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

Form 10-K

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2022

or

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

For the transition period from _____ to _____

Commission file number: 000-50865

MannKind Corporation

(Exact name of registrant as specified in its charter)

Delaware	**13-3607736**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
1 Casper Street **Danbury, Connecticut**	
(Address of principal executive offices)	**06810** **(Zip Code)**

Registrant's telephone number, including area code

(818) 661-5000

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

Title of Each Class	Trading Symbol(s)	Name of Each Exchange on Which Registered
Common Stock, par value $0.01 per share	MNKD	The Nasdaq Stock Market LLC

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

None

(Title of Class)

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☒ No ☐

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

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

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

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☒	Accelerated filer	☐
Non-accelerated filer	☐	Smaller reporting company	☐
		Emerging growth company	☐

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

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

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

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

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

As of June 30, 2022, the aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant, computed by reference to the last sale price of such stock as of such date on the Nasdaq Global Market, was approximately $910,286,410.

As of February 10, 2023, there were 263,923,726 shares of the registrant's Common Stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive Proxy Statement (the "Proxy Statement") for the 2023 Annual Meeting of Stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than May 1, 2023 are incorporated by reference into Part III of this Annual Report on Form 10-K.

MANNKIND CORPORATION

Annual Report on Form 10-K
For the Fiscal Year Ended December 31, 2022

TABLE OF CONTENTS

Forward-Looking Statements

Statements in this report that are not strictly historical in nature are “forward-looking statements” within the meaning of the federal securities laws made pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. In some cases, you can identify forward-looking statements by terms such as “anticipate,” “believe,” “could,” “estimate,” “expect,” “goal,” “intend,” “may,” “plan,” “potential,” “predict,” “project,” “should,” “will,” “would,” and similar expressions intended to identify forward-looking statements, though not all forward-looking statements contain these identifying words. These statements may include, but are not limited to, statements regarding: our ability to successfully market, commercialize and achieve market acceptance for Afrezza®, V-Go® or other product candidates or therapies that we may develop or acquire; our ability to manufacture sufficient quantities of Afrezza and obtain insulin supply as needed; our ability to manufacturing sufficient quantities of Tyvaso DPI® to meet demand; our expectation to receive FDA approval of a new source of FDKP in 2024; our expectations regarding our contract manufacturer’s ability to meet our current and expected near-term demand for V-Go; our ability to successfully commercialize our Technosphere drug delivery platform; our estimates for future performance; our estimates regarding anticipated operating losses, future revenues, capital requirements and our needs for additional financing; the progress or success of our research, development and clinical programs, including the application for and receipt of regulatory clearances and approvals; our ability to protect our intellectual property and operate our business without infringing upon the intellectual property rights of others our ability to service our debt obligations; and scientific studies and the conclusions we draw from them. These statements are only predictions or conclusions based on current information and expectations and involve a number of risks and uncertainties. The underlying information and expectations are likely to change over time. Actual events or results may differ materially from those projected in the forward-looking statements due to various factors, including, but not limited to, those set forth under the caption “Risk Factors” and elsewhere in this report. In addition, statements like “we believe” and similar statements reflect our beliefs and opinions on the relevant subject. These statements are based upon information available to us as of the date of this report, and while we believe such information forms a reasonable basis for such statements, such information may be limited or incomplete, and our statements should not be read to indicate that we have conducted an exhaustive inquiry into, or review of, all potentially available relevant information. These statements are inherently uncertain and you are cautioned not to unduly rely upon these statements. Except as required by law, we undertake no obligation to publicly update or revise any forward-looking statements, whether as a result of new information, future events or otherwise. Afrezza, Technosphere®, BluHale®, Dreamboat® and V-Go, and MannKind Corporation are our trademarks in the United States. We have also applied for or have registered company trademarks in other jurisdictions. This document also contains trademarks and service marks of other companies that are the property of their respective owners.

Risk Factor Summary

Below is a summary of the material factors that make an investment in our common stock speculative or risky. This summary does not address all of the risks that we face. Additional discussion of the risks summarized in this risk factor summary, and other risks that we face, can be found under the heading "Risk Factors" in Part I of this Annual Report on Form 10-K and should be carefully considered, together with other information in this Annual Report on Form 10-K and our other filings with the Securities and Exchange Commission ("SEC") before making investment decisions regarding our common stock.

RISKS RELATED TO OUR BUSINESS

- The products that we or our collaboration partner are commercializing may only achieve a limited degree of commercial success.
- Manufacturing risks may adversely affect our ability to manufacture our products and Tyvaso DPI, which could reduce our gross margin and profitability.
- If our suppliers fail to deliver materials and services needed for commercial manufacturing in a timely and sufficient manner or fail to comply with applicable regulations, and if we fail to timely identify and qualify alternative suppliers, our business, financial condition and results of operations would be harmed and the market price of our common stock and other securities could decline.
- If third-party payers do not cover our approved products, such products might not be prescribed, used or purchased, which would adversely affect our revenues.
- We may need to raise additional capital to fund our operations.
- We expect that our results of operations will fluctuate for the foreseeable future, which may make it difficult to predict our future performance from period to period.
- We have a history of operating losses. We expect to incur losses in the future and we may not generate positive cash flow from operations in the future.
- We have a substantial amount of debt, and we may be unable to make required payments of interest and principal as they become due.
- Our business, product sales, results of operations and ability to access capital could be adversely affected by the effects of health pandemics or epidemics, in regions where we or third parties distribute our products or where we or third parties on which we rely have significant manufacturing facilities, concentrations of clinical trial sites or other business operations.
- Continued testing of our products and product candidates may not yield successful results, and even if it does, we may still be unable to successfully commercialize our current or future products.
- If we do not achieve our projected development goals in the timeframes we expect, our business, financial condition and results of operations will be harmed and the market price of our common stock and other securities could decline.
- The long-term safety and efficacy of approved products may differ from clinical studies, which could negatively impact sales and could lead to reputational harm or other negative effects.
- Our products and product candidates may be rendered obsolete by rapid technological change.
- We may undertake internal restructuring activities in the future that could result in disruptions to our business or otherwise materially harm our results of operations or financial condition.
- If our information technology systems or data, or those of third parties upon which we rely, are or were compromised, we could experience adverse consequences resulting from such compromise, including but not limited to regulatory investigations or actions; litigation; fines and penalties; disruptions of our business operations; reputational harm; loss of revenue or profits; loss of customers or sales; and other adverse consequences.

RISKS RELATED TO GOVERNMENT REGULATION

- Our product candidates must undergo costly and time-consuming rigorous nonclinical and clinical testing and we must obtain regulatory approval prior to the sale and marketing of any product in each jurisdiction. The results of this testing or issues that develop in the review and approval by a regulatory agency may subject us to unanticipated delays or prevent us from marketing any products.
- If we do not comply with regulatory requirements at any stage, whether before or after marketing approval is obtained, we may be fined or forced to remove a product from the market, subject to criminal prosecution, or experience other adverse consequences, including restrictions or delays in obtaining regulatory marketing approval.
- We are subject to stringent, ongoing government regulation.

- If we or any future partner fails to comply with federal and state healthcare laws, including fraud and abuse and health information laws, we could face substantial penalties and our business, results of operations, financial condition and prospects could be adversely affected.
- We are subject to stringent and changing U.S. and foreign laws, regulations, rules, contractual obligations, policies and other obligations related to data privacy and security. Our actual or perceived failure to comply with such obligations could lead to regulatory investigations or actions; litigation; fines and penalties; disruptions of our business operations; reputational harm; loss of revenue or profits; loss of customers or sales; and other adverse business consequences.

RISKS RELATED TO OUR COMMON STOCK

- We may not be able to generate sufficient cash to service all of our indebtedness and commitments. We may be forced to take other actions to satisfy our obligations or we may experience a financial failure.
- Our stock price is volatile.
- Future sales of shares of our common stock in the public market, or the perception that such sales may occur, may depress our stock price and adversely impact the market price of our common stock and other securities.

GENERAL RISK FACTORS

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

PART I

Item 1. *Business*

Unless the context requires otherwise, the words "MannKind," "we," "Company," "us" and "our" refer to MannKind Corporation and its subsidiaries.

We are a biopharmaceutical company focused on the development and commercialization of innovative therapeutic products and devices to address serious unmet medical needs for those living with endocrine and orphan lung diseases. Our signature technologies – Technosphere dry-powder formulations and Dreamboat inhalation devices – offer rapid and convenient delivery of medicines to the deep lung where they can exert an effect locally or enter the systemic circulation.

In our endocrine business unit, we currently commercialize two products: Afrezza (insulin human) Inhalation Powder, an ultra rapid-acting inhaled insulin indicated to improve glycemic control in adults with diabetes, and the V-Go wearable insulin delivery device, which provides continuous subcutaneous infusion of insulin in adults that require insulin. Afrezza was developed by us and received approval from the U.S. Food and Drug Administration ("FDA") in June 2014. Afrezza consists of a dry powder formulation of human insulin delivered from a small portable inhaler. Administered at the beginning of a meal, Afrezza dissolves rapidly upon inhalation to the lung and delivers insulin quickly to the bloodstream. V-Go received 510(k) clearance by the FDA in 2010 and has been available commercially since 2012. In May 2022, we acquired V-Go from Zealand Pharma A/S and Zealand Pharma US, Inc. (together "Zealand") and began integrating the product into our endocrine business unit. V-Go is a mechanical basal-bolus insulin delivery system that is worn like a patch and can eliminate the need for taking multiple daily shots. V-Go administers a continuous preset basal rate of insulin over 24 hours and provides discreet on-demand bolus dosing at mealtimes.

We are solely responsible for the commercialization of Afrezza and V-Go in the United States. Outside of the U.S., our strategy has been to establish regional partnerships in foreign jurisdictions where there are commercial opportunities, subject to the receipt of necessary foreign regulatory approvals. Our partner in Brazil, Biomm S.A. ("Biomm"), commenced commercialization of Afrezza in January 2020. Our partner in India, Cipla Ltd. ("Cipla"), is currently conducting a clinical study of Afrezza in order to meet the requirements for a regulatory submission to the Drug Controller General of India.

The proprietary formulation and inhaler technologies used in Afrezza have also been deployed in our efforts to develop products to treat orphan lung diseases. The first product to come out of our orphan lung disease pipeline, Tyvaso DPI (treprostinil) inhalation powder, received FDA approval in May 2022 for the treatment of pulmonary arterial hypertension (PAH) and pulmonary hypertension associated with interstitial lung disease (PH-ILD). Tyvaso DPI is the first and only approved dry powder inhaled treatment for PAH and PH-ILD. Our collaboration partner, United Therapeutics Corporation ("United Therapeutics" or "UT") began commercializing Tyvaso DPI in June 2022. UT pays us a royalty on net sales of Tyvaso DPI as well as a margin on supplies of Tyvaso DPI that we manufacture for UT.

The next most advanced program in our pipeline of potential treatments for orphan lung diseases is MNKD-101, a nebulized formulation of clofazimine, for the treatment of severe chronic and recurrent pulmonary infections, including nontuberculous mycobacterial (NTM) lung disease. We believe an orally inhaled formulation of clofazimine could potentially provide several clinical advantages over the current solid oral dosage form of this drug. The FDA has designated MNKD-101 as both an orphan drug and a qualified infectious disease product for the treatment of pulmonary NTM infections. We recently completed an initial clinical study of MNKD 101 in Australia and we plan to initiate a Phase 2/3 clinical study in the United States in 2023. In connection with the development of MNKD-101, we are also evaluating the feasibility of developing a dry-powder formulation of clofazimine using our Technosphere formulation technology.

We have formulated other drugs and biologics for the treatment of orphan lung disease and plan to continue their development as dictated by the results achieved in preclinical studies and by resource requirements. We have also partnered with several third parties that have proprietary rights to certain compounds in order to evaluate the feasibility of developing dry-powder formulations of such compounds. We may seek to convert certain of these exploratory programs into full development programs funded by the external parties.

To aid in the development of oral inhalation products, we have created a number of innovative tools, including a novel inhalation profiling apparatus, known as BluHale that uses miniature sensors to assess the drug delivery process at the level of an individual inhaler. The BluHale apparatus medical device provides real-time data regarding patient usage and delivery system performance that is transmitted to a user interface, such as a smartphone application. During 2020, we released a BluHale Professional version of the apparatus for use as a training tool in certain physician's offices. A consumer version of the apparatus, with additional features, is planned for release in 2023.

Manufacturing and Supply

Technosphere powders are based on our proprietary excipient, fumaryl diketopiperazine ("FDKP"), which is a pH-sensitive organic molecule that self-assembles into small particles under acidic conditions. Certain drugs can be loaded onto these particles by combining a solution of the drug with a solution or suspension of Technosphere material, which is then dried to powder form. The resulting powder has a consistent and narrow range of particle sizes with good aerodynamic properties that enable efficient delivery deep into the lungs. Technosphere powders dissolve quickly when the particles contact the moist lung surface with its neutral pH, releasing the drug molecules to diffuse across a thin layer of cells into the arterial circulation, bypassing the liver to provide excellent systemic exposure. In our Danbury, Connecticut facility, we can develop novel Technosphere formulations of different pharmaceutical ingredients and manufacture clinical and commercial supplies of

these powders. In this facility, we currently formulate both the Afrezza and Tyvaso DPI inhalation powders at commercial scale, fill plastic cartridges with the powders and package the cartridges into blister packs. We utilize a contract packager to assemble the blister packs of Afrezza and Tyvaso DPI cartridges along with inhalers and the applicable package inserts, into final kits for sale.

Our Technosphere powders are intended to be administered with our innovative, breath-powered, dry powder inhalers. Our inhalers are easy to use, cost-effective and can be produced in both a reusable (chronic treatment) and a single-use (acute treatment) format. Both the reusable and single-use inhaler formats use the same internal air-flow design. Afrezza and Tyvaso DPI both use the reusable format (also known as Dreamboat). Being breath-powered, our inhalers require only the patient's inhalation effort to deliver the powder. To administer a dose of the inhalation powder, a patient loads a cartridge into our inhaler and inhales through the mouthpiece. Upon inhalation, the dry powder is lifted out of the cartridge and broken up (or de-agglomerated) into small particles. The inhalers are engineered to produce an aggressive airstream that de-agglomerates the powder while keeping the powder moving relatively slowly. This slow-moving powder effectively navigates the patient's airways to reach the deep lung with minimal deposition at the back of the throat. Our inhalers show very little change in performance (i.e., efficient cartridge emptying) over a wide range of inhalation efforts. We have a supply agreement with the contract manufacturer that produces the plastic-molded parts for our inhaler and the corresponding cartridges. We expect to be able to qualify an additional vendor of plastic-molding contract manufacturing services, if warranted by demand. We then assemble the inhalers from the individual components at our Connecticut facility.

The quality management systems of our Connecticut facility have been certified to be in conformance with the ISO 13485:2016 standard. Our facility is inspected on a regular basis by the FDA, most recently in July 2021 when the FDA conducted a pre-approval inspection related to Tyvaso DPI and a GMP inspection related to Afrezza. The FDA made one observation during its most recent inspection, which we corrected and addressed with the FDA following the site visit. We were also inspected by the Agência Nacional de Vigilância Sanitária ("ANVISA") (Brazil National Health Surveillance Agency) in May 2018. ANVISA renewed its certificate in 2020 on the basis of a virtual inspection. The FDA and other foreign jurisdictions are expected to conduct additional inspections of our facility from time to time.

We believe that our Connecticut facility has enough capacity to satisfy the current demand for Afrezza and Tyvaso DPI. In addition, we are currently expanding production capacity with additional filling lines and other equipment in order to meet the demand for Tyvaso DPI projected by UT over the next several years. The costs of this expansion project are being borne by UT.

Currently, the only source of insulin that we have qualified for Afrezza is manufactured by Amphastar France Pharmaceuticals S.A.S. ("Amphastar"). In April 2014, we entered into a supply agreement with Amphastar (as amended, the "Insulin Supply Agreement") to purchase certain annual minimum quantities with an aggregate purchase commitment of €120.1 million over a term that currently extends through December 31, 2027. As of December 31, 2022, there was $72.3 million remaining in aggregate purchase commitments under this agreement. See additional information in Note 16 – Commitments and Contingencies to the consolidated financial statements for further information related to the Insulin Supply Agreement.

The treprostinil used to produce Tyvaso DPI is supplied to us at no cost by United Therapeutics.

Currently, we purchase FDKP, the primary component of our Technosphere powders, from a major chemical manufacturer with facilities in Europe and North America.

We also have an agreement with the contractor that performs the final packaging of Afrezza and Tyvaso DPI overwraps, inhalers and printed material into patient kits. We expect to be able to qualify an additional vendor of packaging services, if warranted by demand.

V-Go is manufactured for us by a contract manufacturer ("CMO") in Southern China using MannKind-owned, custom-designed, semi-automated manufacturing equipment and production lines that can be brought online and/or staffed up as demand increases. We believe these production lines will have the ability to meet our current and expected near-term demand for V-Go. Additional CMOs in China perform release testing, sterilization, inspection and packaging functions.

V-Go is assembled from components that are manufactured to our specifications. Each completed device is tested to ensure compliance with our engineering and quality assurance specifications. A series of automated inspection checks, including x-ray assessments and lot-released testing, are also conducted throughout the manufacturing process to verify proper assembly and functionality. When mechanical components are sourced from outside vendors, those vendors must meet our detailed qualification and process control requirements. We maintain a team of product and process engineers, supply chain and quality personnel who provide product and production line support for V-Go. We also employ a full-time dedicated contractor based in China.

Some of the parts and components of V-Go are purchased from sole-source vendors, and we manage any single-source components and suppliers through our global supply chain operation. We believe that, if necessary, alternative sources of supply would, in most cases, be available in a relatively short period of time and on commercially reasonable terms.

The BluHale device is assembled for us by a CMO using components that are sourced from multiple vendors. Similarly, the clofazimine inhalation solution being evaluated in the MNKD-101 program is manufactured for us by a CMO.

In general, our suppliers and contract manufacturers are sophisticated and mature organizations, often with multinational operations, that have significant experience with pharmaceutical and medical device manufacturing. Our quality and manufacturing personnel conduct

extensive inspections to qualify new vendors and periodic GMP audits of their operations on an ongoing basis. Our CMO facilities and the facilities of our critical suppliers are subject to periodic inspection by the FDA and corresponding state and foreign agencies. With the expansion of our supply chain into the electronic components that are required for BluHale devices, we have begun to require our vendors to confirm that conflict minerals are not knowingly or intentionally added during the manufacturing process for, or are unnecessary to the functionality or production of, the components that we source from such vendors.

Intellectual Property

Our success will depend in large measure on our ability to continue enforcing our intellectual property rights, effectively maintain our trade secrets and avoid infringing the proprietary rights of third parties. Our policy is to file patent applications on what we deem to be important technological developments that might relate to our product candidates or methods of using our product candidates and to seek intellectual property protection for all inventions in the United States, Europe, Japan and, depending on the nature of the invention, selected other jurisdictions. We have obtained, are seeking, and will continue to seek patent protection on the compositions of matter, methods of treatment and manufacturing processes flowing from our research and development efforts.

Our Technosphere drug delivery platform enjoys patent protection relating to the powder, its manufacture, its use for pulmonary delivery of drugs as well as protection related to our inhalers and associated cartridges. We have additional patent coverage relating to methods for the treatment of diabetes using Afrezza. Overall, Afrezza is protected by approximately 670 issued patents and 55 pending patent applications in the United States and selected jurisdictions around the world, the longest-lived of which will expire in 2032. Similarly, Tyvaso DPI is protected by approximately 450 issued patents in the United States and elsewhere and an additional 40 pending patent applications. The longest-lived patent protection for Tyvaso DPI will expire in 2035. Various features of the commercial V-Go device are protected by a portfolio of approximately 200 issued patents and another 25 pending patent applications, the longest-lived of which will expire in 2033. Additional patents and patent applications are expected to provide protection for MNKD-101, our BluHale inhalation-profiling apparatus and various development tools. Our entire worldwide portfolio consists of approximately 1,350 issued patents and approximately 215 pending patent applications We expect to file further patent applications as our research and development efforts continue.

Drug delivery is a crowded field and a substantial number of patents have been issued to innovators in this space. In addition, because patent positions can be highly uncertain and frequently involve complex legal and factual questions, the breadth of claims obtained in any application or the enforceability of issued patents cannot be confidently predicted. Further, there can be substantial delays in commercializing pharmaceutical products, which can partially consume the statutory period of exclusivity through patents. For some of our inventions, particularly manufacturing processes and improvements, we have chosen to rely on trade secrets and know-how, which are not protected by patents, to maintain our competitive position.

We use trademarks and service marks to protect our corporate brand as well as the branding associated with Afrezza, V-Go, our Technosphere formulation technology, our device platform and the product support programs that we have developed. Our current portfolio consists of approximately 240 registered trademarks and 55 applications in the U.S. and selected foreign jurisdictions. We routinely monitor competing trademarks and, when necessary, oppose marks that we believe would be confusing to consumers. We also enforce against the unauthorized use or misappropriation of our marks.

Competition

The pharmaceutical and biotechnology industries are highly competitive and characterized by rapidly evolving technology and intense research and development efforts. We compete with companies, including major global pharmaceutical companies, and other institutions that have substantially greater financial, research and development, marketing and sales capabilities and have substantially greater experience in undertaking preclinical and clinical testing of products, obtaining regulatory approvals and marketing and selling biopharmaceutical products. We face competition based on, among other things, product efficacy and safety, the timing and scope of regulatory approvals, product ease of use and price.

Afrezza is administered at the beginning of a meal, so its principal competitors are rapid-acting” insulin analogs that are used for mealtime insulin injections. The products in this category are marketed by Eli Lilly and Company, Sanofi S.A. and Novo Nordisk A/S. V-Go is typically used by patients as part of a basal-bolus insulin regimen. Like Afrezza, it competes with injectable mealtime insulin products but also with long-acting, or basal, injectable insulins. The principal products in this category are marketed by Novo Nordisk and Sanofi.

Both Afrezza and V-Go also face some competition from glucagon-like peptide-1, or GLP-1, analog injection products. These products are often used in combination with oral medications or basal insulin injection before a patient progresses to a basal-bolus insulin regimen. As a result, we also compete with the manufacturers of GLP-1 analog injection products, such as AstraZeneca PLC, Novo Nordisk A/S and Eli Lilly and Company.

Government Regulation

The FDA and comparable regulatory agencies in state and local jurisdictions impose substantial requirements upon the research, clinical development, testing, manufacture, labeling, storage, shipping, approval, recordkeeping, advertising, promotion, sale and distribution of medical devices and new drug and biologic products. In addition, to the extent that our products are marketed abroad, they are also subject to export requirements and to regulation by foreign governments. The regulatory approval process is generally lengthy, expensive and uncertain.

