 38,454
Liabilities				
Preferred stock warrant liability	$ —	$ —	$ 4,117	$ 4,117
	$ —	$ —	$ 4,117	$ 4,117

	Fair value measurements at March 31, 2021			
	Level 1	Level 2	Level 3	Total
Assets				
Cash equivalents	$104,457	$—	$ —	$104,457
Short-term investments	5,000	—	—	5,000
	$109,457	$—	$ —	$109,457
Liabilities				
Preferred stock warrant liability	$ —	$—	$15,565	$ 15,565
	$ —	$—	$15,565	$ 15,565

During the three months ended March 31, 2021, there were no transfers between Level 1, Level 2 and Level 3.

Valuation of short-term investments

U.S. Treasury bonds 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.

Valuation of preferred stock warrant liability

The warrant liability is related to the warrants (the "Warrants") to purchase shares of the Company's Series A1, B1, and C1 redeemable convertible preferred stock (see Note 11). 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 (iv) 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 Warrants. 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 Warrants.

The table below quantifies the weighted average of the unobservable inputs used to fair value the preferred stock warrant liability:

	Three months ended March 31,	
	2020	2021
Fair value of Series A1 preferred stock	$ 0.56	$ 2.51
Fair value of Series B1 preferred stock	$ 1.04	$ 2.88
Fair value of Series C1 preferred stock	*	$ 2.95
Remaining contractual term (in years)	7.3	7.0
Risk-free interest rate	0.6%	1.3%
Expected dividend yield	0%	0%
Expected volatility	39.2%	41.6%

* – Series C1 preferred stock warrant not outstanding at March 31, 2020.

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

	Three months ended March 31,	
	2020	2021
Balance, beginning of period	$ 3,396	$ 4,117
Change in fair value	(5)	11,448
Balance, end of the period	$ 3,391	$ 15,565

Valuation of derivative liability

The derivative liability is related to the conversion option included within the Unsecured Subordinated Convertible Promissory Notes ("Convertible Notes") issued in February 2020 (see Note 9). The Convertible Notes provided a conversion option whereby upon the closing of a specified financing event the Convertible Notes would automatically convert into shares of the same class and series of capital stock of the Company issued to other investors in the financing at a conversion price equal to 80% of the price per share of the securities paid by the other investors. This conversion option was determined to be an embedded derivative required to be bifurcated and accounted for separately from the notes. The fair value of the derivative liability was determined based on inputs not observable in the market, which represents a Level 3 measurement within the fair value hierarchy.

Upon the closing of the Convertible Notes, management determined that the probability of completing the specified financing event was 100%; thus, the value of the automatic conversion option was deemed to be 20% of the fair value of the capital stock to be issued upon conversion of the Convertible Notes, or $2.4 million. This amount represented the fair value of the embedded derivative at issuance (see Note 9).

Upon the occurrence of the specified financing event in April 2020, the Convertible Notes were converted into 10,351,063 shares of Series C1 Preferred Stock, as defined (see Note 9), and the derivative liability of $2.4 million was extinguished.

4. Short-term investments

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

	December 31, 2020			
	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
US Treasury bonds	$ 14,997	$1	$—	$ 14,998
	$ 14,997	$1	$—	$ 14,998

	March 31, 2021			
	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
US Treasury bonds	$ 4,999	$1	$—	$ 5,000
	$ 4,999	$1	$—	$ 5,000

5. Inventory

Inventory consisted of the following (in thousands):

	December 31, 2020	March 31, 2021
Raw materials	$ 6,754	$ 7,292
Work in process	1,190	996
Finished goods	1,021	1,489
Total	$ 8,965	$ 9,777

Raw materials, work in process and finished goods are presented net of adjustments to net realizable value of $1.0 million and $0.4 million, as of December 31, 2020 and March 31, 2021, respectively.

6. Prepaid expenses and other current assets

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

	December 31, 2020	March 31, 2021
Prepaid commitment fee	$ 275	$ 210
Prepaid financing fees	62	—
Contract asset	471	461
Deposits	1,148	1,346
Lease receivables, current portion	325	238
Other	839	478
	$ 3,120	$ 2,733

7. Property and equipment, net

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

	December 31, 2020	March 31, 2021
Manufacturing and laboratory equipment	$ 12,961	$ 13,082
Computer hardware and software	1,088	1,211
Office furniture and fixtures	343	350
Leasehold improvements	2,996	2,996
	17,388	17,639
Less: Accumulated depreciation	(10,336)	(10,680)
	$ 7,052	$ 6,959

Depreciation and amortization expense related to property and equipment was $0.5 million and $0.3 million for the three months ended March 31, 2020 and 2021, respectively. The Company had less than $0.1 million fully depreciated assets disposed of during the year ended December 31, 2020 and none disposed of during the three months ended March 31, 2021.

8. Accrued expenses and other current liabilities

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

	December 31, 2020	March 31, 2021
Accrued employee compensation and benefits expense	$ 3,083	$ 1,609
Vendor accrual	1,685	2,417
Accrued warranty expense	637	618
Accrued interest	330	784
Deferred rent, current portion	118	121
Accrued taxes	688	704
Other	113	221
	$ 6,654	$ 6,474

9. Long-term debt

The components of the Company's long-term debt consisted of the following (in thousands):

	December 31, 2020	March 31, 2021
Notes Payable	$ 25,000	$ 25,000
Payment in kind interest	1,145	1,145
Less: Unamortized discount	(1,335)	(1,261)
Long-term debt, net of discount	$ 24,810	$ 24,884

Term loan agreements

2018 Term Loan

The Company was required to comply with certain financial and non-financial covenants as defined in the 2018 Term Loan agreement, including a minimum liquidity requirement of the lesser of $7.0 million and the aggregate amount of any revolving indebtedness and outstanding obligations as of any date. In the event this requirement was not met, the Company was subject to a six-month rolling minimum revenue requirement. The Company was in compliance with all financial and non-financial covenants as of March 31, 2020.

The Company repaid the 2018 Term Loan in full in May 2020 using the proceeds from the 2020 Term Loan as discussed below. The Company paid $19.4 million to extinguish the outstanding principal and accrued interest owed, including the non-refundable end-of-term exit fee of $1.3 million (out of which $0.6 million was accrued for in prior years as interest expense) and an early termination fee of $0.1 million.

The loss on extinguishment of debt was $0.8 million which included the write-off of unamortized financing and end-of-term exit fee costs of $0.7 million and $0.1 million in early payment and documentation fees, and was included as a component of other income (expense) in the consolidated statements of operations during the three months ended June 30, 2020. Interest expense on the 2018 Term Loan totaled $0.6 million for three months ended March 31, 2020 which includes amortization of the debt discount of $0.1 million during the three months ended March 31, 2020.

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") subject to certain milestones. The milestone entitling the Company to draw on the Term B Loan is achieved when the Company has received, on a cumulative basis, a predefined number of new system orders during a consecutive twelve month period between January 1, 2020 and November 14, 2021. The milestone entitling the Company to draw down the Term C Loan is achieved when the Company has received, on a cumulative basis, a predefined number of new system orders during a consecutive eighteen month period between January 1, 2020 and May 14, 2022. 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 is obligated to issue additional warrants to the lender with an aggregate exercise value, based on the fair market value of the preferred stock at the time of the draw down, equal to $1.1 million and $0.8 million upon drawing down the Term B Loan and Term C Loan, respectively. 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 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 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 and recorded within prepaid expenses and other current assets on the consolidated balance sheet and amortized on a straight-line basis over the debt access period within interest expense on the consolidated statement of operations.

The 2020 Term Loan agreement includes certain financial and non-financial covenants. These covenants include exceeding certain minimum revenue thresholds on a trailing twelve-month basis, maintaining a minimum balance of $1.5 million in cash and cash equivalents, maintain all inventory in good and marketable condition, and reporting requirements for any material adverse changes in the Company's financial condition. As of March 31, 2021, the Company was in compliance with all covenants under the 2020 Term Loan.

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 warrants issued with the debt. Interest expense on the 2020 Term Loan totaled $0.9 million for three months ended March 31, 2021, which includes the amortization of the debt discount of $0.1 million. As of December 31, 2020 and March 31, 2021, the unamortized debt discount was $1.3 million for both periods. As of December 31, 2020 and March 31, 2021, accrued interest on the 2020 Term Loan was $0.3 million and $0.8 million, respectively, which is included in accrued expenses and other current liabilities in the consolidated balance sheets.