Failure to comply with applicable FDA and other regulatory requirements can result in sanctions being imposed on us, including warning letters, hold letters on clinical research, product recalls or seizures, total or partial suspension of production or injunctions, refusals to permit products to be imported into or exported out of the United States, refusals of the FDA to grant approval of drugs or to allow us to enter into government supply contracts, withdrawals of previously approved marketing applications, civil or criminal fines or other penalties.

As the holder of marketing approvals for Afrezza and V-Go, we are subject to continuing regulation by the FDA, including post marketing study commitments or requirements, record-keeping requirements, reporting of adverse experiences with our products, submitting periodic reports, drug sampling and distribution requirements, notifying the FDA and gaining its approval of certain manufacturing or labeling changes, and complying with certain electronic records and signature requirements. For example, as part of the approval of Afrezza, the FDA required us to conduct certain additional clinical studies of Afrezza in pediatric patients. In 2021, we initiated a Phase 3 clinical trial to evaluate the safety and efficacy of Afrezza in combination with basal insulin versus multiple daily injections of insulin in children and adolescents aged 4-17 who are living with type 1 or type 2 diabetes. This study, known as the INHALE-1 study, is expected to complete enrollment by the end of 2023. When Afrezza was approved, the FDA also required us to conduct an additional long-term safety study that was originally intended to compare the incidence of pulmonary malignancy observed with Afrezza to that observed in a standard of care control group. We have an ongoing dialogue with the FDA regarding the agency's current interest in the long-term safety of Afrezza and an appropriate study design to address any concerns.

As a manufacturer of multiple therapeutic products, including Tyvaso DPI, our Connecticut facility is subject to federal registration and listing requirements and, if applicable, to state licensing requirements. It is also subject to inspection by the FDA and other national regulatory bodies and must comply with current good manufacturing practices ("cGMPs"), quality system regulations for medical devices ("QSR") and other requirements enforced by these regulatory bodies. So too are the facilities of our insulin supplier and the supplier(s) of FDKP. Likewise, the supplier of our inhaler and cartridges and the CMOs for V-Go are subject to QSR, which requires manufacturers to follow elaborate design, testing, control, documentation and other quality assurance procedures during the manufacturing process of medical devices, among other requirements. A failure, including those of our suppliers, to obtain and maintain applicable federal registrations or state licenses, or to meet the inspection criteria of the FDA or the other national regulatory bodies, would disrupt our manufacturing processes and would harm our business. In complying with standards set forth in these regulations, manufacturers must continue to expend time, money and effort in the area of production and quality control to ensure full compliance.

In addition, the FDA imposes complex regulations on entities that advertise and promote drugs, which include, among other requirements, standards for and regulation of direct-to-consumer advertising, industry sponsored scientific and educational activities, promotional activities involving the Internet, and restrictions on off-label promotion. The FDA has very broad enforcement authority, and failure to comply with these regulations can result in penalties, including the issuance of a warning letter, requirements for corrective advertising to healthcare providers, a requirement that future advertising and promotional materials be pre-cleared by the FDA, and state and federal civil and criminal investigations and prosecutions.

Products manufactured in the United States and marketed outside the United States are subject to certain FDA regulations, as well as regulation by the country in which the products are to be sold. We are also subject to foreign regulatory requirements governing clinical trials and drug product sales if products are studied or marketed abroad. Whether or not FDA approval has been obtained, approval of a product by the comparable regulatory authorities of foreign countries usually must be obtained prior to the marketing of the product in those countries. The approval process varies from jurisdiction to jurisdiction and the time required may be longer or shorter than that required for FDA approval.

Pricing and Reimbursement

Government coverage and reimbursement policies both directly and indirectly affect our ability to successfully commercialize our approved products, and such coverage and reimbursement policies will be affected by future healthcare reform measures. Third-party payers, such as government health administration authorities, private health insurers and other organizations that provide healthcare coverage, generally decide which drugs they will pay for and establish reimbursement levels for covered drugs. In particular, in the United States, private third-party payers often provide reimbursement for products and services based on the level at which the government (through the Medicare or Medicaid programs) provides reimbursement for such products and services. In the United States, the European Union and other potentially significant markets for our product candidates, government authorities and other third-party payers are increasingly attempting to limit or regulate the price of medical products and services, particularly for new and innovative products and therapies, which has resulted in lower average selling prices. Further, the increased emphasis on managed healthcare in the United States will put additional pressure on product pricing, reimbursement and usage, which may adversely affect our future product sales and results of operations. Recently, in the United States there has been heightened governmental scrutiny of the manner in which drug manufacturers set prices for their marketed products. Pricing pressures can arise from rules and practices of managed care organizations, judicial decisions and governmental laws and regulations related to Medicare, Medicaid, healthcare reform, pharmaceutical reimbursement policies and pricing in general.

The United States and some foreign jurisdictions have enacted or are considering a number of additional legislative and regulatory proposals to change the healthcare system in ways that could affect our ability to sell our products profitably. Among policy makers and payers in the U.S. and elsewhere, there is significant interest in promoting changes in healthcare systems with the stated goals of containing healthcare costs, improving quality and/or expanding access. In the United States, the pharmaceutical industry has been a particular focus of these efforts and has been significantly affected by major legislative initiatives, including the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act (collectively, "PPACA"), which was enacted in March 2010. In the years since the PPACA was enacted, there have been a number of executive, judicial and congressional challenges to certain aspects of PPACA. While Congress has not passed comprehensive repeal legislation, several bills affecting the implementation of certain provisions of the PPACA have been signed into law. For example, legislation enacted in 2017, informally titled the Tax Cuts and Jobs Act of 2017 ("Tax Act"), includes a provision repealing, effective January 1, 2019, the tax-based shared responsibility payment imposed by the PPACA on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the "individual mandate". Subsequently, a Texas U.S. District Court Judge ruled in December 2018 that the PPACA is unconstitutional in its entirety because the "individual mandate" was repealed by Congress as part of the Tax Act. Ultimately, in June 2021 the Supreme Court dismissed this challenge to the constitutionality of the PPACA, so it remains in effect in its current form. However, in the future, there are likely to be additional proposals relating to the reform of the U.S. health care system, some of which could further limit the prices we are able to charge for our products, or the amounts of reimbursement available for our products. If drug products are made available to authorized users of the Federal Supply Schedule of the General Services Administration, additional laws and requirements apply. All of these activities are also potentially subject to federal and state consumer protection and unfair competition laws.

Moreover, in the United States, there have been several presidential executive orders, congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for products. For example, on March 11, 2021, President Biden signed the American Rescue Plan Act of 2021 into law, which eliminates the statutory Medicaid drug rebate cap, currently set at 100% of a drug's average manufacturer price, for single source and innovator multiple source drugs, beginning January 1, 2024. More recently, the Inflation Reduction Act (the "IRA"), which was signed into law in August 2022, limits insulin copays to $35 per month for Medicare Part D beneficiaries starting in 2023 and extends enhanced subsidies for individuals purchasing health insurance coverage in PPACA marketplaces through plan year 2025. The IRA also eliminates the "donut hole" under the Medicare Part D program beginning in 2025 by significantly lowering the beneficiary maximum out-of-pocket cost and through a newly established manufacturer discount program. In addition, the IRA, among other things, (1) directs the U.S. Department of Health and Human Services ("HHS") to negotiate the price of certain single-source drugs and biologics covered under Medicare and (2) imposes rebates under Medicare Part B and Medicare Part D to penalize price increases that outpace inflation. These provisions will take effect progressively starting in fiscal year 2023, although they may be subject to legal challenges. At the state level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing.

Health Care Fraud and Abuse and Transparency Laws

If a drug product is reimbursed by Medicare, Medicaid or other federal or state healthcare programs, we must comply with, among others, the federal civil and criminal false claims laws, including the civil False Claims Act, as amended, the federal Anti-Kickback Statute, as amended, and similar state laws. Similarly, if a drug product is reimbursed by Medicare or Medicaid, pricing and rebate programs must comply with, as applicable, the Medicaid rebate requirements of the Omnibus Budget Reconciliation Act of 1990, as amended, and the Medicare Prescription Drug Improvement and Modernization Act of 2003.

The federal healthcare Anti-Kickback Statute prohibits, among other things, persons or entities from knowingly and willfully soliciting, offering, receiving or providing remuneration, directly or indirectly, overtly or covertly, in cash or in kind, to induce or reward, or in return for, either the referral of an individual for, or the purchase, order or recommendation of, any good or service, for which payment may be made under a federal healthcare program such as Medicare and Medicaid.

In addition, federal civil and criminal false claims laws, including the civil False Claims Act, which can be enforced through civil whistleblower or qui tam actions, and civil monetary penalty laws impose criminal and civil penalties against individuals or entities for, among other things, knowingly presenting, or causing to be presented, to the federal government, including the Medicare and Medicaid programs, claims for payment or approval that are false or fraudulent or making a false statement to avoid, decrease or conceal an obligation to pay money to the federal government.

The federal Health Insurance Portability and Accountability Act of 1996 ("HIPAA") imposes criminal and civil liability for, among other things, executing a scheme to defraud any healthcare benefit program and also created federal criminal laws that prohibit knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false statements in connection with the delivery of or payment for healthcare benefits, items or services.

The Physician Payments Sunshine Act within PPACA, and its implementing regulations, require certain manufacturers of drugs, devices, biological and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program (with certain exceptions) to (i) report information related to certain payments or other transfers of value made or distributed to physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors), certain other healthcare professionals (such as physician assistants and

nurse practitioners), and teaching hospitals, or to entities or individuals at the request of, or designated on behalf of, the physicians and teaching hospitals and (ii) report annually certain ownership and investment interests held by physicians and their immediate family members.

Many states have similar healthcare statutes or regulations that apply to items and services reimbursed under Medicaid and other state programs, or, in several states, that apply regardless of the payer. Additional state laws require pharmaceutical companies to implement a comprehensive compliance program, comply with industry's compliance guidelines and relevant compliance guidance promulgated by the federal government and register pharmaceutical sales representatives and limit expenditure for, or payments to, individual medical or health professionals. In addition, certain state and local laws require pharmaceutical companies to report expenses relating to the marketing and promotion of pharmaceutical products and to report gifts and payments to individual physicians in the states; register pharmaceutical sales representatives, and report pricing with respect to certain drug products.

Privacy

We are subject to data privacy and security regulation by both the federal government and the states in which we conduct our business. HIPAA, as amended by the Health Information Technology and Clinical Health Act ("HITECH"), and their respective implementing regulations, imposes certain requirements relating to the privacy, security and transmission of individually identifiable health information. Among other things, HITECH makes HIPAA's privacy and security standards directly applicable to "business associates" — independent contractors or agents of covered entities, which include certain healthcare providers, health plans, and healthcare clearinghouses, that receive or obtain protected health information in connection with providing a service on behalf of a covered entity. HITECH also increased the civil and criminal penalties that may be imposed against covered entities, business associates and possibly other persons, and gave state attorneys general new authority to file civil actions for damages or injunctions in federal courts to enforce HIPAA and seek attorneys' fees and costs associated with pursuing federal civil actions.

State laws also govern the privacy and security of personal data, including health information in certain circumstances, many of which differ from each other in significant ways and may not have the same effect, thus complicating compliance efforts. For example, the California Consumer Privacy Act of 2018 ("CCPA") imposes obligations on covered businesses. These obligations include, but are not limited to, providing specific disclosures in privacy notices and affording California residents certain rights related to their personal data. The CCPA allows for statutory fines for noncompliance (up to $7,500 per violation). Although the CCPA exempts some data processed in the context of clinical trials, the CCPA may increase compliance costs and potential liability with respect to other personal data we maintain about California residents. In addition, the California Privacy Rights Act of 2020 ("CPRA"), which became effective January 1, 2023, expands the CCPA. The CPRA establishes a new California Privacy Protection Agency to implement and enforce the CPRA, which could increase the risk of enforcement. Other states have enacted data privacy laws. For example, Virginia passed the Consumer Data Protection Act, and Colorado passed the Colorado Privacy Act, both of which become effective in 2023. U.S. federal and state consumer protection laws require us to publish statements that accurately and fairly describe how we handle personal data and choices individuals may have about the way we handle their personal data.

Foreign data privacy and security laws impose significant and complex compliance obligations on entities that are subject to those laws. As one example, the European Union's General Data Protection Regulation 2016/679 ("EU GDPR") contains provisions specifically directed at the processing of health information, higher sanctions and extra-territoriality measures that are intended to bring non-EU companies under the data security and privacy legal framework specified in the regulation. We anticipate that over time we may expand our business operations to include operations in the EU, including potentially conducting preclinical and clinical trials. With such expansion, we would be subject to increased governmental regulation in the EU countries in which we might operate, including the EU GDPR.

Other regulation

In addition to the foregoing, we are subject to numerous federal, state and local laws relating to such matters as laboratory practices, the experimental use of animals, the use and disposal of hazardous or potentially hazardous substances, controlled drug substances, safe working conditions, manufacturing practices, environmental protection and fire hazard control.

We may incur significant costs to comply with these laws and regulations now or in the future. If our operations are found to be in violation of any of the federal and state laws described above or any other governmental regulations that apply to us, we may be subject to penalties, including significant criminal, civil and administrative penalties, damages, fines, imprisonment, disgorgement, exclusion from government healthcare programs, additional reporting requirements and/or oversight if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws and the curtailment or restructuring of our operations, any of which could adversely affect our ability to operate our business and our results of operations.

Ethical Business Practices and Sustainability

Ethical Marketing

We require that our employees abide by our Code of Business Conduct and Ethics, our policy on interactions with healthcare professionals and patients, U.S. federal and state laws and applicable foreign laws. We are committed to protecting the health and well-being of patients by ensuring that medically sound knowledge of the benefits and risks of our products is understood and communicated thoroughly and accurately to patients, physicians and global health authorities.

Our policy on interactions with healthcare professionals and patients requires that our employees promote our products fairly, truthfully, accurately and on-label. Off-label promotion of our products is explicitly prohibited, as are sales activities that would interfere with a healthcare provider's independent medical judgment or the doctor-patient relationship. All sales staff receive compliance training upon hire and on an annual basis. We also routinely monitor sales calls. We expect that consistent enforcement of, and training on, our Code of Business Conduct and Ethics and our policy on interactions with healthcare professionals and patients will help us to avoid the incidence of unethical marketing practices.

As part of our commitment to patient support and education, our employees and consultants may attend and participate in certain patient events, such as health fairs or local disease awareness and advocacy events. In all cases, interactions with patients and patient groups may only be conducted in settings that are suitable for patient education and separate from the usual place(s) of clinical business of healthcare providers or institutions. In addition, our sponsorship of such events, if any, must be clearly disclosed through prominent signage.

Drug Safety

The safety of our products at all stages – from clinical trials to the administration and use and through to safe disposal – is a key area of attention for us. We manufacture our approved and investigational products in accordance with the applicable cGMPs, QSR and other requirements enforced by the FDA and other regulatory bodies that have oversight over our products.

In addition, all sales packs of our drugs that are placed in the distribution chain are serialized in accordance with the requirements of the Drug Quality and Security Act, which requires drug manufacturers to assign a unique identifier to each sales pack (and each aggregate of such sales pack, such as a case or pallet). These identifiers remain on such pack or aggregate through the whole supply chain until its consumption or destruction. This system is intended to improve detection and removal of drugs that may be counterfeit, stolen, contaminated, or otherwise harmful from the drug supply chain.

All of our employees are required to adhere to a standard operating procedure for capturing and reporting adverse events, safety information, and product complaints/adverse incidents involving any drug products marketed by us. These reports, as well as those that are collected by our third-party call center, are evaluated, processed and reported to regulatory authorities in accordance with FDA regulations and guidance on the post-marketing reporting of adverse experiences involving drugs, medical devices and combination products.

Safety of Clinical Trial Participants

When we are actively conducting clinical trials, the safety of our clinical trials plays a crucial role in the development of new products and our continuing prosperity. We take numerous steps to maximize the safety of our clinical trial participants.

The health of subjects in clinical trials is a priority for us and we are committed to conducting clinical trials according to uniformly high ethical standards. We apply those standards to trials that we sponsor and conduct directly as well as those conducted on our behalf by clinical research organizations. We conduct trials in accordance with all applicable laws, the standards of International Council for Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use Guidelines and following the ethical principles that have their origin in the Declaration of Helsinki.

We require that informed consent be obtained in all trials to ensure that participants understand the risks and benefits of the procedures, how personal medical data is collected and used, and that participation in the trial is voluntary, among other information. We retain documentation that all participants in our trials have provided informed consent.

We monitor clinical trials through audits and inspections conducted by us and by clinical research organizations (CROs) that we engage. We also inspect our CROs prior to, and during, an engagement. These inspections verify that our policies, good clinical practices and applicable laws are being adhered to.

Our ability to ensure the safety of clinical trial participants is critical to securing regulatory approval and continued product development success. Moreover, our inability to conduct safe and effective clinical trials could increase our development costs over time. We will continue to hold ourselves to high standards in our oversight and management of clinical trials.

Our policy is to disclose the basic results of all clinical trials that we conduct to test the effectiveness of investigational drugs intended to treat serious or life-threatening diseases or conditions (i.e., phase 2-4 clinical studies). Additionally, we may voluntarily disclose the results of

initial safety studies (i.e., phase 1 clinical studies). In our disclosure of clinical trial results, our policy is to include all serious adverse events and those non-serious adverse events that have a frequency of at least five percent.

Corruption and Bribery

Our Code of Business Conduct and Ethics reflects the business practices and principles of behavior that we expect of every employee, officer and director. All new employees are trained on the Code of Business Conduct and Ethics and existing employees are required to acknowledge annually that they have refreshed their familiarity with the policies contained within it. Our Code of Business Conduct and Ethics includes clear guidelines on anti-bribery and anti-corruption practices. In addition, we have adopted a separate anti-corruption policy. Currently, we have very limited operations outside the United States; however, as we expand our global reach through collaborations or through our own growth, we acknowledge that certain regions may pose a higher risk for corrupt practices. We intend to continue our internal training programs and oversight over collaborators on anti-bribery, anti-corruption and other unethical practices in order to reduce these risks.

Bribing healthcare professionals to use or recommend our products can create adverse publicity and damage our ability to use a critical channel of influence. We have adopted and implemented PhRMA's Code on Interactions with Healthcare Professionals as part of our policy on interactions with healthcare professionals and patients. We believe that training on, and enforcement of, these codes will limit the incidence of unethical interactions between our personnel and healthcare professionals.

Long-Lived Assets

Our long-lived assets are located in the United States and China and totaled $53.0 million and $38.9 million as of December 31, 2022 and 2021, respectively.

Employees and Human Capital

Our human capital helps us develop and commercialize new products, conduct clinical trials and navigate government regulations. Our ability to recruit, develop and retain highly skilled talent is a significant determinant of our success. Our Code of Business Conduct and Ethics codifies our commitment to diversity and to providing equal opportunity and a positive working environment in all aspects of employment. We also have policies setting forth our expectations for nondiscrimination and a harassment-free work environment. Specifically, our policy is that no aspect of employment, including hiring and promotional opportunities, will be subject to unlawful discrimination or harassment (including sexual harassment) based on race, creed, color, religion, national origin, ancestry, gender (including pregnancy, breastfeeding or medical conditions related to pregnancy or breastfeeding), age, physical or intellectual disability, sexual orientation, gender identity, gender expression, gender stereotyping, marital status, military or veteran status, citizenship, genetic characteristic or information, or any other characteristic protected by applicable federal, state or local law.

As of December 31, 2022, we had 395 total at-will employees, of which 391 were full-time. Of our full-time employees, 210 were engaged in manufacturing, 25 in research and development, 55 in general and administrative and 101 in selling and marketing. Sixteen of these employees had a Ph.D. degree and/or M.D. degree and were engaged in activities relating to research and development, manufacturing, quality assurance or business development. As of December 31, 2022, our workforce was distributed along genders and ethnic minorities as follows:

Grade Levels	Number	Female (%)	Ethnic minority (%)
Vice President and above	17	18%	24%
Executive Director, Director and Senior Manager	115	48%	25%
Managers and below	263	41%	44%
All employees	**395**	**42%**	**37%**

None of our employees are subject to a collective bargaining agreement. We believe relations with our employees are good. In managing our business, we monitor several human capital measures, including:

- performance against a set of specified corporate objectives for each calendar year, some of which are milestone-based, such as achieving deliverables under our collaboration agreements, and some of which are quantitative, such as achieving target net sales of Afrezza. These objectives are intended to stretch employees and serve as development opportunities but also form the basis for our incentive compensation programs.
- churn rate – the number of new hires and terminations each month as a percentage of the employee base – as well as the number of regrettable losses. These metrics help us to identify areas within the company where there may be a need for greater management attention and intervention.
- responses to periodic employee surveys, which are designed to give us insight into employees' perception of company culture and areas where management's efforts are perceived positively or negatively as well as open-ended feedback in the form of anonymous comments and questions. We strive to conduct employee surveys approximately every six months.

We offer our employees a portfolio of rewards (our "Total Rewards Program") to recruit and retain a high level of talent across the Company. Our Total Rewards program is offered to each employee and currently consists of the seven components:

- Base salary – We offer a market-competitive base salary.
- Annual bonus program – We offer quarterly sales incentive bonuses to our sales force and annual bonuses to the remainder of our employees.
- Annual equity program – We offer a new hire and annual equity awards that consist of time- and, in some cases, performance-based restricted stock units and non-qualified stock options.
- Health and wellness program – A variety of insurance plans that allow employees to select among different options, including a health maintenance organization, a preferred provider organization and a high-deductible health plan, as well as flexible spending and health savings accounts.
- Paid time off program – In addition to the paid time off that is accrued throughout the year, we offer paid holidays, including two week-long company shutdowns in July and December.
- Retirement savings program – A 401(k) retirement plan pursuant to which we match 50% of employee contributions up to a specified limit on their annual eligible earnings.
- Employee stock purchase plan ("ESPP") program – The ESPP provides the opportunity to purchase shares of our common stock through payroll deductions every six months at a 15% discount to the market price at the beginning or end of each offering period, whichever is lower.
- Employee Recognition Program – We provide a company-wide Spot and Peer to Peer Recognition Program to more directly reward performance and behaviors and drive cultural improvement.