As of March 31, 2021, the aggregate future principal payments on the Company's outstanding 2020 Term Loan for the next five years were as follows (in thousands):

2021	$ —
2022	—
2023	—
2024	—
2025	26,145
	26,145
Less: Unamortized discount	(1,261)
Long-term debt, net of discount	$24,884

Convertible Notes

In February 2020, the Company issued Convertible Notes to several investors in the aggregate amount of $9.5 million with a stated interest rate of 1.5% per annum and a maturity date of February 28, 2021. The Convertible Notes provided a conversion option whereby upon the closing of a financing event, in which the aggregate gross proceeds of the issuance of preferred stock totaled at least $20.0 million, the notes would automatically convert into shares of the same class and series of capital stock of the Company issued to other investors in the financing at a conversion price equal to 80% of the price per share paid by the other investors. The conversion option met the definition of an embedded derivative and was required to be bifurcated and accounted for separately from the notes. The proceeds from the Convertible Notes were allocated between the derivative liability, with a fair value at issuance of $2.4 million, and the notes, with an initial carrying value of $7.1 million, included in long-term liabilities on the Company's consolidated balance sheets. The difference between the initial carrying value of the notes and the stated value of the notes represented a discount and that was accreted to interest expense over the term of the Convertible Notes using the effective interest method.

In April 2020, the Convertible Notes, including outstanding principal and accrued interest totaling $9.5 million, were automatically converted into 10,351,063 shares of Series C1 Preferred Stock. Upon conversion, the remaining unamortized discount was recognized as loss on extinguishment of debt in the consolidated statement of operations.

Interest expense on the Convertible Notes totaled $0.2 million for three months ended March 31, 2020, which includes amortization of the debt discount of $0.2 million.

10. Redeemable convertible preferred stock

The Company has 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 April 2020, the Company issued and sold 23,611,208 shares of Series C1 Preferred Stock and 20,301,829 shares of Series C2 Preferred Stock to new and existing investors at a price of $1.15 per share for gross proceeds of $27.2 million and $23.3 million, respectively. Additionally, the Company's Convertible Notes, including outstanding principal and accrued interest totaling $9.5 million (see Note 9), were automatically converted into 10,351,063 shares of Series C1 Preferred Stock. The Company incurred issuance costs in connection with this transaction of $0.6 million and recorded them as a reduction to the carrying value of the Series C1 Preferred Stock and Series C2 Preferred Stock.

In March 2021, the Company issued and sold 22,086,725 shares of Series D1 and 413,268 shares of Series D2 Preferred Stock to new investors 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 $1.2 million and recorded them as a reduction to the carrying value of the Series D1 Preferred Stock and Series D2 Preferred Stock.

As of each balance sheet date, the Preferred Stock consisted of the following (in thousands, except for share data):

	December 31, 2020				
	Preferred stock authorized	Preferred stock issued and outstanding	Carrying value	Liquidation preference	Common stock issuable upon conversion
Series A1 Preferred Stock	22,563,639	18,740,115	$ 18,542	$ 21,176	3,748,022
Series B1 Preferred Stock	61,217,425	60,017,425	68,511	90,026	12,003,474
Series C1 Preferred Stock	57,372,796	33,962,271	40,632	58,585	6,792,445
Series C2 Preferred Stock	20,301,829	20,301,829	24,141	35,021	4,060,365
	161,455,689	133,021,640	$ 151,826	$ 204,808	26,604,306

	March 31, 2021				
	Preferred stock authorized	Preferred stock issued and outstanding	Carrying value	Liquidation preference	Common stock issuable upon conversion
Series A1 Preferred Stock	22,563,639	18,740,115	$ 18,836	$ 21,364	3,748,022
Series B1 Preferred Stock	61,217,425	60,017,425	69,340	90,026	12,003,474
Series C1 Preferred Stock	57,372,796	33,962,271	41,299	58,585	6,792,445
Series C2 Preferred Stock	20,301,829	20,301,829	24,539	35,021	4,060,365
Series D1 Preferred Stock	22,499,993	22,086,725	78,349	79,512	4,417,340
Series D2 Preferred Stock	413,268	413,268	1,469	1,487	82,653
	184,368,950	155,521,633	$ 233,832	$ 285,995	31,104,299

The holders of the Preferred Stock have the following rights and preferences:

Voting

The holders of the Preferred Stock, except for Series C2 Preferred Stock and Series D2 Preferred Stock which are non-voting shares, are entitled to vote, together with the holders of common stock voting as a single class, on all matters submitted to the stockholders for a vote. Each holder of Preferred Stock, except for Series C2 Preferred Stock and Series D2 Preferred Stock which are non-voting shares, is entitled to the number of votes equal to the number of shares of common stock into which each share of Preferred Stock is convertible as of the record date for determining stockholders entitled to vote on such matter.