The majority of our employees are essential workers involved in the production of medicine for chronic diseases. As such, they cannot work remotely and must perform their job duties in our Connecticut facility according to a 24/7 shift schedule. Other employees have work responsibilities that can be performed somewhat asynchronously and in different locations. For such employees, our general preference is that in-office employees be in the office during core business hours at least four days per week in order to maximize the productivity gains that come from having a collaborative culture and a common workplace; however, we also recognize that such employees can be equally productive working from home some of the time or with a flexible workday that they can structure around significant events outside of the workplace, such as commute times or childcare responsibilities.

Occupational Health and Safety

Hazardous materials are inherent in our operations, and it is not possible to eliminate completely the risk of accidental exposure from our operations. We have established procedures to comply with governmental regulations regarding workplace safety, including training employees to enable them to recognize risks and empower them to learn, discover, work safely, and to minimize injuries, illnesses, environmental impact and regulatory risks. In 2022, our total illness and injury incidence rate was 0.3 per 100 employees compared to the 2021 industry average of 1.6, as reported by the U.S. Department of Labor, and our DART (days away/restricted or job transfer) incident rate was 0.3 per 100 employees compared to the 2021 industry average of 1.2. We will continue our efforts to ensure a high level of workplace safety.

Corporate Information

We were incorporated in the State of Delaware on February 14, 1991. Our principal executive offices are located at 1 Casper Street, Danbury, Connecticut 06810, and our general telephone number is (818) 661-5000. Our website address is http://www.mannkindcorp.com. Our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and amendments to reports filed pursuant to Sections 13(a) and 15(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, are available free of charge on our website as soon as reasonably practicable after we electronically file such material with, or furnish it to, the SEC. The contents of our websites are not incorporated into this Annual Report. Further, our references to the URLs for these websites are intended to be inactive textual reference only.

Scientific Advisors

We seek advice from a number of leading scientists and physicians on scientific, technical and medical matters. These advisors are leading scientists in endocrinology, pulmonology and other areas of scientific or clinical interest. Our scientific advisors are consulted regularly to assess, among other things:

- our research and development programs;
- the design and implementation of our clinical programs;
- our patent and publication strategies;
- market opportunities from a clinical perspective;

- new technologies relevant to our research and development programs; and
- specific scientific and technical issues relevant to our business.

A partial listing of our current scientific advisors is maintained on our corporate website at www.mannkindcorp.com.

Information about our Executive Officers

The following table sets forth our current executive officers and their ages:

Name	Age	Position(s)
Michael E. Castagna, Pharm.D.	46	Chief Executive Officer
Steven B. Binder	60	Chief Financial Officer
Sanjay Singh, M Pharm, MBA	56	Executive Vice President, Technical Operations
Stuart A. Tross, Ph.D.	56	Chief People and Workplace Officer
David B. Thomson, Ph.D., J.D.	56	General Counsel and Secretary

Michael E. Castagna, Pharm.D. has been our Chief Executive Officer since May 2017 and was our Chief Commercial Officer from March 2016 until May 2017. From November 2012 until he joined us, Dr. Castagna was at Amgen, Inc., where he initially served as Vice President, Global Lifecycle Management and was most recently Vice President, Global Commercial Lead for Amgen's Biosimilar Business Unit. From 2010 to 2012, he was Executive Director, Immunology, at Bristol-Myers Squibb Company ("BMS"), an innovative global biopharmaceutical company. Before BMS, Dr. Castagna served as Vice President & Head, Biopharmaceuticals, North America, at Sandoz, a division of Novartis. He has also held positions with commercial responsibilities at EMD (Merck) Serono, Pharmasset and DuPont Pharmaceuticals. He received his pharmacy degree from the University of the Sciences-Philadelphia College of Pharmacy, a PharmD. from Massachusetts College of Pharmacy & Sciences and an MBA from The Wharton School of Business at the University of Pennsylvania.

Steven B. Binder has been our Chief Financial Officer since July 2017. Before joining us, since 2013 Mr. Binder served as Vice President and Chief Financial Officer of the International Group of Stryker Corporation, a leading global medical technology company, based in Singapore. Prior to Stryker, Mr. Binder served in a series of senior leadership roles at BMS. His last four positions at BMS were Vice President, Finance roles over different geographic operating units: United States (2012-2013), Europe (2008-2011), AsiaPacific (2005-2007), and Japan (2003-2005). Prior to his international experience, Mr. Binder served in three senior leadership roles for Oncology Therapeutics Network, a U.S. based independent subsidiary of BMS: Vice President, Strategic Development (2001-2003), Vice President, Customer Operations (2000-2001), and Chief Financial Officer (1997-2000). Before Oncology Therapeutics Network, Mr. Binder progressed through three finance and accounting roles for BMS Worldwide Medicines Group after joining the company in 1992. Before BMS, he worked for Deloitte & Touche LLP in a series of auditing roles with increasing responsibility over an eight-year period beginning in 1984. Mr. Binder received a B.S. degree in Accounting and Business Administration from Muhlenberg College and is a Certified Public Accountant.

Sanjay Singh has been our Executive Vice President, Technical Operations since October 2022. Before joining us, since 2011 Mr. Singh served as Sr. Vice President and Associate President Technical Operations in India and USA at Aurobindo Pharma , a leading generic pharmaceutical manufacturing company, headquartered in Hyderabad, India. Prior to Aurobindo, Mr. Singh worked in various leadership roles at Cipla Ltd (2000 – 2007, 2008-2011), Glenmark Pharma (2007-2008), Nicholas Piramal India Ltd (1992-2000) and Cadila Laboratories (1990-1991). Mr. Singh has been associated with the Parenteral Drug Association (PDA) and was the founding president of the PDA, India chapter before moving to the US in 2015. Mr. Singh received an M. Pharma. degree in Pharmaceutical Chemistry from LM College of Pharmacy, Ahmedabad, India and an MBA degree from Institute of Management Studies, Indore, India.

Stuart A. Tross, Ph.D. has been our Chief People and Workplace Officer since December 2016, with responsibilities for human resources, information technology, corporate communications and west coast facilities. From 2006 to 2016 he served in various roles of increasing responsibility at Amgen, Inc., most recently as Senior Vice President and Chief Human Resources Officer responsible for human resources and security on a global basis. From 1998 to 2006 he served in a series of leadership roles at BMS, most recently as Vice President and Global Head of Human Resources for Mead Johnson Company. Mr. Tross received a B.S. degree from Cornell University and M.Sc. and Ph.D. degrees in Industrial-Organizational Psychology from the Georgia Institute of Technology.

David B. Thomson, Ph.D., J.D. has been our General Counsel and Corporate Secretary since January 2002. Prior to joining us, he practiced corporate/commercial and securities law at a major Toronto law firm. Earlier in his career, Dr. Thomson was a post-doctoral fellow at the Rockefeller University. Dr. Thomson obtained his B.S., M Sc. and Ph.D. degrees from Queens University and obtained his J.D. degree from the University of Toronto.

Item 1A. ***Risk Factors***

You should consider carefully the following information about the risks described below, together with the other information contained in this Annual Report before you decide to buy or maintain an investment in our common stock. We believe the risks described below are the risks that are material to us as of the date of this Annual Report. Additional risks and uncertainties that we are unaware of may also become important factors that affect us. If any of the following risks actually occur, our business, financial condition, results of operations and future growth prospects would likely be materially and adversely affected. In these circumstances, the market price of our common stock could decline, and you may lose all or part of the money you paid to buy our common stock.

RISKS RELATED TO OUR BUSINESS

The products that we or our collaboration partner are commercializing may only achieve a limited degree of commercial success.

Successful commercialization of therapeutic products is subject to many risks, including some that are outside our control. There are numerous examples of failures to fully exploit the market potential of therapeutic products, including by biopharmaceutical and device companies with more experience and resources than us. The products, including products that we commercialize ourselves and any future, products that we may develop or acquire in the future and the product that is commercialized by our collaboration partner and future products that may be commercialized by a collaboration partner, may not gain market acceptance among physicians, patients, third-party payers and the healthcare community. The degree of market acceptance of our or a collaboration partner's products depends on many factors, including the following:

- approved labeling claims;
- effectiveness of efforts by us and/or any current or future collaboration or marketing partner to support and educate patients and physicians about the benefits and proper administration of our products, and the perceived advantages of our products and the disadvantages of competitive products;
- willingness of the healthcare community and patients to adopt new technologies;
- ability to manufacture the product in sufficient quantities with acceptable quality and cost;
- perception of patients and the healthcare community, including third-party payers, regarding the safety, efficacy and benefits compared to competing products or therapies;
- convenience and ease of administration relative to existing treatment methods;
- coverage and reimbursement, as well as pricing relative to other treatment therapeutics and methods; and
- marketing and distribution support.

Because of these and other factors, the products described above may not gain market acceptance or otherwise be commercially successful. Failure to achieve market acceptance would limit our ability to generate revenue and would adversely affect our results of operations. We or our current or any future collaboration partner may need to enhance our/their commercialization capabilities in order to successfully commercialize such products in the United States or any other jurisdiction in which the product is approved for commercial sale, and we or the collaboration partner may not have sufficient resources to do so. The market for skilled commercial personnel is highly competitive, and we may not be able to hire all of the personnel we need on a timely basis or retain them for a sufficient period.

In order to increase adoption and sales of our products, we need to continue to develop our commercial organization, including maintaining and growing a highly experienced and skilled workforce with qualified sales representatives.

In order to successfully commercialize our products in the United States, we have built a sales force that promotes Afrezza and V-Go to endocrinologists and selected primary care physicians. In order to successfully commercialize any approved products, we must continue to build our sales, marketing, distribution, managerial and other non-technical capabilities. Factors that may hinder our ability to successfully market and commercially distribute our products include:

- inability to recruit, retain and effectively manage adequate numbers of effective sales personnel;
- lack of complementary products to be offered by sales personnel, which may put us at a competitive disadvantage relative to companies that have more extensive product lines; and
- unforeseen delays, costs and expenses associated with maintaining our sales organization.

If we are unable to maintain an effective sales force for our products, including any other potential future approved products, we may not be able to generate sufficient product revenue in the United States. We are required to expend significant time and resources to train our sales force to be credible and persuasive in convincing physicians to prescribe and pharmacists to dispense our products. In addition, we must continually train our sales force and equip them with effective marketing materials to ensure that a consistent and appropriate message about our products is being delivered to our potential customers. We currently have limited resources compared to some of our competitors, and the continued development of our own commercial organization to market our products and any additional products we may develop or acquire will be expensive and time-consuming. We also cannot be certain that we will be able to continue to successfully develop this capability.

Similarly, if United Therapeutics does not effectively engage or maintain its sales force for Tyvaso DPI, our ability to recognize royalties and manufacturing revenue from this collaboration will be adversely affected.

Manufacturing risks may adversely affect our ability to manufacture our products and Tyvaso DPI, which and could reduce our gross margin and profitability.

We use our Danbury, Connecticut facility to formulate both the Afrezza and Tyvaso DPI inhalation powders, fill plastic cartridges with the powders, and package the cartridges into secondary packaging. We also assemble the inhalers from their individual molded parts. These semi-finished goods are then assembled into the final kits for commercial sale by a contract packager.

The manufacture of pharmaceutical products requires significant expertise and capital investment, including the development of advanced manufacturing techniques and process controls. Manufacturers of pharmaceutical products often encounter difficulties in production, especially in scaling up production to commercial batch sizes. These problems include difficulties with production costs, capacity utilization and yields. We may experience shortages of qualified personnel, which could impact our ability to meet manufacturing requirements. There is also a need to comply with strictly enforced federal, state and foreign regulations, including inspections. Our facility is inspected on a regular basis by the FDA, most recently in July 2021 when the FDA conducted a pre-approval inspection related to Tyvaso DPI and a GMP inspection related to Afrezza. The FDA made one observation during its most recent inspection, which we corrected and addressed with the FDA following the site visit. If the FDA makes any major observations during future inspections, the corrective actions required could be onerous and time-consuming.

Any of these factors could cause us to delay or suspend production, could entail higher costs and may result in our being unable to obtain sufficient quantities for the commercialization of drug products at the costs that we currently anticipate. Furthermore, if we or a third-party manufacturer fail to deliver the required commercial quantities of the product or any raw material on a timely basis, and at commercially reasonable prices, sustainable compliance and acceptable quality, and we were unable to promptly find one or more replacement manufacturers capable of production at a substantially equivalent cost, in substantially equivalent volume and quality on a timely basis, we would likely be unable to meet demand for such drug products and we would lose potential revenues.

In addition, we rely on our contract manufacturers in Southern China to manufacture V-Go. Our contract manufacturer uses MannKind-owned custom-designed, semi-automated manufacturing equipment and production lines to meet our quality requirements. Separate contract manufacturers in China perform release testing, sterilization, inspection and packaging functions. As a result, our business is subject to risks associated with doing business in China, including:

- adverse political and economic conditions, particularly those potentially negatively affecting the trade relationship between the United States and China;
- trade protection measures, such as tariff increases, and import and export licensing and control requirements;
- potentially negative consequences from changes in tax laws;
- difficulties associated with the Chinese legal system, including increased costs and uncertainties associated with enforcing contractual obligations in China;
- historically lower protection of intellectual property rights;
- unexpected or unfavorable changes in regulatory requirements;
- changes and volatility in currency exchange rates;
- possible patient or physician preferences for more established pharmaceutical products and medical devices manufactured in the United States; and
- difficulties in managing foreign relationships and operations generally.

These risks are likely to be exacerbated by our limited experience with V-Go and its manufacturing processes. As demand increases, we may have to invest additional resources to purchase components, hire and train employees, and enhance our manufacturing processes. If we fail to increase our production capacity efficiently, our sales may not increase in line with our forecasts and our operating margins could fluctuate or decline. In addition, we may be unable to support commercialization of Tyvaso DPI.

If our suppliers fail to deliver materials and services needed for commercial manufacturing in a timely and sufficient manner or fail to comply with applicable regulations, and if we fail to timely identify and qualify alternative suppliers, our business, financial condition and results of operations would be harmed and the market price of our common stock and other securities could decline.

For the commercial manufacture of inhaled drug products, we need access to sufficient, reliable and affordable supplies of FDKP, the inhaler, the related cartridges and other materials. For Afrezza, we also require a supply of insulin. Currently, the only source of insulin that we have qualified for Afrezza is manufactured by Amphastar. We must rely on all of our suppliers to comply with relevant regulatory and other legal requirements, including the production of insulin and FDKP in accordance with current good manufacturing practices (“cGMP”) for drug products, and the molding of the inhaler and cartridges components in accordance with quality system regulations (“QSRs”).

For V-Go, we obtain parts from a small number of suppliers, including some parts and components that are purchased from single-source vendors. Depending on a limited number of suppliers exposes us to risks, including limited control over pricing, availability, quality and delivery schedules. In addition, we do not have long-term supply agreements with most of our suppliers and, in many cases, we make our purchases on a purchase order basis. Under many of our supply agreements, we have no obligation to buy any given quantity of components, and our suppliers have no obligation to manufacture for us or sell to us any given quantity of components.

Because we do not have long-standing relationships with our suppliers, we may not be able to convince them to continue to make components available to us unless there is demand for such components from their other customers. If any one or more of our suppliers cease to provide us with sufficient quantities of components in a timely manner or on terms acceptable to us, we would have to seek alternative sources of supply. Because of factors such as the proprietary nature of our product, our quality control standards and regulatory requirements, we cannot quickly engage additional or replacement suppliers for some of our critical components.

We may also have difficulty obtaining similar components from other suppliers that meet the requirements of the FDA or other regulatory agencies. Although we conduct our own inspections and review and/or approve investigations of each supplier, there can be no assurance that the FDA, upon inspection, would find that the supplier substantially complies with the QSR or cGMP requirements, where applicable. If a supplier fails to comply with these requirements or the comparable requirements in foreign countries, regulatory authorities may subject us to regulatory action, including criminal prosecutions, fines and suspension of the manufacture of our products. If we are required to find a new or additional supplier, we will need to evaluate that supplier's ability to provide material that meets regulatory requirements, including cGMP or QSR requirements, as well as our specifications and quality requirements, which would require significant time and expense and could delay production.

As a result, our ability to purchase adequate quantities of the components for our products may be limited. Additionally, our suppliers may encounter problems that limit their ability to manufacture components for us, including financial difficulties or damage to their manufacturing equipment or facilities. In general, if any of our suppliers is unwilling or unable to meet its supply obligations or if we encounter delays or difficulties in our relationships with manufacturers or suppliers, and we are unable to secure an alternative supply source in a timely manner and on favorable terms, our business, financial condition, and results of operations may be harmed and the market price of our common stock and other securities may decline.

If third-party payers do not cover our approved products, such products might not be prescribed, used or purchased, which would adversely affect our revenues.

In the United States and elsewhere, sales of prescription pharmaceuticals still depend in large part on the availability of coverage and adequate reimbursement to the consumer from third-party payers, such as government health administration authorities and private insurance plans. Third-party payers are increasingly challenging the prices charged for medical products and services. The market for our approved products will depend significantly on access to third-party payers' formularies, which are the lists of medications and devices for which third-party payers provide coverage and reimbursement. The industry competition to be included in such formularies often leads to downward pricing pressures on pharmaceutical and device companies. Also, third-party payers may refuse to include a particular branded product in their formularies or otherwise restrict patient access to a branded product when a less costly generic equivalent or other alternative is available. Even if favorable coverage and reimbursement status is attained for our products, less favorable coverage policies and reimbursement rates may be implemented in the future. In addition, because each third-party payer individually approves coverage and reimbursement levels, obtaining coverage and adequate reimbursement is a time-consuming and costly process. We may be required to provide scientific and clinical support for the use of any product to each third-party payer separately with no assurance that approval would be obtained. This process could delay the market acceptance of any product and could have a negative effect on our future revenues and operating results. Even if we succeed in bringing more products to market, we cannot be certain that any such products would be considered cost-effective or that coverage and adequate reimbursement to the consumer would be available. Patients will be unlikely to use our products unless coverage is provided and reimbursement is adequate to cover a significant portion of the cost of our products.

Our future revenues and ability to generate positive cash flow from operations may be affected by the continuing efforts of government and other third-party payers to contain or reduce the costs of healthcare through various means. In the United States, there have been several congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for products. For example, the IRA, which was signed into law in August 2022, will limit insulin copays to $35 per month for Medicare Part D beneficiaries starting in 2023. In certain foreign markets the pricing of prescription pharmaceuticals is subject to direct governmental control. The European Union provides options for its member states to restrict the range of medicinal products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. A member state may approve a specific price for the medicinal product or it may instead adopt a system of direct or indirect controls on the profitability of the company placing the medicinal product on the market.

If we or any collaboration or marketing partner is unable to obtain and maintain coverage of, and adequate third-party reimbursement for, our approved products, physicians may limit how much or under what circumstances they will prescribe or administer them and patients may decline to purchase them. This in turn could affect our or any collaboration or marketing partner's ability to successfully commercialize such products and would impact our profitability, results of operations, financial condition, and prospects.

We may need to raise additional capital to fund our operations.

We may need to raise additional capital, whether through the sale of equity or debt securities, additional strategic business collaborations, the establishment of other funding facilities, licensing arrangements, asset sales or other means, in order to support our ongoing activities, including the commercialization of our products and the development of our product candidates. It may be difficult for us to raise additional funds on favorable terms, or at all. The extent of our additional funding requirements will depend on a number of factors, including:

- the degree to which we are able to generate revenue from products that we or a collaboration partner commercialize;
- the costs of developing Afrezza and of commercializing Afrezza and V-Go on our own in the United States;
- the degree to which revenue from Afrezza exceeds or does not exceed the minimum revenue covenants under our credit and security agreement with MidCap Financial Trust (the "MidCap credit facility"), if applicable;
- the demand by any or all of the holders of our debt instruments to require us to repay or repurchase such debt securities if and when required;
- our ability to repay or refinance existing indebtedness, and the extent to which our notes with conversion options or any other convertible debt securities we may issue are converted into or exchanged for shares of our common stock;
- the rate of progress and costs of our clinical studies and research and development activities;
- the costs of procuring raw materials and operating our manufacturing facility;
- our obligation to make lease payments and milestone payments;
- our success in establishing additional strategic business collaborations or other sales or licensing of assets, and the timing and amount of any payments we might receive from any such transactions;
- actions taken by the FDA and other regulatory authorities affecting Afrezza, V-Go, Tyvaso DPI, our product candidates or competitive products;
- the emergence of competing technologies and products and other market developments;
- the costs of preparing, filing, prosecuting, maintaining and enforcing patent claims and other intellectual property rights or defending against claims of infringement by others;
- the level of our legal and litigation expenses; and
- the costs of discontinuing projects and technologies, and/or decommissioning existing facilities, if we undertake any such activities.

We have raised capital in the past through the sale of equity and debt securities and we may in the future pursue the sale of additional equity and/or debt securities, or the establishment of other funding facilities including asset-based borrowings. There can be no assurances, however, that we will be able to raise additional capital in the future on acceptable terms, or at all. Volatility and disruptions of the global supply chain and financial markets, if sustained or recurrent, could prevent us or make it more difficult for us to access capital.

Issuances of additional debt or equity securities or the issuance of common stock upon conversion of outstanding convertible debt securities for shares of our common stock could impact the rights of the holders of our common stock and will dilute their ownership percentage. Moreover, the establishment of other funding facilities may impose restrictions on our operations. These restrictions could include limitations on additional borrowing and specific restrictions on the use of our assets, as well as prohibitions on our ability to create liens, pay dividends, redeem our stock or make investments. We may also raise additional capital by pursuing opportunities for the licensing or sale of certain intellectual property and other assets. We cannot offer assurances, however, that any strategic collaboration, sales of securities or sales or licenses of assets will be available to us on a timely basis or on acceptable terms, if at all. We may be required to enter into relationships with third parties to develop or commercialize products or technologies that we otherwise would have sought to develop independently, and any such relationships may not be on terms as commercially favorable to us as might otherwise be the case.

In the event that sufficient additional funds are not obtained through strategic collaboration opportunities, sales of securities, funding facilities, licensing arrangements, borrowing arrangements and/or asset sales on a timely basis, we may be required to reduce expenses through the delay, reduction or curtailment of our projects, or further reduction of costs for facilities and administration.

We cannot provide assurances that changed or unexpected circumstances will not result in the depletion of our capital resources more rapidly than we currently anticipate. There can be no assurances that we will be able to raise additional capital in sufficient amounts or on favorable terms, or at all. If we are unable to raise adequate additional capital when required or in sufficient amounts or on terms acceptable to us, we may have to delay, scale back or discontinue one or more product development programs, curtail our commercialization activities, significantly reduce expenses, sell assets (potentially at a loss), enter into relationships with third parties to develop or commercialize products or technologies that we otherwise would have sought to develop or commercialize independently, cease operations altogether, pursue an acquisition of our company at a price that may result in up to a total loss on investment for our stockholders, file for bankruptcy or seek other protection from creditors, or liquidate all of our assets.

We expect that our results of operations will fluctuate for the foreseeable future, which may make it difficult to predict our future performance from period to period.

Our operating results have fluctuated in the past and are likely to do so in future periods. Some of the factors that could cause our operating results to fluctuate from period to period include the factors that will affect our funding requirements described above under "Risk Factors — We may need to raise additional capital to fund our operations." In addition, the current inflationary environment related to increased aggregate demand and supply chain constraints has the potential to adversely affect our operating expenses.

We believe that comparisons from period to period of our financial results are not necessarily meaningful and should not be relied upon as indications of our future performance.

We have a history of operating losses. We expect to incur losses in the future and we may not generate positive cash flow from operations in the future.

We are not currently profitable and have rarely generated positive net cash flow from operations. As of December 31, 2022, we had an accumulated deficit of $3.2 billion. The accumulated deficit has resulted principally from costs incurred in our research and development programs, the write-off of assets (including goodwill, inventory and property, plant and equipment) and general operating expenses. We expect to make substantial expenditures and to incur increasing operating losses in the future in order to continue commercializing our products and to advance development of product candidates in our pipeline. In addition, under our Insulin Supply Agreement with Amphastar, we agreed to purchase certain annual minimum quantities of insulin through 2027. As of December 31, 2022, there was approximately $72.3 million remaining in aggregate purchase commitments under this agreement. We may not have the necessary capital resources to service this contractual commitment.

Our losses have had, and are expected to continue to have, an adverse impact on our working capital, total assets and stockholders' equity. Our ability to achieve and sustain positive cash flow from operations and profitability depends heavily upon successfully commercializing our products, and we cannot be sure when, if ever, we will generate positive cash flow from operations or become profitable.

We have a substantial amount of debt, and we may be unable to make required payments of interest and principal as they become due.

The notes to our consolidated financial statements in this Annual Report on Form 10-K provide details about our various debt obligations. As of December 31, 2022, we had $278.8 million principal amount of outstanding debt, consisting of:

- $230.0 million aggregate principal amount of Senior convertible notes bearing interest at 2.50% payable semi-annually in arrears on March 1 and September 1 of each year, beginning on September 1, 2021 and will mature on March 1, 2026, unless earlier converted, redeemed or repurchased. The Senior convertible notes are convertible at an initial conversion price of approximately $5.21 per share of common stock. The conversion rate is subject to adjustment under certain circumstances in accordance with the terms of the Indenture.
- $40.0 million principal amount under the MidCap credit facility, bearing interest at an annual rate equal to one-month Secured Overnight Financing Rate ("SOFR") plus 6.25% (cap of 8.25%), subject to a one-month SOFR floor of 1.00%, payable in equal monthly installments beginning in September 2023 through maturity in August 2025. In August 2022, we amended the MidCap credit facility and transitioned the benchmark interest rate from the London Interbank Offered Rate ("LIBOR") to the SOFR. The interest rate prior to the amendment was one-month LIBOR (1% floor) plus 6.25% (cap of 8.25%).
- $8.8 million principal amount of indebtedness under a $35.0 million note that we issued to The Mann Group LLC ("Mann Group") in August 2019 that is convertible into shares of our common stock at the option of Mann Group at a conversion price of $2.50 per share (the "Mann Group convertible note"), bearing interest at a fixed rate of 2.50% per annum compounded quarterly and maturing in December 2025. Interest is paid-in-kind from August 2019 until the end of 2020, after which we have the option to pay interest in-kind or in shares.

The MidCap credit facility requires us, and any debt arrangements we may enter into in the future may require us, to comply with various covenants that limit our ability to, among other things:

- dispose of assets;
- complete mergers or acquisitions;
- incur indebtedness or modify existing debt agreements;
- amend or modify certain material agreements;
- engage in additional lines of business;
- encumber assets;
- pay dividends or make other distributions to holders of our capital stock;
- make specified investments;

- change certain key management personnel or organizational documents; and
- engage in transactions with our affiliates.

We may be required to comply with additional covenants in the future under certain circumstances. The restrictive covenants in the MidCap credit facility could prevent us from pursuing business opportunities that we or our stockholders may consider beneficial.

If our unrestricted cash and short-term investments balance falls below $90.0 million, we will be subject to a covenant relating to trailing twelve-month minimum Afrezza net revenue, tested on a monthly basis, which is set forth in the MidCap credit facility Agreement, as amended. If we fail to meet this covenant, any outstanding borrowings, together with accrued interest, under the MidCap credit facility could be declared immediately due and payable.

A breach of any of these covenants could result in an event of default under the MidCap credit facility. If we default on our obligations under the MidCap credit facility, the lender could proceed against the collateral granted to them to secure our indebtedness or declare all obligations under the MidCap credit facility to be due and payable. In certain circumstances, procedures by the lender could result in a loss by us of all of our equipment and inventory, which are included in the collateral granted to the lender. In addition, upon any distribution of assets pursuant to any liquidation, insolvency, dissolution, reorganization or similar proceeding, the holders of secured indebtedness will be entitled to receive payment in full from the proceeds of the collateral securing our secured indebtedness before the holders of other indebtedness or our common stock will be entitled to receive any distribution with respect thereto.

There can be no assurance that we will have sufficient resources to make any required repayments of principal under the terms of our indebtedness when required. While we have been able to timely make our required interest payments to date, we cannot guarantee that we will be able to do so in the future. If we fail to pay interest on, or repay, our outstanding term loan under the MidCap credit facility or borrowings under either of the Mann Group convertible note or the non-convertible note issued to Mann Group in August 2019 in an aggregate principal amount of $35.1 million (the “Mann Group non-convertible note” and, together with the Mann Group convertible note, the “Mann Group promissory notes’) when required, we will be in default under the instrument for such debt securities or loans, and may also suffer an event of default under the terms of other borrowing arrangements that we may enter into from time to time. Any of these events could have a material adverse effect on our business, results of operations and financial condition, up to and including the note holders initiating bankruptcy proceedings or causing us to cease operations altogether.

Our business, product sales, results of operations and ability to access capital could be adversely affected by the effects of health pandemics or epidemics, in regions where we or third parties distribute our products or where we or third parties on which we rely have significant manufacturing facilities, concentrations of clinical trial sites or other business operations.

Our business could be adversely affected by the effects of health pandemics or epidemics in regions where we have business operations, and we could experience significant disruptions in the operations of third-party manufacturers and distributors upon whom we rely. For example, sales and demand for Afrezza were previously adversely affected by the global COVID-19 pandemic, and a resurgence of the COVID-19 pandemic or future pandemics or epidemics could adversely affect the demand for and sales of our products in the future. Quarantines, shelter-in-place and similar government orders, or the perception that such orders, shutdowns or other restrictions on the conduct of business operations could occur, related to COVID-19 or other infectious diseases, could impact personnel at third-party manufacturing facilities in the United States and other countries, or the availability or cost of materials, which would disrupt our supply chain. In particular, our contract manufacturers in China could be impacted by that country’s recent policy of strict lockdowns in order to reduce the spread of disease. Disruptions in sales and demand for our products would be expected to occur:

- if patients are physically quarantined or are unable or unwilling to visit healthcare providers,
- if physicians restrict access to their facilities for a material period of time,
- if healthcare providers prioritize treatment of acute or communicable illnesses over chronic disease management,
- if pharmacies are closed or suffering supply chain disruptions,
- if patients lose access to employer-sponsored health insurance due to periods of high unemployment, or
- as a result of general disruptions in the operations of payers, distributors, logistics providers and other third parties that are necessary for our products to be prescribed and reimbursed.

In addition, clinical trials of our products previously experienced delays as a result of the COVID-19 pandemic and may be affected by a resurgence in the COVID-19 pandemic or a future health pandemic or epidemic. Clinical site initiation and patient enrollment may be delayed due to prioritization of hospital resources toward the health pandemic or epidemic. Some patients may not be able or willing to comply with clinical trial protocols if quarantines impede patient movement or interrupt healthcare services. Similarly, our ability to recruit and retain patients and principal investigators and site staff would adversely impact our clinical trial operations.

A pandemic or epidemic also has the potential for disruption of global financial markets. This disruption, if sustained or recurrent, could make it more difficult for us to access capital, which could negatively affect our liquidity. In addition, a recession or market correction as a result of a health pandemic or epidemic could materially affect our business and the value of our common stock.

If we do not obtain regulatory approval of our products in foreign jurisdictions, we will not be able to market in such jurisdictions, which could limit our commercial revenues. We may not be able to establish additional regional partnerships or other arrangements with third parties for the commercialization of our products outside of the United States.

Although Afrezza has been approved in the United States by the FDA and in Brazil by ANVISA, we have not yet obtained approval in any other jurisdiction. Similarly, V-Go has received 510(k) clearance from the FDA, but has not received a comparable approval in any other country. In order to market our products in a foreign jurisdiction, we must obtain regulatory approval in each such foreign jurisdiction, and we may never be able to obtain such approvals. The research, testing, manufacturing, labeling, sale, import, export, marketing, and distribution of therapeutic products outside the United States are subject to extensive regulation by foreign regulatory authorities, whose regulations differ from country to country. We will be required to comply with the different regulations and policies of the jurisdictions where we seek approval for our products, and we have not yet identified all of the requirements that we will need to satisfy to submit our products for approval for other jurisdictions. This will require additional time, expertise and expense, including the potential need to conduct additional studies or development work for other jurisdictions beyond the work that we have conducted to support the approval of our products in the United States.

Our current strategy for the future commercialization of our products outside of the United States, subject to receipt of the necessary regulatory approvals, is to seek, establish and maintain regional partnerships in foreign jurisdictions where there are commercial opportunities. It may be difficult to find or maintain collaboration partners that are able and willing to devote the time and resources necessary to successfully commercialize our products. Collaborations with third parties may require us to relinquish material rights, including revenue from commercialization, agree to unfavorable terms or assume material ongoing development obligations that we would have to fund. These collaboration arrangements are complex and time-consuming to negotiate, and if we are unable to reach agreements with third-party collaborators, we may fail to meet our business objectives and our financial condition may be adversely affected. We may also face significant competition in seeking collaboration partners, and may not be able to find a suitable collaboration partner in a timely manner on acceptable terms, or at all. Any of these factors could cause delay or prevent the successful commercialization of our products in foreign jurisdictions and could have a material and adverse impact on our business, financial condition and results of operations and the market price of our common stock and other securities could decline.

Continued testing of our products and product candidates may not yield successful results, and even if it does, we may still be unable to successfully commercialize our current or future products.

We have generally sought to develop product candidates through our internal research programs. All such product candidates will require additional research and development and, in some cases, significant preclinical, clinical and other testing prior to seeking regulatory approval to market them. Accordingly, these product candidates will not be commercially available for a number of years, if at all. Further research and development on these programs will require significant financial resources. Given our limited financial resources, we may not be able to advance these programs into clinical development unless we are able to obtain specific funding for these programs or enter into collaborations with third parties.

Our research and development programs are designed to test the safety and efficacy of our product candidates through extensive nonclinical and clinical testing. We may experience numerous unforeseen events during, or as a result of, the testing process that could delay or impact commercialization of any of our product candidates, including the following:

- safety and efficacy results obtained in our nonclinical and early clinical testing may be inconclusive or may not be predictive of results that we may obtain in our future clinical studies or following long-term use, and we may as a result be forced to stop developing a product candidate or alter the marketing of an approved product;
- the analysis of data collected from clinical studies of our product candidates may not reach the statistical significance necessary, or otherwise be sufficient to support FDA or other regulatory approval for the claimed indications;
- after reviewing clinical data, we or any collaborators may abandon projects that we previously believed were promising;
- our product candidates may not produce the desired effects or may result in adverse health effects or other characteristics that preclude regulatory approval or limit their commercial use once approved; and
- disruptions caused by man-made or natural disasters or public health pandemics or epidemics or other business interruptions.

As a result of any of these events, we, any collaborator, the FDA, or any other regulatory authorities, may suspend or terminate clinical studies or marketing of the drug at any time. Any suspension or termination of our clinical studies or marketing activities may harm our business, financial condition and results of operations and the market price of our common stock and other securities may decline.

If we do not achieve our projected development goals in the timeframes we expect, our business, financial condition and results of operations will be harmed and the market price of our common stock and other securities could decline.

For planning purposes, we estimate the timing of the accomplishment of various scientific, clinical, regulatory and other product development goals, which we sometimes refer to as milestones. These milestones may include the commencement or completion of scientific studies and clinical studies and the submission of regulatory filings. From time to time, we publicly announce the expected timing of some of

these milestones. All of these milestones are based on a variety of assumptions. The actual timing of the achievement of these milestones can vary dramatically from our estimates, in many cases for reasons beyond our control, depending on numerous factors, including:

- the rate of progress, costs and results of our clinical studies and preclinical research and development activities;
- our ability to identify and enroll patients who meet clinical study eligibility criteria;
- our ability to access sufficient, reliable and affordable supplies of components used in the manufacture of our product candidates;
- the costs of expanding and maintaining manufacturing operations, as necessary;
- the extent to which our clinical studies compete for clinical sites and eligible subjects with clinical studies sponsored by other companies;
- actions by regulators; and
- disruptions caused by geopolitical conflicts, man-made or natural disasters or public health pandemics or epidemics or other business interruptions.

If we fail to commence or complete, or experience delays in or are forced to curtail, our proposed development programs or otherwise fail to adhere to our projected development goals in the timeframes we expect (or within the timeframes expected by analysts or investors), our business, financial condition and results of operations may be harmed and the market price of our common stock and other securities may decline. In addition, we may be delayed or prevented from generating revenues from milestone or other payments that depend on our ability to achieve any milestone obligations specified in an out-licensing arrangement.

The long-term safety and efficacy of approved products may differ from clinical studies, which could negatively impact sales and could lead to reputational harm or other negative effects.

The effects of approved therapeutic products over terms longer than the clinical studies or in much larger populations may not be consistent with earlier clinical results. If long-term use of an approved therapeutic product results in adverse health effects or reduced efficacy or both, the FDA or other regulatory agencies may terminate our or any marketing or collaboration partner's ability to market and sell the product, may narrow the approved indications for use or otherwise require restrictive product labeling or marketing, or may require further clinical studies, which may be time-consuming and expensive and may not produce favorable results.

V-Go received pre-market clearance in 2010 under Section 510(k) of the U.S. Federal Food, Drug, and Cosmetic Act, or FDCA. This process typically requires the submission of less supporting documentation than other FDA approval processes and does not always require long-term clinical studies. As a result, we currently lack significant published long-term clinical data supporting the safety and efficacy of V-Go and the benefits it offers that might have been generated in connection with other approval processes. For these reasons, adults who require insulin and their healthcare providers may be slower to adopt or recommend V-Go, we may not have comparative data that our competitors have or are generating, and third-party payers may not be willing to provide coverage or reimbursement for V-Go. Further, future studies or clinical experience may indicate that treatment with V-Go is not superior to treatment with competitive products. Such results could slow the adoption of V-Go and significantly reduce our sales, which could prevent us from achieving our forecasted sales targets or achieving or sustaining profitability. Moreover, if future results and experience indicate that V-Go causes unexpected or serious complications or other unforeseen negative effects, we could be subject to mandatory product recalls, suspension or withdrawal of FDA clearance or approval, significant legal liability or harm to our business reputation.

We may not realize the benefit of our recent acquisition of V-Go or any future acquisition or strategic transaction; we may be unable to successfully integrate new products or businesses we may acquire.

We periodically evaluate and pursue acquisition of therapeutic products. We completed the acquisition of V-Go on May 31, 2022 and it remains to be seen whether the acquisition will further our business strategy as anticipated or generate significant revenues. Moreover, the integration of any acquired business, product or other assets into our company may be complex and time-consuming and, if such businesses, products or assets are not successfully integrated, we may not achieve the anticipated benefits, cost-savings or growth opportunities. Potential difficulties that may be encountered in the integration process include the following:

- unanticipated liabilities related to acquired assets, companies or joint ventures;
- integrating personnel, operations and systems, while maintaining focus on producing and delivering consistent, high quality products;
- coordinating geographically dispersed organizations;
- diversion of management time and focus from operating our business to management of strategic alliances or joint ventures or acquisition integration challenges;
- retention of key employees;

- increases in our expenses and reductions in our cash available for operations and other uses;
- retaining existing customers and attracting new customers;
- managing inefficiencies associated with integrating the operations of our company; and
- possible write-offs or impairment charges relating to acquired assets, businesses or joint ventures.

Furthermore, these acquisitions and other arrangements, even if successfully integrated, may fail to further our business strategy as anticipated, expose us to increased competition or challenges with respect to our products or geographic markets, and expose us to additional liabilities associated with an acquired business, product, technology or other asset or arrangement. Any one of these challenges or risks could impair our ability to realize any benefit from our acquisitions or arrangements after we have expended resources on them.

Future acquisitions or dispositions could also result in potentially dilutive issuances of our equity securities, the incurrence of debt, contingent liabilities or amortization expenses or write-offs of goodwill, any of which could harm our financial condition.

Our products and product candidates may be rendered obsolete by rapid technological change.

The rapid rate of scientific discoveries and technological changes could result in our approved products or one or more of our product candidates becoming obsolete or noncompetitive. Our competitors may develop or introduce new products that render our technology or products less competitive, uneconomical or obsolete. Our future success may depend not only on our ability to develop our product candidates, but also our ability to improve them in order to keep pace with emerging industry developments. We cannot assure you that we will be able to do so.

We also expect to face competition from universities and other non-profit research organizations. These institutions carry out a significant amount of research and development in various areas of unmet medical need. These institutions are becoming increasingly aware of the commercial value of their findings and are more active in seeking patent and other proprietary rights as well as licensing revenues.

Reports of side effects or safety concerns in related technology fields or in other companies' clinical studies could delay or prevent us from obtaining regulatory approval for our product candidates or negatively impact public perception of our approved products.

There are a number of clinical studies being conducted by other pharmaceutical companies involving compounds similar to, or potentially competitive with, our product candidates. Adverse results reported by these other companies in their clinical studies or by companies that use our proprietary formulation and inhaler technologies could delay or prevent us from obtaining regulatory approval, may subject our products to class warnings in their labels or negatively impact public perception of our product candidates, which could harm our business, financial condition and results of operations and cause the market price of our common stock and other securities to decline.

If product liability claims are brought against us, we may incur significant liabilities and suffer damage to our reputation.

The testing, manufacturing, marketing and sales of our products and any clinical testing of our product candidates expose us to potential product liability claims. A product liability claim may result in substantial judgments as well as consume significant financial and management resources and result in adverse publicity, decreased demand for a product, injury to our reputation, withdrawal of clinical studies volunteers and loss of revenues. We currently carry worldwide product liability insurance in the amount of $10.0 million as well as an errors and omissions policy in the amount of $1.0 million. Our insurance coverage may not be adequate to satisfy any liability that may arise, and because insurance coverage in our industry can be very expensive and difficult to obtain, we cannot assure you that we will seek to obtain, or be able to obtain if desired, sufficient additional coverage. If losses from such claims exceed our liability insurance coverage, we may incur substantial liabilities that we may not have the resources to pay. If we are required to pay a product liability claim our business, financial condition and results of operations would be harmed and the market price of our common stock and other securities may decline.

If we lose any key employees or scientific advisors, our operations and our ability to execute our business strategy could be materially harmed.

We face intense competition for qualified employees among companies in the biotechnology and biopharmaceutical industries. Our success depends upon our ability to attract, retain and motivate highly skilled employees. We may be unable to attract and retain these individuals on acceptable terms, if at all. In addition, we may be required to expand our workforce. These activities will require the addition of new personnel, including management, and the development of additional expertise by existing personnel, and we cannot assure you that we will be able to attract or retain any such new personnel on acceptable terms, if at all.

The loss of the services of any principal member of our management, commercial and scientific staff could significantly delay or prevent the achievement of our scientific and business objectives. All of our employees are "at will" and we currently do not have employment agreements with any of the principal members of our management, commercial or scientific staff, and we do not have key person life insurance to cover the loss of any of these individuals. Replacing key employees may be difficult and time-consuming because of the limited number of individuals in our industry with the skills and experience required to develop, gain regulatory approval of and commercialize products successfully.

We have relationships with scientific advisors at academic and other institutions to conduct research or assist us in formulating our research, development or clinical strategy. These scientific advisors are not our employees and may have commitments to, and other obligations with, other entities that may limit their availability to us. We have limited control over the activities of these scientific advisors and can generally expect these individuals to devote only limited time to our activities. Failure of any of these persons to devote sufficient time and resources to our programs could harm our business. In addition, these advisors are not prohibited from, and may have arrangements with, other companies to assist those companies in developing technologies that may compete with our products.

If our internal controls over financial reporting are not considered effective, our business, financial condition and market price of our common stock and other securities could be adversely affected.

Section 404 of the Sarbanes-Oxley Act of 2002 requires us to evaluate the effectiveness of our internal controls over financial reporting as of the end of each fiscal year, and to include a management report assessing the effectiveness of our internal controls over financial reporting in our annual report on Form 10-K for that fiscal year.

Our management, including our Chief Executive Officer and our Chief Financial Officer, does not expect that our internal controls over financial reporting will prevent all errors and all fraud. A control system, no matter how well designed and operated, can provide only reasonable, not absolute, assurance that the control system's objectives will be met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud involving a company have been, or will be, detected. The design of any system of controls is based in part on certain assumptions about the likelihood of future events, and we cannot assure you that any design will succeed in achieving its stated goals under all potential future conditions. Over time, controls may become inadequate because of changes in conditions or deterioration in the degree of compliance with policies or procedures. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected. A material weakness in our internal controls has been identified in the past, and we cannot assure you that we or our independent registered public accounting firm will not identify a material weakness in our internal controls in the future. A material weakness in our internal controls over financial reporting would require management and our independent registered public accounting firm to evaluate our internal controls as ineffective. If our internal controls over financial reporting are not considered effective, we may experience a loss of public confidence, which could have an adverse effect on our business, financial condition and the market price of our common stock and other securities.

Changes or modifications in financial accounting standards may harm our results of operations.

From time to time, the Financial Accounting Standards Board ("FASB"), either alone or jointly with other organizations, promulgates new accounting principles that could have an adverse impact on our financial position, results of operations and presentation or classification of cash flows. New pronouncements and varying interpretations of pronouncements have occurred with frequency in the past and are expected to occur again in the future and as a result we may be required to make changes in our accounting policies. Any difficulties in adopting or implementing new accounting standards, and updating or modifying our internal controls as needed on a timely basis, could result in our failure to meet our financial reporting obligations, which could result in regulatory discipline and harm investors' confidence in us. Finally, if we were to change our critical accounting estimates, including those related to the recognition of collaboration revenue and other revenue sources, our operating results could be significantly affected.