Conversion

Each share Preferred Stock, except for the Series C2 Preferred Stock and Series D2 Preferred Stock, is convertible into shares of common stock at the option of the holder at any time after the date of issuance and without the payment of additional consideration by the holder. Each share of the Series C2/D2 Preferred Stock shall be convertible, at the option of the holder thereof, at any time after the date of issuance, into an equal number of shares of Series C1/D2 Preferred Stock; provided, that, after conversion, each initial holder of Series C2/D2 Preferred Stock would represent less than ten percent of the combined voting power of the Company's outstanding voting securities.

Each share of the Preferred Stock will be mandatorily converted upon the closing of a firm commitment underwritten public offering of the Company's common stock with gross proceeds to the Company of at least $100.0 million and at a price per share of not less than $18.00.

Notwithstanding the previous provision, no shares of Series C2 Preferred Stock or Series D2 Preferred stock shall automatically convert into any other class of capital stock of the Company unless and until the Company has authorized a sufficient number of shares of non-voting common stock to support the conversion of all such shares of Series C2/D2 Preferred stock into non-voting common stock. Upon the sale, assignment, transfer or other disposition of any shares of Series C2/D2 Preferred Stock to a person or entity other than the initial holder of the Series C2/D2 Preferred stock, each such outstanding share of Series C2/D2 Preferred shall be automatically converted into one fully paid and non-assessable share of Series C2 or Series D2 Preferred Stock. Upon the occurrence of a Restriction Removal Event, defined as the holder of Series C2/D2 Preferred stock and the Company submitting a specified U.S. governmental body a notice or declaration concerning the proposed conversion and the governmental body takes no issue or the initial holder of the Series C2/D2 Preferred stock and the Company agree that such filing to with such governmental body is not necessary, each share of Series C2/D2 Preferred Stock then outstanding shall be automatically converted into one fully paid and non-assessable share of Series C1/D2 Preferred stock.

The conversion ratio of each series of Preferred Stock is determined by dividing the Original Issue Price of each series by the Conversion Price of each series. The Original Issue Price per share is $1.00 for Series A1 Preferred Stock, $1.00 for Series B1 Preferred Stock, $1.15 for Series C1 Preferred Stock, $1.15 for Series C2 Preferred Stock, $3.60 for Series D1 Preferred Stock and $3.60 for Series D2 Preferred Stock. The Conversion Price per share is $5.00 for Series A1 Preferred Stock, $5.00 for Series B1 Preferred Stock, $5.75 for Series C1 Preferred Stock, $5.75 for Series C2 Preferred Stock $18.00 for Series D1 Preferred Stock and $18.00 for Series D2 Preferred Stock, each subject to appropriate adjustment in the event of any stock split, stock dividend, combination or other similar recapitalization and other adjustments as set forth in the Company's certificate of incorporation, as amended and restated.

Dividends

From and after the date of issuance, each share of Series A1 Preferred Stock accrues a dividend at the rate of $0.04 per annum. The dividends accrue ratably on a quarterly basis, whether or not declared. The Preferred Stock accruing dividends shall be payable only when, as, and if declared by the Board of Directors and the Company shall be under no obligation to pay such Preferred Stock accruing dividends.

From and after the date of issuance, each share of Series B1 Preferred Stock accrues a dividend at the rate of $0.04 per annum. If the Series B1 Preferred Stock is not redeemed on any of the three eligible annual installments, per the redemption rights, the rate the dividend accrues is increased to $0.10 per share per annum. The dividends accrue ratably on a quarterly basis, whether or not declared. The Preferred Stock accruing dividends shall be payable only when, as, and if declared by the Board of Directors and the Company shall be under no obligation to pay such Preferred Stock accruing dividends.

From and after the date of issuance, each share of Series C1 and Series C2 Preferred Stock accrues a dividend at the rate of $0.046 per annum. If the Series C1 Preferred Stock is not redeemed on any of the three eligible annual installments, per the redemption rights, the rate the dividend accrues is increased to $0.115 per share per annum. The dividends accrue ratably on a quarterly basis, whether or not declared. The Preferred Stock accruing dividends shall be payable only when, as, and if declared by the Board of Directors and the Company shall be under no obligation to pay such Preferred Stock accruing dividends.

The holders of any Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock shall be entitled to be paid, on an equal basis, the amount due for any accrued dividends before any payment shall be made to the holders of Series A1 Preferred Stock.

The holders of the Series D1 Preferred Stock and Series D2 Preferred Stock are not entitled to accruing dividends.