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

New income, sales, use or other tax laws, statutes, rules, regulations or ordinances could be enacted at any time, which could adversely affect our business operations and financial performance. Further, existing tax laws, statutes, rules, regulations or ordinances could be interpreted, changed, modified or applied adversely to us. For example, the Tax Act, the Coronavirus Aid, Relief, and Economic Security Act and the IRA enacted many significant changes to the U.S. tax laws. Further guidance from the Internal Revenue Service and other tax authorities with respect to such legislation may affect us, and certain aspects of such legislation could be repealed or modified in future legislation. In addition, it is uncertain if and to what extent various states will conform to federal tax laws. Future tax reform legislation could have a material impact on the value of our deferred tax assets and could increase our future U.S. tax expense.

Effective January 1, 2022, the Tax Act eliminated the option to deduct research and development expenses for tax purposes in the year incurred and requires taxpayers to capitalize and subsequently amortize such expenses over five years for research activities conducted in the United States and over 15 years for research activities conducted outside the United States. Unless the United States Department of the Treasury issues regulations that narrow the application of this provision to a smaller subset of our research and development expenses or the provision is deferred, modified, or repealed by Congress, it could harm our future operating results by effectively increasing our future tax obligations. The actual impact of this provision will depend on multiple factors, including the amount of research and development expenses we will incur, whether we achieve sufficient income to fully utilize such deductions and whether we conduct our research and development activities inside or outside the United States.

Our ability to use net operating losses to offset future taxable income may be subject to limitations.

As of December 31, 2022, the Company had federal and state net operating loss carryforwards of approximately $2.2 billion and $1.7 billion available, respectively, to reduce future taxable income. $499.6 million of the federal losses do not expire and the remaining federal losses have started expiring, beginning in the current year through various future dates.

Pursuant to IRC Sections 382 and 383, annual use of the Company's federal and California net operating loss and research and development credit carryforwards may be limited in the event a cumulative change in ownership of more than 50% occurs within a three-year period. As a result of the Company's initial public offering, an ownership change within the meaning of IRC Section 382 occurred in August 2004. As a result, federal net operating loss and credit carryforwards of approximately $105.8 million are subject to an annual use limitation of approximately $13.0 million. The annual limitation is cumulative and therefore, if not fully utilized in a year can be utilized in future years in addition to the Section 382 limitation for those years. We have completed a Section 382 analysis beginning from the date of our initial public offering through December 31, 2022, to determine whether additional limitations may be placed on the net operating loss carryforwards and other tax attributes, and no additional changes in ownership that met Section 382 study ownership change threshold has been identified through December 31, 2022. There is a risk that changes in ownership may occur in tax years after December 31, 2022. If a change in ownership were to occur, our net operating loss carryforwards and other tax attributes could be further limited or restricted. If limited, the related asset would be removed from the deferred tax asset schedule with a corresponding reduction in the valuation allowance. Due to the existence of the valuation allowance, limitations created by future ownership changes, if any, related to the Company's operations in the U.S. will not impact the Company's effective tax rate.

In addition, at the state level, there may be periods during which the use of net operating loss carryforwards is suspended or otherwise limited, which could accelerate or permanently increase state taxes owed. As a result, if we earn net taxable income, we may be unable to use all or a material portion of our net operating loss carryforwards and other tax attributes, which could potentially result in increased future tax liability to us and adversely affect our future cash flows.

Tax authorities may disagree with our positions and conclusions regarding certain tax positions, resulting in unanticipated costs, taxes or non-realization of expected benefits.

A tax authority may disagree with tax positions that we have taken, which could result in increased tax liabilities. For example, the U.S. Internal Revenue Service or another tax authority could challenge our allocation of income by tax jurisdiction and the amounts paid between our affiliated companies pursuant to our intercompany arrangements and transfer pricing policies, including amounts paid with respect to our intellectual property development. Similarly, a tax authority could assert that we are subject to tax in a jurisdiction where we believe we have not established a taxable nexus, often referred to as a "permanent establishment" under international tax treaties, and such an assertion, if successful, could increase our expected tax liability in one or more jurisdictions. A tax authority may take the position that material income tax liabilities, interest and penalties are payable by us, in which case, we expect that we might contest such assessment. Contesting such an assessment may be lengthy and costly and if we were unsuccessful in disputing the assessment, the implications could increase our anticipated effective tax rate, where applicable.

We may undertake internal restructuring activities in the future that could result in disruptions to our business or otherwise materially harm our results of operations or financial condition.

From time to time, we may undertake internal restructuring activities as we continue to evaluate and attempt to optimize our cost and operating structure in light of developments in our business strategy and long-term operating plans. These activities may result in write-offs or other restructuring charges. There can be no assurance that any restructuring activities that we undertake will achieve the cost savings, operating efficiencies or other benefits that we may initially expect. Restructuring activities may also result in a loss of continuity, accumulated knowledge and inefficiency during transitional periods and thereafter. In addition, internal restructurings can require a significant amount of time and focus from management and other employees, which may divert attention from commercial operations. If we undertake any internal restructuring activities and fail to achieve some or all of the expected benefits therefrom, our business, results of operations and financial condition could be materially and adversely affected.

Our operations might be interrupted by the occurrence of a natural disaster or other catastrophic event.

At least for the foreseeable future, we expect that our manufacturing facility in Connecticut will be the sole location for the manufacturing of Afrezza and Tyvaso DPI. Similarly, our contract manufacturer in Southern China is the only location for the assembly of V-Go. Additional contract manufacturers in China perform release testing, sterilization, inspection and packaging functions. These facilities and the specialized manufacturing equipment we use at them would be costly to replace and could require substantial lead-time to repair or replace. We depend on our facilities and on collaborators, contractors and vendors for the continued operation of our business. Natural disasters or other catastrophic events, including interruptions in the supply of natural resources, political and governmental changes, severe weather conditions, public health pandemics or epidemics, wars, conflicts (including the current Russia-Ukraine conflict), wildfires and other fires, explosions, actions of animal rights activists, terrorist attacks, volcanic eruptions, earthquakes and wars could disrupt our operations or those of our collaborators, contractors and vendors. We might suffer losses as a result of business interruptions that exceed the coverage available under our and our contractors' insurance policies or for which we or our contractors do not have coverage. For example, we are not insured against a terrorist attack. Any natural disaster or catastrophic event could have a significant negative impact on our operations and financial results. Moreover, any such event could delay our research and development programs or cause interruptions in our commercialization of our products.

We deal with hazardous materials and must comply with environmental laws and regulations, which can be expensive and restrict how we do business.

Our research and development work involves the controlled storage and use of hazardous materials, including chemical and biological materials. Our operations also produce hazardous waste products. We are subject to federal, state and local laws and regulations (i) governing how we use, manufacture, store, handle and dispose of these materials (ii) imposing liability for costs of cleaning up, and damages to natural resources from past spills, waste disposals on and off-site, or other releases of hazardous materials or regulated substances, and (iii) regulating workplace safety. Moreover, the risk of accidental contamination or injury from hazardous materials cannot be completely eliminated, and in the event of an accident, we could be held liable for any damages that may result, and any liability could fall outside the coverage or exceed the limits of our insurance. Currently, our general liability policy provides coverage up to $1.0 million per occurrence and $2.0 million in the aggregate and is supplemented by an umbrella policy that provides a further $20.0 million of coverage; however, our insurance policy excludes pollution liability coverage and we do not carry a separate hazardous materials policy. In addition, we could be required to incur significant costs to comply with environmental laws and regulations in the future. Finally, current or future environmental laws and regulations may impair our research, development or production efforts or have an adverse impact on our business, results of operations and financial condition.

When we purchased our facility in Connecticut in 2001, a soil and groundwater investigation and remediation was being conducted by a former site operator (a "responsible party") under the oversight of the Connecticut Department of Energy & Environmental Protection (formerly the Connecticut Department of Environmental Protection), which investigation and remediation is ongoing. The former site operator and responsible party will make further filings necessary to achieve closure for the environmental investigation and remediation it has conducted at the site, and has agreed to indemnify us for any future costs and expenses we may incur that are directly related to its prior operations at the facility. If we are unable to collect these future costs and expenses, if any, from the responsible party, our business, financial condition and results of operations may be harmed. When we sold a portion of the property upon which our facility is located to the entity that is now our landlord, we became an additional responsible party for any environmental investigation and remediation on that portion of the property, including with respect to investigation or remediation that may be required as a result of our activities since 2001. To date, we have not identified any material environmental investigation or remediation activities that we are required to perform.

If our information technology systems or data, or those of third parties upon which we rely, are or were compromised, we could experience adverse consequences resulting from such compromise, including but not limited to regulatory investigations or actions; litigation; fines and penalties; disruptions of our business operations; reputational harm; loss of revenue or profits; loss of customers or sales; and other adverse consequences.

We, and third parties acting on our behalf, employ and are increasingly dependent upon information technology systems, infrastructure, applications, websites and other resources. Our business requires collecting, receiving, manipulating, analyzing, storing, processing, generating, using, disclosing, protecting, securing, transmitting, sharing, disposing of, and making accessible (collectively "processing") large amounts of data, including proprietary, confidential and sensitive data (such as personal or health-related data), intellectual property, and trade secrets (collectively, "sensitive information").

Cyberattacks, malicious internet-based activity, online and offline fraud and other similar activities threaten the confidentiality, integrity, and availability of our sensitive information and information technology systems, and those of the third parties upon which we rely. Such threats are prevalent and continue to increase are increasingly difficult to detect, and come from a variety of sources, including traditional computer "hackers," threat actors "hacktivists," organized criminal threat actors, personnel (such as through theft or misuse), sophisticated nation-states, and nation-state-supported actors. Some actors now engage and are expected to continue to engage in cyber-attacks, including without limitation nation-state actors, for geopolitical reasons and in conjunction with military conflicts and defense activities. We and the third parties upon which we rely may be subject to a variety of evolving threats, including but not limited to social-engineering attacks (including through phishing attacks), malicious code (such as viruses and worms), malware (including as a result of advanced persistent threat intrusions), denial-of-service attacks (such as credential stuffing), credentials harvesting, personnel misconduct or error, ransomware attacks, supply-chain attacks, software bugs, server malfunctions, software or hardware failures, loss of data or other information technology assets, adware, telecommunications failures, earthquakes, fires, floods, and other similar threats. Ransomware attacks, including by organized criminal threat actors, nation-states, and nation-state-supported actors, are becoming increasingly prevalent and severe and can lead to significant interruptions in our operations, loss of data and income, reputational harm, and diversion of funds. Extortion payments may alleviate the negative impact of a ransomware attack, but we may be unwilling or unable to make such payments due to, for example, applicable laws or regulations prohibiting such payments. During times of war and other major conflicts, we and the third parties upon which we rely may be vulnerable to a heightened risk of these attacks, including retaliatory cyber-attacks, that could materially disrupt our systems and operations, supply chain, and ability to produce, sell and distribute our goods and services. Some of our workforce works remotely, which also poses increased risks to our information technology systems and data, as employees working from home, in transit or in public locations, utilize network connections, computers and devices outside our premises or network. Future or past business transactions (such as acquisitions or integrations) could expose us to additional cybersecurity risks and vulnerabilities, as our systems could be negatively affected by vulnerabilities present in acquired or integrated entities' systems and technologies. Furthermore, we may discover security issues that were not found during due diligence of such acquired or integrated entities, and it may be difficult to integrate companies into our information technology environment and security program.

We may rely on third-party service providers and technologies to operate critical business systems to process sensitive information in a variety of contexts, including, without limitation, cloud-based infrastructure, data center facilities, encryption and authentication technology, employee email, and other functions. We may also rely on third-party service providers to provide other products or services, or otherwise to operate our business. For example, we rely on an enterprise software system to operate and manage our business. Our business, including our

ability to manufacture drug products and conduct clinical trials, therefore depends on the continuous, effective, reliable and secure operation of our information technology resources and those of third parties acting on our behalf, including computer hardware, software, networks, Internet servers and related infrastructure. Our ability to monitor these third parties' information security practices is limited, and these third parties may not have adequate information security measures in place. If our third-party service providers experience a security incident or other interruption, we could experience adverse consequences. In particular, supply-chain attacks have increased in frequency and severity, and we cannot guarantee that third parties and infrastructure in our supply chain or our third-party partners' supply chains have not been compromised or that they do not contain exploitable defects or bugs that could result in a breach of or disruption to our information technology systems (including our products) or the third-party information technology systems that support us and our services. While we may be entitled to damages if our third-party service providers fail to satisfy their privacy or security-related obligations to us, any award may be insufficient to cover our damages, or we may be unable to recover such award.

Any of the previously identified or similar threats could cause a security incident or other interruption that could result in unauthorized, unlawful, or accidental acquisition, modification, destruction, loss, alteration, encryption, disclosure of, or access to our sensitive information or our information technology systems, or those of the third parties upon whom we rely. A security incident or other interruption could disrupt our ability (and that of third parties upon whom we rely) to provide our products. We may expend significant resources or modify our business activities (including our clinical trial activities) to try to protect against security incidents. Certain data privacy and security obligations may require us to implement and maintain specific security measures, industry-standards or reasonable security measures to protect our information technology systems and sensitive information. While we have implemented security measures designed to protect against security incidents, there can be no assurance that these measures will be effective. We have not always been able in the past and may be unable in the future to detect vulnerabilities in our information technology systems because such threats and techniques change frequently, are often sophisticated in nature, and may not be detected until after a security incident has occurred. For example, like many companies, we use SolarWinds to help manage our information technology systems. A cyberattack on SolarWinds was discovered in December 2020 and widely exploited by threat actors. Upon learning of this vulnerability, we applied the software patch provided by SolarWinds and remediated the incident. The incident did not appear to have any negative impact on our operations or the sensitive information we may process. In addition, a ransomware attack on Ultimate Kronos Group's ("UKG") Kronos Private Cloud service was discovered in December 2021. We use UKG Pro, a product offered through UKG that is not in the Kronos Private Cloud, for human capital management. UKG is not aware of an impact on UKG Pro and the incident did not appear to have any negative impact on our operations or the sensitive information we may process. Thus, despite our efforts to identify and remediate vulnerabilities, if any, in our information technology systems, our efforts may not be successful. Further, we may experience delays in developing and deploying remedial measures designed to address any such identified vulnerabilities.

Applicable data privacy and security obligations may require us to notify relevant stakeholders of security incidents. Such disclosures are costly, and the disclosures or the failure to comply with such requirements could lead to adverse consequences. If we (or a third party upon whom we rely) experience a security incident or are perceived to have experienced a security incident, we may experience adverse consequences. These consequences may include: government enforcement actions (for example, investigations, fines, penalties, audits, and inspections); additional reporting requirements and/or oversight; restrictions on processing sensitive information (including personal data); litigation (including class claims); indemnification obligations; negative publicity; reputational harm; monetary fund diversions; interruptions in our operations (including availability of data); financial loss; and other similar harms. Security incidents and attendant consequences may cause customers to stop using our products, deter new customers from using our products, and negatively impact our ability to grow and operate our business. Additionally, our contracts may not contain limitations of liability, and even where they do, there can be no assurance that limitations of liability in our contracts are sufficient to protect us from liabilities, damages, or claims related to our data privacy and security obligations. We cannot be sure that our cybersecurity insurance coverage will be adequate or sufficient to protect us from or to mitigate liabilities arising out of our privacy and security practices, that such coverage will continue to be available on commercially reasonable terms or at all, or that such coverage will pay future claims.

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

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

Disruptions at the FDA and other agencies may also slow the time necessary for new drugs to be reviewed and/or approved by necessary government agencies, which would adversely affect our business. For example, over the last several years, the U.S. government has shut down several times and certain regulatory agencies, such as the FDA and the SEC, have had to furlough critical FDA, SEC and other government employees and stop critical activities. If a prolonged government shutdown occurs, it could significantly impact the ability of the FDA to timely review and process our regulatory submissions, which could have a material adverse effect on our business. Further, future government shutdowns could impact our ability to access the public markets and obtain necessary capital in order to properly capitalize and continue our operations.

RISKS RELATED TO GOVERNMENT REGULATION

Our product candidates must undergo costly and time-consuming rigorous nonclinical and clinical testing and we must obtain regulatory approval prior to the sale and marketing of any product in each jurisdiction. The results of this testing or issues that develop in the review and approval by a regulatory agency may subject us to unanticipated delays or prevent us from marketing any products.

Our research and development activities for product candidates, as well as the manufacturing and marketing of approved products, are subject to regulation, including regulation for safety, efficacy and quality, by the FDA in the United States and comparable authorities in other countries. FDA regulations and the regulations of comparable foreign regulatory authorities are wide-ranging and govern, among other things:

- product design, development, manufacture and testing;
- product labeling;
- product storage and shipping;
- pre-market clearance or approval;
- advertising and promotion; and
- product sales and distribution.

The requirements governing the conduct of clinical studies as well as the manufacturing and marketing of drug products outside the United States vary widely from country to country. Foreign approvals may take longer to obtain than FDA approvals and can require, among other things, additional testing and different clinical study designs. Foreign regulatory approval processes include essentially all of the risks associated with the FDA approval processes. Some of those agencies also must approve prices of the products. Approval of a product by the FDA does not ensure approval of the same product by the health authorities of other countries. In addition, changes in regulatory policy in the United States or in foreign countries for product approval during the period of product development and regulatory agency review of each submitted new application may cause delays or rejections.

Clinical testing can be costly and take many years, and the outcome is uncertain and susceptible to varying interpretations. We cannot be certain if or when regulatory agencies might request additional studies, under what conditions such studies might be requested, or what the size or length of any such studies might be. The clinical studies of our product candidates may not be completed on schedule, regulatory agencies may order us to stop or modify our research, or these agencies may not ultimately approve any of our product candidates for commercial sale. The data collected from our clinical studies may not be sufficient to support regulatory approval of our product candidates. Even if we believe the data collected from our clinical studies are sufficient, regulatory agencies have substantial discretion in the approval process and may disagree with our interpretation of the data. Our failure to adequately demonstrate the safety and efficacy of any of our product candidates would delay or prevent regulatory approval of our product candidates, which could prevent us from achieving profitability.

Questions that have been raised about the safety of marketed drugs generally, including pertaining to the lack of adequate labeling, may result in increased cautiousness by regulatory agencies in reviewing new drugs based on safety, efficacy, or other regulatory considerations and may result in significant delays in obtaining regulatory approvals. Such regulatory considerations may also result in the imposition of more restrictive drug labeling or marketing requirements as conditions of approval, which may significantly affect the marketability of our drug products.

If we do not comply with regulatory requirements at any stage, whether before or after marketing approval is obtained, we may be fined or forced to remove a product from the market, subject to criminal prosecution, or experience other adverse consequences, including restrictions or delays in obtaining regulatory marketing approval.

Even if we comply with regulatory requirements, we may not be able to obtain the labeling claims necessary or desirable for product promotion. We may also be required to undertake post-marketing studies.

In addition, if we or other parties identify adverse effects after any of our products are on the market, or if manufacturing problems occur, regulatory approval may be withdrawn and a reformulation of our products, additional clinical studies, changes in labeling of, or indications of use for, our products and/or additional marketing applications may be required. If we encounter any of the foregoing problems, our business, financial condition and results of operations will be harmed and the market price of our common stock and other securities may decline.

We are subject to stringent, ongoing government regulation.

The FDA and comparable foreign regulatory authorities subject any approved therapeutic product to extensive and ongoing regulatory requirements concerning the manufacturing processes, labeling, packaging, distribution, adverse event reporting, storage, advertising, promotion, import, export and recordkeeping. These requirements include submissions of safety and other post-marketing information and reports, registration, as well as continued compliance with cGMPs and GCP requirements for any clinical trials that we conduct post-approval.

Later discovery of previously unknown problems, including adverse events of unanticipated severity or frequency, or with our third-party manufacturers or manufacturing processes, or failure to comply with regulatory requirements, may result in, among other things:

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

We also are required to register our establishments and list our products with the FDA and certain state agencies. We and any third-party manufacturers or suppliers must continually adhere to federal regulations setting forth cGMP (for drugs) and QSR (for medical devices), and their foreign equivalents, which are enforced by the FDA and other national regulatory bodies through their facilities inspection programs. In complying with cGMP and foreign regulatory requirements, we and any of our third-party manufacturers or suppliers will be obligated to expend time, money and effort in production, record-keeping and quality control to ensure that our products meet applicable specifications and other requirements. QSR requirements also impose extensive testing, control and documentation requirements. State regulatory agencies and the regulatory agencies of other countries have similar requirements. In addition, we will be required to comply with regulatory requirements of the FDA, state regulatory agencies and the regulatory agencies of other countries concerning the reporting of adverse events and device malfunctions, corrections and removals (e.g., recalls), promotion and advertising and general prohibitions against the manufacture and distribution of adulterated and misbranded devices. Failure to comply with these regulatory requirements could result in significant civil fines, product seizures, injunctions and/or criminal prosecution of responsible individuals and us. Any such actions would have a material adverse effect on our business, financial condition and results of operations.

As part of the approval of Afrezza, the FDA required us to conduct certain additional clinical studies of Afrezza. We have initiated one of these studies, a Phase 3 clinical trial to evaluate the safety and efficacy of Afrezza in 4-17 year-old children and adolescents. We have engaged a clinical research organization to assist us with conducting this study and have budgeted the projected costs of the study in our operating plans. The other required study is a long-term safety study that was originally intended to compare the incidence of pulmonary malignancy observed with Afrezza to that observed in a standard of care control group. We have an ongoing dialogue with the FDA regarding the agency's current interest in the long-term safety of Afrezza and an appropriate study design to address any concerns. To date, we have not commenced a long-term safety study or budgeted any amount for it, but such a study in its original design would be anticipated to require substantial capital resources that we may not be able to obtain.

The FDA and other regulatory authorities impose significant restrictions on approved products through regulations on advertising, promotional and distribution activities. This oversight encompasses, but is not limited to, direct-to-consumer advertising, healthcare provider-directed advertising and promotion, sales representative communications to healthcare professionals, promotional programming and promotional activities involving the Internet. Regulatory authorities may also review industry-sponsored scientific and educational activities that make representations regarding product safety or efficacy in a promotional context. Prescription drugs may be promoted only for the approved indications in accordance with the approved label. The FDA and other regulatory authorities may take enforcement action against a company for promoting unapproved uses of a product or for other violations of its advertising and labeling laws and regulations. However, physicians may, in their independent medical judgment, prescribe legally available products for off-label uses. The FDA does not regulate the behavior of physicians in their choice of treatments, but the FDA does restrict manufacturer's communications on the subject of off-label use of their products. Enforcement action may include product seizures, injunctions, significant civil or criminal penalties or regulatory letters, which may require corrective advertising or other corrective communications to healthcare professionals. Failure to comply with such regulations also can result in adverse publicity or increased scrutiny of company activities by the U.S. Congress or other legislators. Certain states have also adopted regulations and reporting requirements surrounding the promotion of pharmaceuticals. Failure to comply with state requirements may affect our ability to promote or sell our products in certain states.

The FDA's and other regulatory authorities' policies may change and additional government regulations may be enacted that could prevent, limit or delay regulatory approval of our product candidates, delay the submission or review of an application or require additional expenditures by us. In addition, interested parties (such as individuals, advocacy groups and competing pharmaceutical companies) can file a citizen petition with the FDA to request policy change or some form of administrative action on the FDA's part, including with respect to an NDA. For example, in July 2021, a third party submitted a citizen petition to the FDA requesting that the FDA refuse to approve Tyvaso DPI, and/or impose additional requirements in order to approve the product. This prompted the FDA to request additional information concerning Tyvaso DPI prior to granting approval in May 2022. If successful, a citizen petition can significantly delay, or even prevent, the approval of a drug product.

We cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative action, either in the United States or abroad. We also cannot be sure that actions by foreign regulatory bodies pertaining to the safety of drugs or medical devices will not adversely affect our operations. If we are slow or unable to adapt to changes in existing requirements or the

adoption of new requirements or policies, or if we are not able to maintain regulatory compliance, we may be denied marketing approval or lose any marketing approval that we have already obtained. There can be no assurance that we will be able to obtain necessary regulatory clearances or approvals on a timely basis, if at all, for any of our product candidates under development, and delays in receipt or failure to receive such clearances or approvals, the loss of previously received clearances or approvals, or failure to comply with existing or future regulatory requirements could have a material adverse effect on our business and results of operations.

Healthcare legislation may make it more difficult to receive revenues.

In both the United States and certain foreign jurisdictions, there has been a number of legislative and regulatory proposals in recent years to change the healthcare system in ways that could impact our ability to sell our products profitably. The most recent significant healthcare legislation was the Patient Protection and Affordable Care Act, as amended by the Health Care Education and Reconciliation Act (collectively, the "PPACA"), enacted in March 2010, which substantially changed the way healthcare is financed by both governmental and private insurers and continues to significantly affect the healthcare industry. There have been executive, judicial and congressional challenges to certain provisions of the PPACA, although the constitutionality of the PPACA appears to now be settled. In addition, there have been proposed and enacted health reform initiatives affecting the PPACA. For example, on August 16, 2022, President Biden signed the IRA into law, which among other things, extends enhanced subsidies for individuals purchasing health insurance coverage in PPACA marketplaces through plan year 2025, eliminates the "donut hole" under the Medicare Part D program beginning in 2025 by significantly lowering the beneficiary maximum out-of-pocket cost and through a newly established manufacturer discount program, and caps the out-of-pocket cost of insulin (including Afrezza) at $35 per month for Medicare recipients beginning in 2023. It is possible that the PPACA will be subject to judicial or Congressional challenges in the future. It is unclear how any such challenges, other litigation, and the healthcare reform measures of the current administration will impact the PPACA.

Recently there has been heightened governmental scrutiny over the manner in which manufacturers set prices for their marketed products. Specifically, there have been several recent U.S. Presidential executive orders, Congressional inquiries and proposed and enacted legislation designed to, among other things, bring more transparency to drug pricing, reduce the cost of prescription drugs under Medicare, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drugs. These new laws and initiatives may result in additional reductions in Medicare and other healthcare funding, which could have a material adverse effect on our customers and accordingly, our financial operations.

Our future revenues and ability to generate positive cash flow from operations may be affected by the continuing efforts of government and other third-party payers to contain or reduce the costs of healthcare through various means. In the United States, there have been several congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for products. At the federal level, in July 2021, the Biden administration released an executive order, "Promoting Competition in the American Economy," with multiple provisions aimed at prescription drugs. In response to Biden's executive order, on September 9, 2021, the U.S. Department of Health and Human Services ("HHS") released a Comprehensive Plan for Addressing High Drug Prices that outlines principles for drug pricing reform and sets out a variety of potential legislative policies that Congress could pursue as well as potential administrative actions HHS can take to advance these principles. In addition, the IRA, among other things, (1) directs HHS to negotiate the price of certain single-source drugs and biologics covered under Medicare and (2) imposes rebates under Medicare Part B and Medicare Part D to penalize price increases that outpace inflation. These provisions will take effect progressively starting in fiscal year 2023, although they may be subject to legal challenges. It is currently unclear how the IRA will be implemented but is likely to have a significant impact on the pharmaceutical industry. Further, the Biden administration released an additional executive order on October 14, 2022, directing HHS to submit a report on how the Center for Medicare and Medicaid Innovation can be further leveraged to test new models for lowering drug costs for Medicare and Medicaid beneficiaries. At the state level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing. We expect that there will continue to be a number of federal and state proposals to implement similar and/or additional governmental controls. We cannot be certain what legislative proposals will be adopted or what actions federal, state or private third-party payers may take in response to any drug pricing and reimbursement reform proposals or legislation. Further, to the extent that such reforms have a material adverse effect on our ability to commercialize our products and product candidates under development, our business, financial condition and profitability may be adversely affected.

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

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

As a biopharmaceutical company, even though we do not and will not control referrals of healthcare services or bill directly to Medicare, Medicaid or other third-party payers, certain federal and state healthcare laws and regulations, including those pertaining to fraud and abuse and patients' rights, are and will be applicable to our business. The number and scope of these laws, regulations and industry standards are

changing, subject to differing applications and interpretations, and may be inconsistent between jurisdictions or in conflict with each other, making compliance difficult. The key laws that may affect our ability to operate include, among others:

- The federal Anti-Kickback Statute (as amended by PPACA, which modified the intent requirement of the federal Anti-Kickback Statute so that a person or entity no longer needs to have actual knowledge of the Statute or specific intent to violate it to have committed a violation), which constrains our business activities, including our marketing practices, educational programs, pricing policies, and relationships with healthcare providers or other entities by prohibiting, among other things, knowingly and willfully soliciting, receiving, offering or paying remuneration, directly or indirectly, to induce, or in return for, either the referral of an individual or the purchase or recommendation of an item or service reimbursable under a federal healthcare program, such as the Medicare and Medicaid programs;
- Federal civil and criminal false claims laws, including without limitation the False Claims Act, and civil monetary penalties laws, which prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, claims for payment from Medicare, Medicaid, or other federal healthcare programs that are false or fraudulent, and knowingly making, or causing to be made, a false record or statement material to a false or fraudulent claim to avoid, decrease or conceal an obligation to pay money to the federal government, and under PPACA, the government may assert that a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the federal false claims laws;
- The federal Physician Payments Sunshine Act under PPACA, which requires certain manufacturers of drugs, devices, biologics, and medical supplies to report annually to Centers for Medicare & Medicaid Services ("CMS") information related to payments and other transfers of value to physicians (defined to include defined to include doctors, dentists, optometrists, podiatrists and chiropractors), certain other healthcare professionals (such as physician assistants and nurse practitioners), and teaching hospitals, and ownership and investment interests held by physicians and their immediate family members.
- The federal Health Insurance Portability and Accountability Act of 1996 ("HIPAA"), which created new federal criminal statutes that prohibit, among other things, knowingly and willfully executing a scheme to defraud any healthcare benefit program or falsifying, concealing, or covering up a material fact in connection with the delivery of or payment for health care benefits.
- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009 ("HITECH"), and their respective implementing regulations, which impose certain requirements relating to the privacy, security and transmission of individually identifiable health information on entities subject to the law, such as certain healthcare providers, health plans, and healthcare clearinghouses and their respective business associates that perform services for them that involve the creation, use, maintenance or disclosure of, individually identifiable health information as well as their covered subcontractors.
- Other state and foreign law equivalents of each of the above federal laws, such as anti-kickback and false claims laws which may apply to items or services reimbursed by any third-party payer, including commercial insurers, and state and foreign laws governing the privacy and security and other processing of personal data (including health information) in certain circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts; state laws that require pharmaceutical companies to comply with the industry's voluntary compliance guidelines and the applicable compliance guidance promulgated by the federal government that otherwise restricts certain payments that may be made to healthcare providers and entities; state and local laws that require the registration of pharmaceutical sales representatives; and state laws that require drug manufacturers to report information related to payments and other transfer of value to physicians and other healthcare providers and entities, marketing expenditures or drug pricing.

Because of the breadth of these laws and the narrowness of available statutory exceptions and regulatory safe harbors, it is possible that some of our business activities could be subject to challenge under one or more of such laws. With Afrezza approved in Brazil and as we pursue additional international approvals, we will be subject to similar foreign laws and regulations. If we or our operations are found to be in violation of any of the laws described above or any other governmental regulations that apply to us, or any contractual obligations related to the same, we may be subject to governmental enforcement actions, investigations, litigation (including class action lawsuits) and other penalties, including significant civil, criminal and administrative penalties, damages, fines, imprisonment, disgorgement, defense costs, exclusion from U.S. federal or state healthcare programs, additional reporting requirements and/or oversight (including if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws), bans or restrictions on our processing of personal data, indemnity obligations and the curtailment or restructuring of our operations. Any such event or consequence, including penalties, damages, fines, and curtailment or restructuring of our operations, could materially adversely affect our ability to operate our business, including our ability to run clinical trials, and our financial results and harm our reputation. Although compliance programs can help mitigate the risk of investigation and prosecution for violations of these laws, the risks cannot be eliminated. Any action against us for violation of these laws, even if we successfully defend against it, could cause us to incur significant legal expenses and divert our management's attention from the operation of our business. Moreover, achieving and sustaining compliance with applicable federal and state fraud laws may prove costly.

We are subject to stringent and changing U.S. and foreign laws, regulations, rules, contractual obligations, policies and other obligations related to data privacy and security. Our actual or perceived failure to comply with such obligations could lead to regulatory investigations or actions; litigation; fines and penalties; disruptions of our business operations; reputational harm; loss of revenue or profits; loss of customers or sales; and other adverse business consequences.

In the ordinary course of business, we process sensitive information (as those terms are defined above). Our data processing activities subject us to numerous data privacy and security obligations, such as various laws, regulations, guidance, industry standards, external and internal privacy and security policies, contractual requirements, and other obligations relating to data privacy and security.

In the United States, federal, state, and local governments have enacted numerous data privacy and security laws, including data breach notification laws, personal data privacy laws, consumer protection laws (e.g., Section 5 of the Federal Trade Commission Act), and other similar laws (e.g., wiretapping laws). For example, HIPAA, as amended by HITECH, imposes specific requirements relating to the privacy, security, and transmission of individually identifiable health information. In addition, the CCPA imposes obligations on covered businesses. These obligations include, but are not limited to, providing specific disclosures in privacy notices and affording California residents certain rights related to their personal data. The CCPA provides for civil penalties (up to $7,500 per violation and allows private litigants affected by certain data breaches to recover significant statutory damages). Although the CCPA exempts some data processed in the context of clinical trials, the CCPA may increase compliance costs and potential liability with respect to other personal data we maintain about California residents. In addition, the California Privacy Rights Act of 2020 ("CPRA"), which became operative January 1, 2023, expands the CCPA's requirements, including by applying to personal information of business representatives and employees. Additionally, the CPRA establishes a new California Privacy Protection Agency to implement and enforce the CPRA, which could increase the risk of enforcement. Other states also have enacted comprehensive data privacy laws. For example, Virginia passed the Consumer Data Protection Act, and Colorado passed the Colorado Privacy Act, both of which become effective in 2023. In addition, data privacy and security laws have been proposed at the federal, state, and local levels in recent years, which could further complicate compliance efforts.

Outside the United States, an increasing number of laws, regulations, and industry standards apply to data privacy and security. For example, the General Data Protection Regulation ("GDPR") and, the United Kingdom's GDPR ("UK GDPR"), Brazil's General Data Protection Law (Lei Geral de Proteção de Dados Pessoais, or "LGPD") (Law No. 13,709/2018), and Australia's Privacy Act 1988 impose strict requirements for processing personal data. For example, under the EU GDPR, companies may face temporary or definitive bans on data processing and other corrective actions; fines of up to 20 million euros or 4% of annual global revenue, whichever is greater; or private litigation related to the processing of personal data brought by classes of data subjects or consumer protection organizations authorized at law to represent their interests.

In the ordinary course of business, we may transfer personal data from Europe and other jurisdictions to the United States or other countries. Europe and other jurisdictions have enacted laws requiring data to be localized or limiting the transfer of personal data to other countries. In particular, the European Economic Area (EEA) and the United Kingdom (UK) have significantly restricted the transfer of personal data to the United States and other countries whose privacy laws it believes are inadequate. Other jurisdictions may adopt similarly stringent interpretations of their data localization and cross-border data transfer laws. Although there are currently various mechanisms that may be used to transfer personal data from the EEA and UK to the United States in compliance with law, such as the EEA and UK's standard contractual clauses, these mechanisms are subject to legal challenges, and there is no assurance that we can satisfy or rely on these reasons to lawfully transfer personal data to the United States. If there is no lawful manner for us to transfer personal data from the EEA, the UK or other jurisdictions to the United States, or if the requirements for a legally-compliant transfer are too onerous, we could face significant adverse consequences, including the interruption or degradation of our operations, the need to relocate part of or all of our business or data processing activities to other jurisdictions at significant expense, increased exposure to regulatory actions, substantial fines and penalties, the inability to transfer data and work with partners, vendors and other third parties, and injunctions against our processing or transferring of personal data necessary to operate our business. Some European regulators have prevented companies from transferring personal data out of Europe for allegedly violating the GDPR's cross-border data transfer limitations.

We may also be bound by contractual obligations related to data privacy and security, and our efforts to comply with such obligations may not be successful. For example, certain privacy laws, such as the GDPR and the CCPA, require our customers to impose specific contractual restrictions on their service providers. We publish privacy policies, marketing materials and other statements, such as compliance with certain certifications or self-regulatory principles, regarding data privacy and security. If these policies, materials or statements are found to be deficient, lacking in transparency, deceptive, unfair, or misrepresentative of our practices, we may be subject to investigation, enforcement actions by regulators or other adverse consequences. In addition, privacy advocates and industry groups have proposed, and may propose, standards with which we are legally or contractually bound to comply.

Our obligations related to data privacy and security are quickly changing in an increasingly stringent fashion, creating some uncertainty as to the effective future legal framework. Additionally, these obligations may be subject to differing applications and interpretations, which may be inconsistent or conflict among jurisdictions. Preparing for and complying with these obligations requires significant resources and may necessitate changes to our information technologies, systems, and practices and to those of any third parties that process personal data on our behalf. Although we endeavor to comply with all applicable data privacy and security obligations, we may at times fail (or be perceived to have failed) to do so. Moreover, despite our efforts, our personnel or third parties upon whom we rely may fail to comply with such obligations, which could negatively impact our business operations and compliance posture. If we or the third parties on which we rely fail, or are perceived to have failed, to address or comply with data privacy and security obligations, we could face significant consequences. These consequences may include, but are not limited to, government enforcement actions (e.g., investigations, fines, penalties, audits, inspections, and similar); litigation (including class-related claims); additional reporting requirements and/or oversight; bans on processing personal data; orders to

destroy or not use personal data; and imprisonment of company officials. Any of these events could have a material adverse effect on our reputation, business, or financial condition, including but not limited to: loss of customers; interruptions or stoppages in our business operations (including, as relevant, clinical trials); inability to process personal data or to operate in certain jurisdictions; limited ability to develop or commercialize our products; expenditure of time and resources to defend any claim or inquiry; adverse publicity; or revision or restructuring of our operations.

If we fail to comply with our reporting and payment obligations under the Medicaid Drug Rebate Program or other governmental pricing programs in the United States, we could be subject to additional reimbursement requirements, fines, sanctions and exposure under other laws which could have a material adverse effect on our business, results of operations and financial condition.

We participate in the Medicaid Drug Rebate Program, as administered by CMS, and other federal and state government pricing programs in the United States, and we may participate in additional government pricing programs in the future. These programs generally require us to pay rebates or otherwise provide discounts to government payers in connection with drugs that are dispensed to beneficiaries/recipients of these programs. In some cases, such as with the Medicaid Drug Rebate Program, the rebates are based on pricing that we report on a monthly and quarterly basis to the government agencies that administer the programs. Pricing requirements and rebate/discount calculations are complex, vary among products and programs, and are often subject to interpretation by governmental or regulatory agencies and the courts. The requirements of these programs, including, by way of example, their respective terms and scope, change frequently. For example, on March 11, 2021, President Biden signed the American Rescue Plan Act of 2021 into law, which eliminates the statutory Medicaid drug rebate cap, currently set at 100% of a drug's AMP, for single source and innovator multiple source drugs, beginning January 1, 2024. Responding to current and future changes may increase our costs, and the complexity of compliance will be time consuming. Invoicing for rebates is provided in arrears, and there is frequently a time lag of up to several months between the sales to which rebate notices relate and our receipt of those notices, which further complicates our ability to accurately estimate and accrue for rebates related to the Medicaid program as implemented by individual states. Thus, there can be no assurance that we will be able to identify all factors that may cause our discount and rebate payment obligations to vary from period to period, and our actual results may differ significantly from our estimated allowances for discounts and rebates. Changes in estimates and assumptions may have a material adverse effect on our business, results of operations and financial condition.

In addition, the Office of Inspector General of the HHS and other Congressional, enforcement and administrative bodies have recently increased their focus on pricing requirements for products, including, but not limited to the methodologies used by manufacturers to calculate AMP and best price ("BP") for compliance with reporting requirements under the Medicaid Drug Rebate Program. We are liable for errors associated with our submission of pricing data and for any overcharging of government payers. For example, failure to submit monthly/quarterly AMP and BP data on a timely basis could result in a civil monetary penalty. Failure to make necessary disclosures and/or to identify overpayments could result in allegations against us under the False Claims Act and other laws and regulations. Any required refunds to the U.S. government or responding to a government investigation or enforcement action would be expensive and time consuming and could have a material adverse effect on our business, results of operations and financial condition. In addition, in the event that the CMS were to terminate our rebate agreement, no federal payments would be available under Medicaid or Medicare for our covered outpatient drugs.

Our business could be negatively impacted by environmental, social and corporate governance (ESG) matters or our reporting of such matters.

There is an increasing focus from certain investors, employees, partners, and other stakeholders concerning ESG matters. We may be, or be perceived to be, not acting responsibly in connection with these matters, which could negatively impact us. Moreover, the SEC has recently proposed, and may continue to propose, certain mandated ESG reporting requirements, such as the SEC's proposed rules designed to enhance and standardize climate-related disclosures, which, if finally approved, would significantly increase our compliance and reporting costs and may also result in disclosures that certain investors or other stakeholders deem to negatively impact our reputation and/or that harm our stock price. We currently do not report our environmental emissions and absent a legal requirement to do so we currently do not plan to report our environmental emissions, and lack of reporting could result in certain investors declining to invest in our common stock.

Our portfolio of investment securities may require us to register with the SEC as an "investment company" in accordance with the Investment Company Act of 1940 ("'40 Act").

The rules and interpretations of the SEC and the courts relating to the definition of "investment company" are very complex. Although we are a biopharmaceutical company and we do not hold ourselves out as an investment company, the value of our investment securities relative to our total assets (exclusive of government securities and cash items) has in the past exceeded safe harbor limits prescribed in the '40 Act. If our asset mix does not continue to qualify for one of the safe harbor limits prescribed in the '40 Act, it is possible that the SEC would take the position that we would be required to register under the '40 Act and comply with the '40 Act's registration and reporting requirements, capital structure requirements, affiliate transaction restrictions, conflict of interest rules, requirements for disinterested directors, and other substantive provisions. If we were required to register as an "investment company" and be subject to the restrictions of the '40 Act, those restrictions likely would require significant changes in the way we do business and add significant administrative costs and burdens to our operations.

RISKS RELATED TO INTELLECTUAL PROPERTY

If we are unable to protect our proprietary rights, we may not be able to compete effectively, or operate profitably.

Our commercial success depends, in large part, on our ability to obtain and maintain intellectual property protection for our technology. Our ability to do so will depend on, among other things, complex legal and factual questions, and it should be noted that the standards regarding intellectual property rights in our fields are still evolving. We attempt to protect our proprietary technology through a combination of patents, trade secrets and confidentiality agreements. We own a number of domestic and international patents, have a number of domestic and international patent applications pending and have licenses to additional patents. We cannot assure you that our patents and licenses will successfully preclude others from using our technologies, and we could incur substantial costs in seeking enforcement of our proprietary rights against infringement. Even if issued, the patents may not give us an advantage over competitors with alternative technologies.

For example, the coverage claimed in a patent application can be significantly reduced before a patent is issued, either in the United States or abroad. Statutory differences in patentable subject matter may limit the protection we can obtain on some of our inventions outside of the United States. For example, methods of treating patients are not patentable in many countries outside of the United States. These and other issues may limit the patent protection we are able to secure internationally. Consequently, we do not know whether any of our pending or future patent applications will result in the issuance of patents or, to the extent patents have been issued or will be issued, whether these patents will be subjected to further proceedings limiting their scope, will provide significant proprietary protection or competitive advantage, or will be circumvented or invalidated.

Furthermore, patents already issued to us or our pending applications may become subject to disputes that could be resolved against us. In the United States and certain other countries, applications are generally published 18 months after the application's priority date. Because publication of discoveries in scientific or patent literature often trails behind actual discoveries, we cannot be certain that we were the first inventor of the subject matter covered by our pending patent applications or that we were the first to file patent applications on such inventions. Assuming the other requirements for patentability are met, in the United States prior to March 15, 2013, the first to make the claimed invention is entitled to the patent, while outside the United States, the first to file a patent application is entitled to the patent. After March 15, 2013, under the Leahy-Smith America Invents Act ("AIA"), the United States moved to a first inventor to file system. In general, the AIA and its 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 and financial condition.

Moreover, the term of a patent is limited and, as a result, the patents protecting our products expire at various dates. As and when these different patents expire, our products could become subject to increased competition. As a consequence, we may not be able to recover our development costs.

An issued patent is presumed valid unless it is declared otherwise by a court of competent jurisdiction. However, the issuance of a patent is not conclusive as to its validity or enforceability and it is uncertain how much protection, if any, will be afforded by our patents. A third party may challenge the validity or enforceability of a patent after its issuance by various proceedings such as oppositions in foreign jurisdictions, or post grant proceedings, including, oppositions, re-examinations or other review in the United States. In some instances, we may seek re-examination or reissuance of our own patents. If we attempt to enforce our patents, they may be challenged in court where they could be held invalid, unenforceable, or have their breadth narrowed to an extent that would destroy their value.