Through March 31, 2021, no dividends have been declared on any series or class of stock.

Liquidation

In the event of any voluntary or involuntary liquidation, dissolution or winding up of the Company, the holders of Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock then outstanding shall be entitled to be paid out of the assets of the Company available for distribution to its stockholders, and before any payment shall be made to the holders of Series A1 Preferred Stock or common stock or any other class or series of capital stock ranking on liquidation junior to the Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock by reason of their ownership thereof, an amount equal to the greater of (i) $3.60 per share for Series D1 Preferred Stock and Series D2 Preferred Stock, $1.725 per share for Series C1 Preferred Stock and Series C2 Preferred Stock and $1.50 per share for Series B1 Preferred Stock, all subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the applicable series of Preferred Stock, and (ii) the sum of (x) the Original Issue Price of the applicable series of Preferred Stock, (y) any accruing dividends accrued but unpaid on the applicable series of Preferred Stock, and (z) any other dividends declared but unpaid on the applicable series of Preferred Stock (the greater of clauses (i) and (ii) for the Series C1 Preferred Stock and Series C2 Preferred Stock, the “Series C Liquidation Preference” and the greater of clauses (i) and (ii) for the Series B1 Preferred Stock, the “Series B1 Liquidation Preference”). If upon any such liquidation, dissolution or winding up of the Company, the assets of the Company available for distribution to its stockholders shall be insufficient to pay the holders of shares of Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock the full amount to which they shall be entitled, the holders of shares of Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock shall share ratably in any distribution of the assets available for distribution in proportion to the respective amounts which would otherwise be payable in respect of the shares held by them upon such distribution if all amounts payable on or with respect to such shares were paid in full.

Following the aforementioned payments to the holders of Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock, and before any payment shall be made to the holders of common stock by reason of their ownership thereof, the holders of Series A1 Preferred Stock then outstanding shall be entitled to be paid out of the assets of the Company available for distribution to its stockholders an amount equal to the sum of (x) $1.00 per share, subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the Series A1 Preferred Stock, (y) any accruing dividends accrued but unpaid on the shares of Series A1 Preferred Stock, and (z) any other dividends declared but unpaid on the Series A1 Preferred Stock (the “Series A1 Liquidation Preference” and, together with the Series B1 Liquidation Preference and Series C Liquidation Preference, the “Liquidation Preferences”). If upon any such liquidation, dissolution or winding up of the Company, the assets of the Company available for distribution to its stockholders shall be insufficient to pay the holders of shares of Series A1 Preferred Stock the full amount to which they shall be entitled, the holders of shares of Series A1 Preferred Stock shall share ratably in any distribution of the assets available for distribution in proportion to the respective amounts which would otherwise be payable in respect of the shares held by them upon such distribution if all amounts payable on or with respect to such shares were paid in full.

After the payment of the applicable Liquidation Preferences to the holders of Preferred Stock, the assets of the Company available for the distribution to it stockholders shall be distributed among such holders in the following order: (1) the Series A1 Preferred Stock and common stock, pro rata based on the number of shares held by each such holder, on an as-converted basis, until the holders of shares of Series A1 Preferred Stock have received an aggregate per share amount in respect of the Series A1 Preferred Stock equal to the Series B1 Liquidation Preference;(2) among the holders of the Series B1 Preferred Stock, Series A1 Preferred Stock and common stock, pro rata based on the number of shares held by each such holder, on an as-converted basis, until the holders of shares of Series B1 Preferred Stock have received an aggregate per share amount in respect of the Series B1 Preferred Stock equal to the Series C Liquidation Preference; (3) among the holders of the Series C1, Series B1

Preferred Stock, Series A1 Preferred Stock and common stock, pro rata based on the number of shares held by each such holder, on an as-converted basis, until the holders of shares of Series C1 Preferred Stock have received an aggregate per share amount in respect of the Series C1 Preferred Stock equal to the Series D Liquidation Preference; and (4) among the holders of the Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock, Series B1 Preferred Stock, Series A1 Preferred Stock and common stock, pro rata based on the number of shares held by each such holder, on an as-converted basis.