We also rely on unpatented technology, trade secrets, know-how and confidentiality agreements. We require our officers, employees, consultants and advisors to execute proprietary information and invention and assignment agreements upon commencement of their relationships with us. These agreements provide that all inventions developed by the individual on behalf of us must be assigned to us and that the individual will cooperate with us in connection with securing patent protection on the invention if we wish to pursue such protection. We also execute confidentiality agreements with outside collaborators. However, disputes may arise as to the ownership of proprietary rights to the extent that outside collaborators apply technological information to our projects that are developed independently by them or others, or apply our technology to outside projects, and there can be no assurance that any such disputes would be resolved in our favor. In addition, any of these parties may breach the agreements and disclose our confidential information or our competitors might learn of the information in some other way. Thus, there can be no assurance, however, that our inventions and assignment agreements and our confidentiality agreements will provide meaningful protection for our inventions, trade secrets, know-how or other proprietary information in the event of unauthorized use or disclosure of such information. If any trade secret, know-how or other technology not protected by a patent were to be disclosed to or independently developed by a competitor, our business, results of operations and financial condition could be adversely affected.

If we become involved in lawsuits to protect or enforce our patents or the patents of our collaborators or licensors, we would be required to devote substantial time and resources to prosecute or defend such proceedings.

Competitors may infringe our patents or the patents of our collaborators or licensors. To counter infringement or unauthorized use, we may be required to file infringement claims, which can be expensive and time-consuming. In addition, in an infringement proceeding, a court may decide that a patent of ours is not valid or is unenforceable, or may refuse to stop the other party from using the technology at issue on the grounds that our patents do not cover its technology. A court may also decide to award us a royalty from an infringing party instead of issuing an injunction against the infringing activity. An adverse determination of any litigation or defense proceedings could put one or more of our patents at risk of being invalidated or interpreted narrowly and could put our patent applications at risk of not issuing.

Interference proceedings brought by the USPTO, may be necessary to determine the priority of inventions with respect to our pre-AIA patent applications or those of our collaborators or licensors. Additionally, the AIA has greatly expanded the options for post-grant review of patents that can be brought by third parties. In particular, Inter Partes Review ("IPR"), available against any issued United States patent (pre-and post-AIA), has resulted in a higher rate of claim invalidation, due in part to the much reduced opportunity to repair claims by amendment as compared to re-examination, as well as the lower standard of proof used at the USPTO as compared to the federal courts. With the passage of time an increasing number of patents related to successful pharmaceutical products are being subjected to IPR. Moreover, the filing of IPR petitions has been used by short-sellers as a tool to help drive down stock prices. We may not prevail in any litigation, post-grant review, or interference proceedings in which we are involved and, even if we are successful, these proceedings may result in substantial costs and be a distraction to our management. Further, we may not be able, alone or with our collaborators and licensors, to prevent misappropriation of our proprietary rights, particularly in countries where the laws may not protect such rights as fully as in the United States.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. In addition, during the course of this kind of litigation, there could be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, the market price of our common stock and other securities may decline.

If our technologies conflict with the proprietary rights of others, we may incur substantial costs as a result of litigation or other proceedings and we could face substantial monetary damages and be precluded from commercializing our products, which would materially harm our business and financial condition.

Biotechnology patents are numerous and may, at times, conflict with one another. As a result, it is not always clear to industry participants, including us, which patents cover the multitude of biotechnology product types. Ultimately, the courts must determine the scope of coverage afforded by a patent and the courts do not always arrive at uniform conclusions.

A patent owner may claim that we are making, using, selling or offering for sale an invention covered by the owner's patents and may go to court to stop us from engaging in such activities. Such litigation is not uncommon in our industry.

Patent lawsuits can be expensive and would consume time and other resources. There is a risk that a court would decide that we are infringing a third party's patents and would order us to stop the activities covered by the patents, including the commercialization of our products. In addition, there is a risk that we would have to pay the other party damages for having violated the other party's patents (which damages may be increased, as well as attorneys' fees ordered paid, if infringement is found to be willful), or that we will be required to obtain a license from the other party in order to continue to commercialize the affected products, or to design our products in a manner that does not infringe a valid patent. We may not prevail in any legal action, and a required license under the patent may not be available on acceptable terms or at all, requiring cessation of activities that were found to infringe a valid patent. We also may not be able to develop a non-infringing product design on commercially reasonable terms, or at all.

Moreover, certain components of our products may be manufactured outside the United States and imported into the United States. As such, third parties could file complaints under 19 U.S.C. Section 337(a)(1)(B) (a "337 action") with the International Trade Commission (the "ITC"). A 337 action can be expensive and would consume time and other resources. There is a risk that the ITC would decide that we are infringing a third party's patents and either enjoin us from importing the infringing products or parts thereof into the United States or set a bond in an amount that the ITC considers would offset our competitive advantage from the continued importation during the statutory review period. The bond could be up to 100% of the value of the patented products. We may not prevail in any legal action, and a required license under the patent may not be available on acceptable terms, or at all, resulting in a permanent injunction preventing any further importation of the infringing products or parts thereof into the United States. We also may not be able to develop a non-infringing product design on commercially reasonable terms, or at all.

Although we do not believe that our products or product candidates infringe any third-party patents, if a plaintiff was to allege infringement of their patent rights, we would have to establish with the court that their patents are invalid or unenforceable in order to avoid legal liability for infringement of these patents. However, proving patent invalidity or unenforceability can be difficult because issued patents are presumed valid. Therefore, in the event that we are unable to prevail in a non-infringement or invalidity action we will have to either acquire the third-party patents outright or seek a royalty-bearing license. Royalty-bearing licenses effectively increase production costs and therefore may materially affect product profitability. Furthermore, should the patent holder refuse to either assign or license us the infringed patents, it may be necessary to cease manufacturing the product entirely and/or design around the patents, if possible. In either event, our business, financial condition and results of operations would be harmed and our profitability could be materially and adversely impacted.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. In addition, during the course of this kind of litigation, there could be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, the market price of our common stock and other securities may decline.

In addition, patent litigation may divert the attention of key personnel and we may not have sufficient resources to bring these actions to a successful conclusion. At the same time, 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. An adverse determination in a judicial or administrative proceeding or failure to obtain necessary licenses could prevent us from manufacturing and selling our products or result in substantial monetary damages, which would adversely affect our business, financial condition and results of operations and cause the market price of our common stock and other securities to decline.

We may not obtain trademark registrations for our potential trade names.

We have not selected trade names for some of our product candidates in our pipeline; therefore, we have not filed trademark registrations for such potential trade names for our product candidates, nor can we assure that we will be granted registration of any potential trade names for which we do file. No assurance can be given that any of our trademarks will be registered in the United States or elsewhere, or once registered that, prior to our being able to enter a particular market, they will not be cancelled for non-use. Nor can we give assurances, that the use of any of our trademarks will confer a competitive advantage in the marketplace.

Furthermore, even if we are successful in our trademark registrations, the FDA has its own process for drug nomenclature and its own views concerning appropriate proprietary names. It also has the power, even after granting market approval, to request a company to reconsider the name for a product because of evidence of confusion in the marketplace. We cannot assure you that the FDA or any other regulatory authority will approve of any of our trademarks or will not request reconsideration of one of our trademarks at some time in the future.

RISKS RELATED TO OUR COMMON STOCK

We may not be able to generate sufficient cash to service all of our indebtedness and commitments. We may be forced to take other actions to satisfy our obligations or we may experience a financial failure.

Our ability to make scheduled payments on our lease and debt obligations will depend on our financial and operating performance, which is subject to the commercial success of our products, the extent to which we are able to successfully develop and commercialize our products, prevailing economic and competitive conditions, and to certain financial, business and other factors beyond our control. We cannot assure you that we will maintain a level of cash flows from operating activities sufficient to permit us to pay the principal, premium, if any, and interest on our indebtedness. If our cash flows and capital resources are insufficient to fund our obligations, we may be forced to reduce or delay capital expenditures, sell assets or operations, seek additional capital or restructure or refinance our indebtedness and lease obligations. We cannot assure you that we would be able to take any of these actions, that these actions would be successful and permit us to meet our scheduled obligations or that these actions would be permitted under the terms of our future debt agreements. In the absence of sufficient operating results and resources, we could face substantial liquidity problems and might be required to dispose of material assets or operations to meet our debt service and other obligations. We may not be able to consummate those dispositions or obtain sufficient proceeds from those dispositions to meet our debt service and other obligations when due.

Our stock price is volatile.

The trading price of our common stock has been and is likely to continue to be volatile. The volatility of pharmaceutical and biotechnology stocks often does not relate to the operating performance of the companies represented by the stock. Our business and the market price of our common stock may be influenced by a large variety of factors, including:

- our ability to obtain marketing approval for our products outside of the United States and to find collaboration partners for the commercialization of our products in foreign jurisdictions;
- future estimates of product sales, royalties, prescriptions or other operating metrics;
- our ability to successfully commercialize other products based on our Technosphere drug delivery platform;
- the progress and results of preclinical and clinical studies of our product candidates and of post-approval studies of approved products that are required by the FDA;
- general economic, political or stock market conditions, especially for emerging growth and pharmaceutical market sectors;
- geopolitical events, such as the current Russia-Ukraine conflict;
- legislative developments;
- disruptions caused by man-made or natural disasters or public health pandemics or epidemics or other business interruptions;
- changes in the structure of the healthcare payment systems;
- announcements by us, our collaborators, or our competitors concerning clinical study results, acquisitions, strategic alliances, technological innovations, newly approved commercial products, product discontinuations, or other developments;
- the availability of critical materials used in developing and manufacturing our products and product candidates;
- developments or disputes concerning our relationship with any of our current or future collaborators or third party manufacturers;

- developments or disputes concerning our patents or proprietary rights;
- the expense and time associated with, and the extent of our ultimate success in, securing regulatory approvals;
- announcements by us concerning our financial condition or operating performance;
- changes in securities analysts' estimates of our financial condition or operating performance;
- sales of large blocks of our common stock, including sales by our executive officers, directors and significant stockholders;
- the trades of short sellers;
- our ability, or the perception of investors of our ability, to continue to meet all applicable requirements for continued listing of our common stock on The Nasdaq Global Market, and the possible delisting of our common stock if we are unable to do so;
- the status of any legal proceedings or regulatory matters against or involving us or any of our executive officers and directors; and
- discussion of our products, competitors' products, or our stock price by the financial and scientific press, the healthcare community and online investor communities such as chat rooms. In particular, it may be difficult to verify statements about us that appear on interactive websites that permit users to generate content anonymously or under a pseudonym. Statements attributed to company officials may, in fact, have originated elsewhere.

Any of these risks, as well as other factors, could cause the market value of our common stock and other securities to decline.

If we fail to continue to meet all applicable listing requirements, our common stock may be delisted from the Nasdaq Global Market, which could have an adverse impact on the liquidity and market price of our common stock.

Our common stock is currently listed on The Nasdaq Global Market, which has qualitative and quantitative listing criteria. If we are unable to meet any of the Nasdaq listing requirements in the future, such as the corporate governance requirements, the minimum closing bid price requirement, or the minimum market value of listed securities requirement, Nasdaq could determine to delist our common stock. A delisting of our common stock could adversely affect the market liquidity of our common stock, decrease the market price of our common stock, adversely affect our ability to obtain financing for the continuation of our operations and result in the loss of confidence in our company.

Anti-takeover provisions in our charter documents and under Delaware law could make an acquisition of us, which may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or remove our current management.

We are incorporated in Delaware. Certain anti-takeover provisions under Delaware law and in our certificate of incorporation and amended and restated bylaws, as currently in effect, may make a change of control of our company more difficult, even if a change in control would be beneficial to our stockholders or the holders of our other securities. Our anti-takeover provisions include provisions such as a prohibition on stockholder actions by written consent, the authority of our board of directors to issue preferred stock without stockholder approval, and supermajority voting requirements for specified actions. In addition, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which generally prohibits stockholders owning 15% or more of our outstanding voting stock from merging or combining with us in certain circumstances. These provisions may delay or prevent an acquisition of us, even if the acquisition may be considered beneficial by some of our stockholders. In addition, they may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors, which is responsible for appointing the members of our management.

Our amended and restated bylaws provide that the Court of Chancery of the State of Delaware and the federal district courts of the United States of America are the exclusive forums for substantially all disputes between us and our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers, or employees.

Our amended and restated bylaws provide that, to the fullest extent permitted by law and subject to the court's having personal jurisdiction over the indispensable parties named as defendants, the Court of Chancery of the State of Delaware is the exclusive forum for the following types of actions or proceedings under Delaware statutory or common law:

- any derivative action or proceeding brought on our behalf;
- any action or proceeding asserting a breach of fiduciary duty owed by any of our current or former directors, officers or other employees to us or our stockholders;
- any action or proceeding asserting a claim against us or any of our current or former directors, officers or other employees arising out of or pursuant to any provision of the Delaware General Corporation Law, our amended and certificate of incorporation or amended and restated bylaws;
- any action or proceeding to interpret, apply, enforce or determine the validity of our amended and restated certificate of incorporation or our amended and restated bylaws;

- any action or proceeding as to which the Delaware General Corporation Law confers jurisdiction to the Court of Chancery of the State of Delaware; and
- any action asserting a claim against us or any of our directors, officers or other employees that is governed by the internal affairs doctrine.

This provision does not apply to suits brought to enforce a duty or liability created by the Exchange Act. Furthermore, Section 22 of the Securities Act of 1933, as amended, or the Securities Act, creates concurrent jurisdiction for federal and state courts over all such Securities Act actions. Accordingly, both state and federal courts have jurisdiction to entertain such claims. To prevent having to litigate claims in multiple jurisdictions and the threat of inconsistent or contrary rulings by different courts, among other considerations, our amended and restated bylaws further provides that the federal district courts of the United States of America will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act. While the Delaware courts have determined that such choice of forum provisions are facially valid, a stockholder may nevertheless seek to bring a claim in a venue other than those designated in the exclusive forum provisions. In such instance, we would expect to vigorously assert the validity and enforceability of the exclusive forum provisions of our amended and restated bylaws. This may require significant additional costs associated with resolving such action in other jurisdictions and there can be no assurance that the provisions will be enforced by a court in those other jurisdictions.

These exclusive forum provisions may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers, or other employees, which may discourage lawsuits against us and our directors, officers and other employees. If a court were to find either exclusive forum provision in our amended and restated bylaws to be inapplicable or unenforceable in an action, we may incur further significant additional costs associated with resolving the dispute in other jurisdictions, all of which could seriously harm our business.

Because we do not expect to pay dividends in the foreseeable future, you must rely on stock appreciation for any return on any investment in our common stock.

We have paid no cash dividends on any of our capital stock to date, and we currently intend to retain our future earnings, if any, to fund the development and growth of our business. As a result, we do not expect to pay any cash dividends in the foreseeable future, and payment of cash dividends, if any, will also depend on our financial condition, results of operations, capital requirements and other factors and will be at the discretion of our board of directors. In addition, pursuant to the MidCap credit facility, we are subject to contractual restrictions on the payment of dividends. There is no guarantee that our common stock will appreciate or maintain its current price. You could lose the entire value of any investment in our common stock.

Future sales of shares of our common stock in the public market, or the perception that such sales may occur, may depress our stock price and adversely impact the market price of our common stock and other securities.

We may need to raise substantial additional capital in the future to fund our operations. If we raise additional funds by issuing equity securities or additional convertible debt, the market price of our common stock and other securities may decline. Similarly, if our existing stockholders sell substantial amounts of our common stock in the public market, the market price of our common stock and other securities could decrease . The perception in the public market that we or our existing stockholders might sell shares of common stock could also depress the market price of our common stock and the market price of our other securities.

Likewise, the issuance of additional shares of our common stock upon the exchange or conversion of the Mann Group promissory notes, or the Senior convertible notes, could adversely affect the market price of our common stock and other securities. Moreover, the existence of these notes may encourage short selling of our common stock by market participants, which could adversely affect the market price of our common stock and other securities.

In addition, a substantial number of shares of our common stock is reserved for issuance upon the exercise of stock options, the vesting of restricted stock unit awards and purchases under our employee stock purchase program. The issuance or sale of substantial amounts of common stock, or the perception that such issuances or sales may occur, could adversely affect the market price of our common stock and other securities.

If other biotechnology and biopharmaceutical companies or the securities markets in general encounter problems, the market price of our common stock and other securities could be adversely affected.

Public companies in general, including companies listed on The Nasdaq Stock Market, have experienced price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of those companies. There has been particular volatility in the market prices of securities of biotechnology and other life sciences companies, and the market prices of these companies have often fluctuated because of problems or successes in a given market segment or because investor interest has shifted to other segments. These broad market and industry factors may cause the market price of our common stock and other securities to decline, regardless of our operating performance. We have no control over this volatility and can only focus our efforts on our own operations, and even these may be affected due to the state of the capital markets.

In the past, following periods of large price declines in the public market price of a company's securities, securities class action litigation has often been initiated against that company. Litigation of this type could result in substantial costs and diversion of management's attention and resources, which would hurt our business. Any adverse determination in litigation could also subject us to significant liabilities.

GENERAL RISK FACTORS

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

The global credit and financial markets have experienced extreme volatility and disruptions in the past. These disruptions can result in severely diminished liquidity and credit availability, increase in inflation, declines in consumer confidence, declines in economic growth, increases in unemployment rates and uncertainty about economic stability. There can be no assurance that further deterioration in credit and financial markets and confidence in economic conditions will not occur. Our general business strategy may be adversely affected by any such economic downturn, volatile business environment, higher inflation, or continued unpredictable and unstable market conditions. If the current equity and credit markets deteriorate, it may make any necessary debt or equity financing more difficult, more costly and more dilutive. Our portfolio of corporate and government bonds could also be adversely impacted. Failure to secure any necessary financing in a timely manner and on favorable terms could have a material adverse effect on our operations, growth strategy, financial performance and stock price and could require us to delay or abandon clinical development plans. In addition, there is a risk that one or more of our current service providers, manufacturers and other partners may not survive an economic downturn or rising inflation, which could directly affect our ability to attain our operating goals on schedule and on budget.

Other international and geopolitical events could also have a serious adverse impact on our business. For instance, in February 2022, Russia initiated military action against Ukraine. In response, the United States and certain other countries imposed significant sanctions and trade actions against Russia and could impose further sanctions, trade restrictions, and other retaliatory actions. While we cannot predict the broader consequences, the conflict and retaliatory and counter-retaliatory actions could materially adversely affect global trade, currency exchange rates, inflation, regional economies, and the global economy, which in turn may increase our costs, disrupt our supply chain, impair our ability to raise or access additional capital when needed on acceptable terms, if at all, or otherwise adversely affect our business, financial condition, and results of operations.

Item 1B. ***Unresolved Staff Comments***

None.

Item 2. ***Properties***

In 2001, we acquired a facility in Danbury, Connecticut that included two buildings comprised of approximately 190,000 square feet on 17.5 acres. In September 2008, we completed the construction of approximately 140,000 square feet of new manufacturing space providing us with two buildings totaling approximately 328,000 square feet, housing our research and development, manufacturing and certain administrative functions. The Danbury facility contains our principal executive offices. We believe the Danbury facility has sufficient space, including unimproved manufacturing space, to satisfy anticipated commercial demand for Afrezza and Tyvaso DPI. Our obligations under the MidCap Credit Facility are secured by a portion of the facility in Danbury and other assets.

On November 8, 2021, we sold a portion of the Danbury facility to an affiliate of Creative Manufacturing Properties (the "Purchaser") for a sales price of $102.3 million and entered into a 20-year lease agreement with the Purchaser, with four renewal options of five years each. See Note 7 – Property and Equipment and Note 16 – Commitments and Contingencies in the consolidated financial statements included in Part II, Item 8 – Financial Statements and Supplementary Data.

As of December 31, 2022, we leased a total of approximately 24,475 square feet of office space in Westlake Village, California pursuant to a lease that expires in July 2028.

In addition, we assumed certain leased real property (the "Marlborough Lease") pursuant to the Asset Purchase Agreement entered into in May 2022 with Zealand Pharma A/S and Zealand Pharma US, Inc. The Marlborough Lease pertains to certain premises in a building located in Marlborough, Massachusetts. As of December 31, 2022, we leased a total of approximately 20,000 square feet of building space pursuant to a lease that expires in February 28, 2026. See Note 16 – Commitments and Contingencies in the consolidated financial statements included in Part II, Item 8 – Financial Statements and Supplementary Data.

Item 3. ***Legal Proceedings***

See Note 16 – Commitments and Contingencies in the consolidated financial statements included in Part II, Item 8 – Financial Statements and Supplementary Data.

Item 4. ***Mine Safety Disclosures***

Not applicable.

PART II

Item 5. ***Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities***

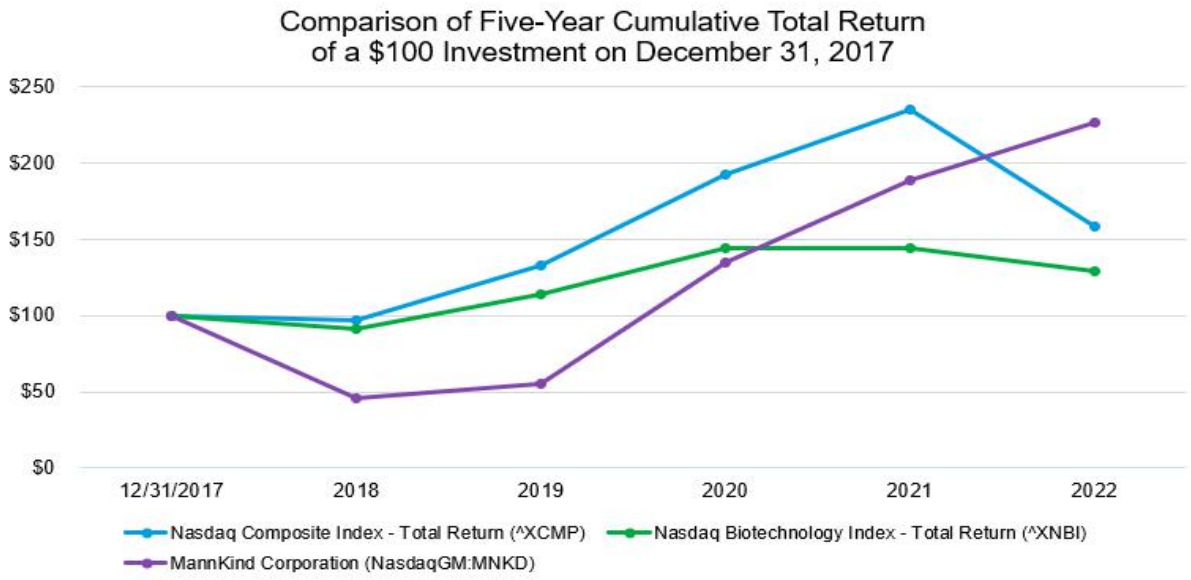
Common Stock Market

Our common stock has been traded on The Nasdaq Global Market under the symbol "MNKD" since July 28, 2004. The closing sales price of our common stock on The Nasdaq Global Market was $5.16 on February 10, 2023 and there were 104 registered holders of record of our common stock as of that date.