Redemption

Unless otherwise prohibited by Delaware law governing distribution to stockholders, shares of Preferred Stock shall be redeemed by the Company at a price equal to the Liquidation Preference applicable to each series of Preferred Stock in three annual installments commencing not more than 60 days after the receipt by the Company of written notice, at any time on or after the fifth anniversary of the Series D1 original issue date, from the requisite holders, requesting redemption of all shares of Preferred Stock. The Preferred Stock shall be redeemed in the following amounts: one-third of the amount payable based on the Liquidation Preference shall be redeemed on the first installment, 50% of the aggregate amount of the amount unpaid calculated as of the second installment, and the remaining amount due on the third installment. On each installment, holders of Series D1 Preferred Stock, Series D2 Preferred Stock, Series C1 Preferred Stock, Series C2 Preferred Stock and Series B1 Preferred Stock shall receive the amounts due based on the respective Liquidation Preferences per share before any payment is made to the holders of Series A1 Preferred Stock.

The Company entered into an agreement with a holder of Series B1 Preferred Stock that includes a special redemption right in the event the Company breaches specified conditions set forth in the agreement, including covenants around specified business activities the Company may participate in, specified business activity ratios and financial ratios related to investments and indebtedness. If the Company breaches the terms of the agreement, and does not cure such breach by the date that is one year following written notice of such breach, such holder of Series B1 Preferred Stock shall have the right to redeem all shares of Preferred Stock outstanding and held by such holder at a price equal to two times the applicable original issue price, plus any applicable dividends accrued but unpaid on such shares of Preferred Stock, plus any other dividends declared but unpaid on such shares of Preferred Stock. In such event, shares of Preferred Stock shall be redeemed by the Company in three annual installments commencing not more than 60 days after the receipt by the Company of written notice, at any time on or after the fifth anniversary of the special redemption date. In the event such holder of Series B1 Preferred Stock requests such special redemption, all other holders of Preferred Stock may elect to participate in such special redemption alongside the holders of Series B1 Preferred Stock. If any holder of Preferred Stock elects not to participate in the special redemption, their shares shall not be redeemed in accordance with the special redemption.

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 has outstanding warrants to purchase shares of Preferred Stock issued in connection with previous financing agreements.

As of December 31, 2020 and March 31, 2021, warrants to purchase the following classes of preferred stock outstanding consisted of the following (in thousands, except for share and per share data):

	December 31, 2020					
Issuance date	Contractual term (in years)	Series of redeemable convertible preferred stock	Balance sheet classification	Preferred shares issuable upon exercise of warrant	Weighted average exercise price	Warrant fair value
April 24, 2017	10	Series A1	Liability	3,823,524	$ 0.01	$ 1,875
April 12, 2018	10	Series B1	Liability	1,199,994	$ 0.01	1,501
May 14, 2020	10	Series C1	Liability	1,195,652	$ 1.15	741
				6,219,170		$ 4,117

	March 31, 2021					
Issuance date	Contractual term (in years)	Series of redeemable convertible preferred stock	Balance sheet classification	Preferred shares issuable upon exercise of warrant	Weighted average exercise price	Warrant fair value
April 24, 2017	10	Series A1	Liability	3,823,524	$ 0.01	$ 9,562
April 12, 2018	10	Series B1	Liability	1,199,994	$ 0.01	3,445
May 14, 2020	10	Series C1	Liability	1,195,652	$ 1.15	2,558
				6,219,170		$ 15,565

12. Common stock and common stock warrants

As of December 31, 2020 and March 31, 2021, the Company's amended certificate of incorporation authorized the issuance of 35,000,000 shares and 40,000,000 shares, respectively, of $0.01 par value common stock.

Each share of common stock entitles the holder to one vote on all matters submitted to a vote of the Company's stockholders. The holders of common stock, voting exclusively and as a separate class, are entitled to elect one director of the Company. 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 March 31, 2020 and 2021, no cash dividends had been declared or paid.

As of December 31, 2020 and March 31, 2021, the Company had reserved 32,574,029 and 38,440,246 shares, respectively, of common stock for the conversion of the outstanding Preferred Stock, exercise of outstanding stock options, the number of shares remaining available for grant under the Company's 2010 Stock Incentive Plan (see Note 13) and the exercise of outstanding warrants to purchase shares of common stock (see Note 11).

In prior years the Company issued warrants to purchase common stock in conjunction with previous financing arrangements. As of December 31, 2020 and March 31, 2021, warrants to purchase the common stock outstanding consisted of the following (in thousands, except for share and per share data):

	December 31, 2020 and March 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
			55,835	

13. Stock-based compensation

2010 stock option and grant plan

The Company's 2010 Stock Option and Grant Plan (the "2010 Plan") provides 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.

At December 31, 2020, shares of common stock that may be issued under the 2010 Plan was 4,945,783. In March 2021, the Board of Directors approved an increase to the 2010 Plan shares by 382,889 shares. At March 31, 2021, shares of common stock that may be issued under the 2010 Plan was 5,328,672. As of December 31, 2020 and March 31, 2021, 1,065,501 shares and 523,358 shares, respectively, remained available for future grant. Shares that are expired, forfeited, canceled or otherwise terminated without having been fully exercised will be available for future grant under the 2010 Plan. In addition, shares of common stock that are tendered to the Company by a participant to exercise an award are added to the number of shares of common stock available for future grants.

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 March 31,
	2021
Risk-free interest rate	0.9%
Expected term (in years)	6.0
Expected volatility	44.9%
Expected dividend yield	0%

No options were granted during the three months ended March 31, 2020.

Stock options

The following table summarizes the Company's stock option activity since December 31, 2020 (in thousands, except for share and per share data):

	Number of shares	Weighted average exercise price	Weighted average remaining contractual term	Aggregate intrinsic value
			(in years)	
Outstanding as of December 31, 2020	3,604,584	$ 0.92	8.12	$ 4,272
Granted	889,202	7.81		
Exercised	(67,418)	1.02		
Expired	(33,438)	0.99		
Forfeited	(179,635)	1.04		
Outstanding as of March 31, 2021	4,213,295	$ 2.36	8.32	$ 35,672
Options vested and expected to vest as of March 31, 2021	4,213,295	$ 2.36	9.01	$ 18,984
Options exercisable as of March 31, 2021	1,717,265	$ 1.08	8.32	$ 35,672

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 common stock for those options that had exercise prices lower than the fair value of the Company's common stock.

The intrinsic value of stock options exercised during the three months ended March 31, 2021 was $0.1 million. No stock options were exercised during the three months ended March 31, 2020.

The weighted average grant-date fair value per share of stock options granted during the three months ended March 31, 2021 was and $3.40. No options were granted during the three months ended March 31, 2020.

Restricted stock

In February 2021, the Company granted 248,903 shares of restricted stock to an employee 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 a specific event, the Company shall have the right to repurchase unvested restricted common stock shares. At December 31, 2020 and March 31, 2021, the Company has zero 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, 2020 (in thousands except for share and per share data):

	Number of shares	Weighted average fair value
Unvested as of December 31, 2020	—	
Granted	248,903	$ 2.10
Vested	—	
Forfeited	—	
Unvested as of March 31, 2021	248,903	$ 2.10

Stock-based compensation

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

	Three months ended March 31,	
	2020	2021
Cost of revenue	$ 21	$ 29
General and administrative	72	128
Sales and marketing	16	21
Research and development	11	13
Total stock-based compensation expense	$ 120	$ 191

As of March 31, 2021, total unrecognized compensation expense related to unvested stock options held by employees and directors was $3.9 million, which is expected to be recognized over a weighted-average period of 1.58 years.

14. Income taxes

During the three months ended March 31, 2020 and 2021, the Company did not record income tax benefits for the net operating losses incurred or for the research and development tax credits generated in each period, due to its uncertainty of realizing a benefit from those items.

The Company's tax provision and the resulting effective tax rate for interim periods is determined based upon its estimated annual effective tax rate ("AETR"), 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 December 31, 2020 and March 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 is under examination in its local country for tax years 2016-2018. Any adjustments that may result from the examinations are not expected to have a material impact on the financial position, liquidity, or results of operations of the Company.

15. Net loss per share

Net loss per share attributable to the common stockholders

Basic and diluted net loss per share attributable to common stockholders was calculated as follow (in thousands, except share and per share amounts):

	Three months ended March 31,	
	2020	2021
Numerator:		
Net loss	$ (8,007)	$ (22,101)
Accretion of redeemable convertible preferred stock to redemption value	(818)	(787)
Cumulative redeemable convertible preferred stock dividends	(788)	(1,411)
Net loss attributable to common stockholders — basic and diluted	$ (9,613)	$ (24,299)
Denominator:		
Weighted average common shares outstanding — basic and diluted	353,465	641,371
Net loss per share attributable common stockholders — basic and diluted	$ (27.20)	$ (37.89)

The Company's potentially dilutive securities, which include stock options, unvested 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 months ended March 31,	
	2020	2021
Options to purchase common stock	2,779,583	4,246,685
Unvested restricted common stock	—	248,903
Warrants to purchase common stock	55,838	55,835
Redeemable convertible preferred stock (as converted to common stock)	15,751,496	31,104,299
Warrants to purchase preferred stock (as converted to warrants to purchase common stock)	1,004,697	1,243,827
	19,591,614	36,899,549

16. Commitments and contingencies

Lease agreements

In October 2013, the Company entered into an operating lease for office and manufacturing space in in Lowell, Massachusetts, which expires in July 2026. The terms of the lease include options for a one-time, five-year extension of the lease and early termination of the lease in July 2024 as well as a $0.7 million tenant improvement allowance, which was fully utilized as of March 31, 2021.

The Company recognizes rent expense on a straight-line basis over the respective lease period. The Company has recorded deferred rent for rent expense incurred but not yet paid. Rent expense was $0.1 million for each of the three months ended March 31, 2020 and 2021.

Future minimum lease commitments under operating leases as of March 31, 2021 are as follows (in thousands):

Period Ending March 31,	
Remaining 2021	$ 332
2022	454
2023	468
2024	481
2025	494
Thereafter	293
Total	$2,522

Exit fee

In December 2016, in connection with the amendment of a then-outstanding loan agreement with the lender, the Company entered into an agreement under which it is obligated to pay the lender an exit fee in the amount of $0.8 million in the event of a qualifying exit event prior to December 31, 2026. A qualifying event is defined as any (i) liquidation, dissolution or winding up whether voluntary or involuntary; (ii) consolidation, merger or reverse merger; (iii) sale, lease, transfer, exclusive license, exchange, dividend or other disposition of all or substantially all of the Company's assets; (iv) issuance and/or sale of the Company's stock that is greater than 50% of the shares of common stock immediately following such issuance; (v) any other form of acquisition or business combination that results in a change of control at the Company; or (vi) the consummation of any public offering of shares of common stock. There were no amounts accrued for the exit fee as of December 31, 2020 or March 31, 2021, as the occurrence of a qualifying exit event was not deemed probable.

Supply agreement

In March 2020, the Company entered into an agreement with a supplier to provide raw materials used in the manufacturing process. As March 31, 2021, the Company had committed to minimum payments under these arrangements totaling $0.8 million, through December 31, 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 $0.1 million and less than $0.1 million accrued for the supply agreement as of December 31, 2020 and March 31, 2021, respectively.

Software subscription

During the year ended December 31, 2020, the Company entered into a non-cancelable agreement with a service provider for software as a service and cloud hosting services. As of March 31, 2021, the Company had committed to minimum payments under these arrangements totaling $1.1 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. There were no amounts accrued for the software subscription as of December 31, 2020 and March 31, 2021.

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 December 31, 2020 or March 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 such legal proceedings.

17. 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 less than $0.1 million and $0.1 million to the plan during the three months ended March 31, 2020 and 2021, respectively.

18. Subsequent events

For its condensed consolidated financial statements as of March 31, 2021, and for the three months then ended, the Company evaluated subsequent events through May 6, 2021, the date on which those financial statements were issued.

In April 2021, the Company's contract with BARDA was modified resulting in an increase in the contract value of up to $1.0 million, an increase in the cost share reimbursement rate and specification of various developmental milestones.

Events subsequent to original issuance of condensed consolidated financial statements

In June 2021, the Company entered into a Sublease agreement for office and manufacturing space in Lexington, Massachusetts, which expires in June 2029. The Sublease agreement includes an option to terminate the sublease

in July 2026, subject to an early termination fee. Monthly rent payments are fixed and future minimum lease payments over the term of the sublease is $5.6 million. The Company also has the right to use furniture and equipment specified in the Sublease agreement for $0.6 million in future payments over the term of the sublease with the option to purchase the furniture and equipment at the end of the sublease term. Concurrent with entering into the Sublease agreement, the Company executed an Option Agreement with the property owner which provides the Company the option to enter into a new direct lease for the Lexington facility for an additional five-years following expiration of the sublease.

On June 25, 2021, the Company filed an amended and restated certificate of incorporation, which effected 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. Additionally, on June 25, 2021, a certain number of investors exchanged Series C1 and D1 Preferred Stock to Series C2 and D2 Preferred Stock.

On July 9, 2021, the Company effected a one-for-five reverse share 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 share split and adjustment of the Preferred Stock conversion ratios.

7,920,000 Shares

Class A common stock

Prospectus

J.P. Morgan **Morgan Stanley** **Cowen** **Stifel**

Prospectus dated July 14, 2021