Stock Performance Graph

This performance graph shall not be deemed "filed" for purposes of Section 18 of the Exchange Act, or incorporated by reference into any of our filings under the Securities Act or the Exchange Act, except as shall be expressly set forth by specific reference in such filing.

The following graph illustrates a comparison of the cumulative total stockholder return (change in stock price plus reinvested dividends) of our common stock with (i) The Nasdaq Composite Index and (ii) The Nasdaq Biotechnology Index. The graph assumes a $100 investment, on December 31, 2017, in (i) our common stock, (ii) the securities comprising The Nasdaq Composite Index and (iii) the securities comprising The Nasdaq Biotechnology Index.



	12/31/2017	12/31/2018	12/31/2019	12/31/2020	12/31/2021	12/31/2022
	12/31/2017	**2018**	**2019**	**2020**	**2021**	**2022**
Nasdaq Composite Index - Total Return (^XCMP)	$100.00	$97.16	$132.81	$192.47	$235.15	$158.65
Nasdaq Biotechnology Index - Total Return (^XNBI)	$100.00	$91.14	$114.02	$144.15	$144.18	$129.59
MannKind Corporation (NasdaqGM:MNKD)	$100.00	$45.69	$55.60	$134.91	$188.36	$227.16

Dividend Policy

We have never declared or paid any cash dividends on our common stock. We currently intend to retain all available funds and any future earnings for use in the operation and expansion of our business. Accordingly, we do not anticipate paying any cash dividends on our common stock in the foreseeable future. Any future determination to pay dividends will be at the discretion of our board of directors. In addition, under the terms of the MidCap Credit Facility, we are restricted from declaring and distributing a cash dividend to our stockholders.

Recent Sales of Unregistered Securities

Under the Mann Group convertible note, we pay quarterly interest payments on the first day of each calendar quarter, which we may pay at our election in shares of our common stock. During the year ended December 31, 2022, we elected to pay our April 1st, July 1st and October 1st, quarterly interest payments under the Mann Group convertible note by issuing the Mann Group an aggregate of 75,487 shares of common stock. See Note 10 – *Borrowings*.

We relied on an exemption from registration provided by Section 3(a)(9) or 4(a)(2) of the Securities Act of 1933, as amended, for the issuance of the shares described above.

Item 6. [Reserved]

Item 7. *Management's Discussion and Analysis of Financial Condition and Results of Operations*

The following discussion of our financial condition and results of operations should be read in conjunction with our consolidated financial statements and notes thereto included in this Annual Report on Form 10-K.

A discussion of changes in our results of operations during the year ended December 31, 2021 compared to the year ended December 31, 2020 has been omitted from this Annual Report on Form 10-K but may be found in "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" in our Annual Report on Form 10-K for the year ended December 31, 2021, filed with the SEC on February 24, 2022, which discussion is incorporated herein by reference and which is available free of charge on the SEC's website at www.sec.gov.

Overview

We are a biopharmaceutical company focused on the development and commercialization of innovative therapeutic products and devices to address serious unmet medical needs for those living with endocrine and orphan lung diseases. Our signature technologies—Technosphere dry-powder formulations and Dreamboat inhalation devices—offer rapid and convenient delivery of medicines to the deep lung where they can exert an effect locally or enter the systemic circulation. In our endocrine business unit, we currently commercialize two products: Afrezza (insulin human) Inhalation Powder, an ultra rapid-acting inhaled insulin indicated to improve glycemic control in adults with diabetes, and the V-Go wearable insulin delivery device, which provides continuous subcutaneous infusion of insulin in adults that require insulin. The first product to come out of our orphan lung disease pipeline, Tyvaso DPI (treprostinil) inhalation powder, received FDA approval in May 2022 for the treatment of PAH and PH-ILD. Our development and marketing partner, United Therapeutics, began commercializing Tyvaso DPI in June 2022 and is obligated to pay us a royalty on net sales of the product. We also receive a margin on supplies of Tyvaso DPI that we manufacture for UT.

Our business is subject to significant risks, including but not limited to our ability to manufacture sufficient quantities of our products and Tyvaso DPI. Other significant risks also include the risk that our products may only achieve a limited degree of commercial success and the risks inherent in drug development, clinical trials and the regulatory approval process for our product candidates, which in some cases depends upon the efforts of our partners.

As of December 31, 2022, we had an accumulated deficit of $3.2 billion and a stockholders' deficit of $250.5 million. We had net loss of $87.4 million, $80.9 million and $57.2 million in the years ended December 31, 2022, 2021 and 2020, respectively. To date, we have funded our operations primarily through the sale of our equity and convertible debt securities, from the receipt of upfront and milestone payments from collaborations, from borrowings, from sales of Afrezza and V-Go, from royalties and manufacturing revenue from UT as well as from proceeds of the sale-leaseback of our manufacturing facility in Danbury, CT.

Critical Accounting Policies and Estimates

The preparation of our consolidated financial statements is in accordance with accounting principles generally accepted in the United States of America ("GAAP"). The preparation of our consolidated financial statements requires management to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues, and expenses and related disclosure of contingent assets and liabilities. We consider an accounting estimate to be critical to the consolidated financial statements if (i) the estimate is complex in nature or requires a high degree of judgment and (ii) different estimates and assumptions were used, the results could have a material impact on the consolidated financial statements. On an ongoing basis, we evaluate our estimates and the application of our policies. We base our estimates on historical experience, current conditions and on various other assumptions 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. Actual results may differ from these estimates under different assumptions or conditions.

We consider our critical accounting policies to be those related to revenue recognition and gross-to-net adjustments, inventory costing and recoverability, recognized loss on purchase commitments, impairment of long-lived assets, milestone rights liability, clinical trial expenses, stock-based compensation and accounting for income taxes. These critical accounting policies are also considered significant accounting policies and are more fully described in Note 2 – Summary of Significant Accounting Policies of the Notes to Consolidated Financial Statements included in Part II, Item 8 — Financial Statements and Supplementary Data.

Revenue Recognition – Net Revenue – Commercial Product Sales — We sell products to a limited number of wholesale distributors and specialty and retail pharmacies, and durable medical suppliers ("DME") in the U.S. (collectively, "Customers"). Wholesale distributors subsequently resell our products to retail pharmacies and certain medical centers or hospitals. Specialty pharmacies sell directly to patients. In addition to distribution agreements with Customers, we enter into arrangements with payers that provide for government mandated and/or privately negotiated rebates, chargebacks, and discounts with respect to the purchase of our products.

We recognize revenue on product sales when the Customer obtains control of our product, which occurs at delivery for wholesale distributors and generally at delivery for specialty pharmacies. We recognize revenue on product sales to a retail pharmacy as the product is dispensed to patients. Product revenues are recorded net of applicable reserves including discounts, allowances, rebates, returns and other incentives. See *Reserves for Variable Consideration* below.

Reserves for Variable Consideration — Revenues from product sales are recorded at the net sales price (transaction price), which includes estimates of variable consideration for which reserves are established. Components of variable consideration include trade discounts and allowances, product returns, provider chargebacks and discounts, government rebates, payer rebates, and other incentives, such as voluntary patient assistance, and other allowances that are offered within contracts between us and our Customers, payers, and other indirect customers relating to the sale of our products. These reserves are based on the amounts earned, or to be claimed on the related sales, and result in a reduction of accounts receivable or establishment of a current liability. Significant judgments are required in making these estimates.

Where appropriate, these estimates take into consideration a range of possible outcomes, which are probability-weighted in accordance with the expected value method in Accounting Standards Codification ("ASC") Topic 606, *Revenue from Contracts with Customers* ("ASC 606") for relevant factors such as current contractual and statutory requirements, specific known market events and trends, industry data, and forecasted customer buying and payment patterns. Overall, these reserves reduce recognized revenue to our best estimates of the amount of consideration to which we are entitled based on the terms of the respective underlying contracts.

The amount of variable consideration that is included in the transaction price may be constrained, and is included in the net sales price only to the extent that it is probable that a significant reversal in the amount of the cumulative revenue recognized under the contract will not occur in a future period. Our analysis also contemplates application of the constraint in accordance with the guidance, under which we determined a material reversal of revenue would not occur in a future period for the estimates of gross-to-net adjustments as of December 31, 2022 and, therefore, the transaction price was not reduced further during the year ended December 31, 2022. Actual amounts of consideration ultimately received may differ from the Company's estimates. If actual results in the future vary from our estimates, we will adjust these estimates, which would affect net revenue — commercial product sales and earnings in the period such variances become known.

Significant judgment is required in estimating gross-to-net adjustments, historical experience, payer channel mix unbilled claims, claim submission time lags and inventory levels in the distribution channel.

Our reserves for variable consideration are reflected in our gross-to-net adjustments which were 42% of gross revenue, or $40.8 million, for the year ended December 31, 2022, compared to 39% of gross revenue, or $24.9 million, for the year ended December 31, 2021. If there is a 10% difference between the estimates for accruals and the actual liability in the reserves for variable consideration, the impact to our revenue for commercial product sales would be $2.0 million or a 4.1% change in the gross-to-net adjustment percentage for the year ended December 31, 2022.

These reserves are further detailed under Reserves for Variable Consideration in Note 2 – *Summary of Significant Accounting Policies* of the Notes to Consolidated Financial Statements included in Part II, Item 8 — Financial Statements and Supplementary Data.

Revenue Recognition – Collaborations and Services — We enter into licensing, research or other agreements under which we license certain rights to our product candidates to third parties, conduct research or provide other services to third parties. The terms of these arrangements may include but are not limited to payment to us of one or more of the following: up-front license fees; development, regulatory, and commercial milestone payments; payments for commercial manufacturing and clinical supply services we provide; and royalties on net sales of licensed products and sublicenses of the rights. As part of the accounting for these arrangements, we must develop assumptions that require judgment such as determining the performance obligation in the contract and determining the stand-alone selling price for each performance obligation identified in the contract. With respect to our significant collaboration and service agreement with UT that includes a long-term commercial supply agreement (as amended, the "CSA"), we have identified three distinct performance obligations: (1) the license, supply of product to be used in clinical development, and continued development and approval support for Tyvaso DPI ("R&D Services and License"); (2) development activities for the next generation of the product ("Next-Gen R&D Services"); and (3) a material right associated with current and future commercial manufacturing and supply of product ("Manufacturing Services"). Pre-production activities under the CSA, such as facility expansion services and other administrative services, were considered bundled services under the Manufacturing Services performance obligation as required by ASC 606. Following the FDA's approval of Tyvaso DPI, UT began issuing purchase orders for the supply of product, which represent distinct contracts and performance obligations under ASC 606. Revenue is recognized for the supply of product at a point in time, once control is transferred to UT. See Note 11 – *Collaboration, Licensing and Other Arrangements* of the Notes to Consolidated Financial Statements included in Part II, Item 8 — Financial Statements and Supplementary Data.

If an arrangement has multiple performance obligations, the allocation of the transaction price is determined from observable market inputs, and we use key assumptions to determine the stand-alone selling price, which may include development timelines, reimbursement rates for personnel costs, discount rates, and probabilities of technical and regulatory success. Revenue is recognized based on the measurement of progress as the performance obligation is satisfied and consideration received that does not meet the requirements to satisfy the revenue recognition criteria is recorded as deferred revenue. Current deferred revenue consists of amounts that are expected to be recognized as revenue in the next 12 months. Amounts that we expect will not be recognized within the next 12 months are classified as long-term deferred revenue.

If there is a 10% difference in the estimates used to determine the transaction price for the CSA entered into in December 2022 with UT, the related allocation of the transaction price between performance obligations, the difference between the estimates for accruals and the actual liability for deferred revenue and revenue recognized for collaborations and services would be $0.4 million for the year ended December 31, 2022.

Stock-Based Compensation — Share-based payments to employees, including grants of restricted stock units, performance-based awards, restricted stock units with market conditions ("Market RSUs"), nonqualified stock options ("options") and the compensatory elements of employee stock purchase plans, are recognized in the consolidated statements of operations based upon the fair value of the awards at the grant date. Restricted stock units are valued based on the market price on the grant date. We evaluate stock awards with performance conditions as to the probability that the performance conditions will be met and estimates the date at which the performance conditions will be met in order to properly recognize stock-based compensation expense over the requisite service period. The grant date fair value and the effect of the market conditions for the Market RSUs was estimated using a Monte Carlo valuation. We use the Black-Scholes option valuation model to estimate the grant date fair value of employee options and the compensatory elements of employee stock purchase plans.

The grant date fair value for the Market RSUs was $6.10 per unit for the Market RSUs granted during the year ended December 31, 2022, compared to $9.30 and $3.77 per unit for the Market RSUs granted during the years ended December 31, 2021 and 2020, respectively. If there is a 10% difference in the grant date fair value of the Market RSUs, the impact to our stock-based compensation expense would be $0.6 million for the year ended December 31, 2022.

Results of Operations

Trends and Uncertainties

We continue to maintain an elevated level of safety stock of certain raw materials due to concerns that supply chain interruptions may interfere with the manufacture of Afrezza, V-Go and Tyvaso DPI.

Manufacturing risks may adversely affect our ability to manufacture our products and could reduce our gross margin.

Our future success is dependent on our, and our current and future collaboration partners', ability to effectively commercialize our approved products. Our future success is also dependent on our pipeline of new products. There is a high rate of failure inherent in the research and development process for new drugs. As a result, there is a high risk that the funds we invest in research programs will not generate sufficient financial returns. Products may appear promising in development but fail to reach market within the expected or optimal timeframe, or at all.

Years ended December 31, 2022 and 2021

Revenues

The following table provides a comparison of the revenue categories for the years ended December 31, 2022 and 2021 (dollars in thousands):

	Year Ended December 31,			
	2022	2021	$ Change	% Change
Net revenue — commercial product sales:				
Gross revenue from product sales	$ 97,048	$ 64,023	$ 33,025	52%
Wholesaler distribution fees, rebates and chargebacks, product returns and other discounts	(40,801)	(24,855)	$ 15,946	64%
Net revenue — commercial product sales	56,247	39,168	$ 17,079	44%
Gross-to-net revenue adjustment percentage	(42%)	(39%)		
Revenue — collaborations and services	27,924	36,274	$ (8,350)	(23%)
Royalties — collaborations	15,599	—	$ 15,599	*
Total revenues	$ 99,770	$ 75,442	$ 24,328	32%

* Not meaningful

Afrezza — Gross revenue from sales of Afrezza increased by $7.1 million, or 11%, for the year ended December 31, 2022 compared to the prior year. The increase reflects a combination of higher price (including a more favorable gross-to-net adjustment), higher product demand and a favorable cartridge mix. The gross-to-net adjustment was 39% of gross revenue, or $27.8 million, for the year ended December 31, 2022, compared to 39% of gross revenue or $24.9 million, for the prior year. The gross-to-net percentage remained consistent over the prior year and was primarily impacted by an increase in anticipated product returns, offset by a decrease in co-pay assistance and wholesaler distribution fees (as a percentage of gross sales) due to an increased mix of specialty and retail pharmacy sales. As a result, net revenue from sales of Afrezza increased by $4.1 million, or 11%, for the year ended December 31, 2022 compared to the prior year.

V-Go — The acquisition of V-Go on May 31, 2022 resulted in an increase in gross revenue from commercial product sales of $25.9 million and net revenue of $12.9 million for the year ended December 31, 2022. The gross-to-net adjustment of 50.2% of gross revenue was mainly attributable to commercial and government rebates and product distribution fees.

Collaborations and Services — Net revenue from collaborations and services decreased by $8.4 million, or 23%, for the year ended December 31, 2022 compared to the prior year. The decrease in collaborations and services revenue was primarily attributable to the completion of the R&D Services performance obligation associated with our collaboration with UT during 2021. In August 2021, we entered into a commercial supply agreement with UT (the "CSA"). Revenue associated with the CSA was deferred until we began manufacturing and subsequently selling Tyvaso DPI in the second quarter of 2022. During the year ended December 31, 2022, we recognized $24.8 million of revenue under the CSA. We also recognized royalty revenue from our collaboration with UT of $15.6 million during the year ended December 31, 2022.

See Note 11 – Collaboration, Licensing and Other Arrangements in the consolidated financial statements included in Part II, Item 8 – Financial Statements and Supplementary Data.

Commercial product gross profit

The following table provides a comparison of the commercial product gross profit categories for the years ended December 31, 2022 and 2021 (dollars in thousands):

	Year Ended December 31,			
	2022	2021	$ Change	% Change
Commercial product gross profit:				
Net revenue — commercial product sales	$ 56,247	$ 39,168	$ 17,079	44%
Less cost of goods sold	(16,003)	(16,833)	$ (830)	(5%)
Commercial product gross profit:	$ 40,244	$ 22,335	$ 17,909	80%
Gross margin	72%	57%		

Afrezza — Commercial product gross profit for Afrezza increased by $12.3 million, or 55%, for the year ended December 31, 2022, compared to the prior year. Gross margin for the year ended December 31 2022 increased to 80% compared to 57% for the prior year. The increase in gross profit and gross margin was attributable to an increase in Afrezza sales as well as a decrease in cost of goods sold. Cost of goods sold decreased by $8.2 million, or 48%, for the year ended December 31, 2022 compared to the prior year. The decrease in cost of goods sold was primarily attributable to a $4.1 million decrease in excess capacity costs as Tyvaso DPI began commercial production a $1.6 million decrease in inventory write-offs in the current year and a $2.0 million fee incurred for the amendment of the Insulin Supply Agreement with Amphastar in the prior year.

V-Go — The acquisition of V-Go on May 31, 2022 resulted in an increase in commercial product gross profit of $5.6 million with a gross margin of 43% for the year ended December 31, 2022.

Expenses

The following table provides a comparison of the expense categories for the years ended December 31, 2022 and 2021 (dollars in thousands):

	Year Ended December 31,			
	2022	2021	$ Change	% Change
Expenses:				
Cost of goods sold	$ 16,003	$ 16,833	$ (830)	(5%)
Cost of revenue — collaborations and services	41,494	22,024	$ 19,470	88%
Research and development	19,721	12,312	$ 7,409	60%
Selling	53,753	45,528	$ 8,225	18%
General and administrative	37,720	31,889	$ 5,831	18%
Asset impairment	—	106	$ (106)	(100%)
Gain on foreign currency translation	(4,811)	(6,567)	$ (1,756)	(27%)
Loss on purchase commitments	—	339	$ (339)	(100%)
Total expenses	$ 163,880	$ 122,464	$ 41,416	34%

Cost of revenue — collaborations and services increased by $19.5 million, or 88%, for the year ended December 31, 2022 compared to the prior year. The increase was attributable to an increase in manufacturing activities for Tyvaso DPI product.

Research and development expenses increased by $7.4 million, or 60%, for the year ended December 31, 2022 compared to the prior year. The increase was primarily attributable to development activities for our product pipeline, increased headcount for pipeline development activities and the Afrezza pediatrics clinical study (INHALE-1).

Selling expenses increased by $8.2 million, or 18%, for the year ended December 31, 2022, compared to the prior year. The increase was primarily attributable to a pilot promotional effort aimed at primary care physicians that began in the fourth quarter of 2021 and ended in the third quarter of 2022, elimination of a co-promotion for third party product (which permitted some expenses associated with the sales force to be recognized as cost of revenue — collaborations and services in the same period of 2021), V-Go promotional efforts after the acquisition in the second quarter of 2022, partially offset by the net favorable impact of personnel-related costs due to Afrezza sales force restructuring.

General and administrative expenses increased by $5.8 million, or 18%, for the year ended December 31, 2022, compared to the prior year. This increase was primarily attributable to higher stock-based compensation, increased headcount, and higher professional and consulting fees.

Gain on foreign currency translation was $4.8 million for the year ended December 31, 2022 compared to $6.6 million for the prior year. Under the Insulin Supply Agreement with Amphastar, payment obligations are denominated in Euros. We are required to record the foreign currency translation impact of the U.S. dollar to Euro exchange rate associated with the recognized loss on purchase commitments. The decrease in year-over-year gain was due to the translation of Euro to U.S. dollar exchange rates.

Other Income (Expense)

The following table provides a comparison of the other income (expense) categories for the years ended December 31, 2022 and 2021 (dollars in thousands):

	Year Ended December 31,			
	2022	2021	$ Change	% Change
Interest income	$ 2,513	$ 112	$ 2,401	*
Interest expense on financing liability	(9,758)	(1,373)	$ 8,385	*
Interest expense on notes	(15,011)	(15,204)	$ (193)	(1%)
Loss on available-for-sale securities	(932)	—	$ (932)	*
Loss on extinguishment of debt	—	(17,200)	$ (17,200)	(100%)
Other expense	(102)	(239)	$ (137)	(57%)
Total other expense	$ (23,290)	$ (33,904)	$ (10,614)	(31%)

* Not meaningful

Interest income, consisting of interest on investments net of amortization, increased by $2.4 million compared to the prior year primarily due to higher yields on our marketable securities and money market funds.

Interest expense on financing liability was $9.8 million for the year ended December 31, 2022 and represented interest incurred on the sale lease-back transaction for our manufacturing facility in Danbury, CT which was entered into in the fourth quarter of 2021.

Interest expense on notes for the year ended December 31, 2022 was comparable to the prior year. See Note 10 — *Borrowings*.

Loss on available-for-sale securities for the year ended December 31, 2022 was $0.9 million as a result of the change in the fair value of the investment that related to credit risk.

Loss on extinguishment of debt of $17.2 million for the year ended December 31, 2021 consisted of a $22.1 million loss on extinguishment of debt for the amendment to the Mann Group convertible note, which did not result in a change in our financial position, partially offset by a $4.9 million gain on extinguishment of debt as a result of the U.S. Small Business Administration's ("SBA") forgiveness of the Paycheck Protection Program loan (the "PPP loan").

Other expense or income for the years ended December 31, 2022 and 2021 consisted primarily of the loss associated with a foreign currency hedging transaction which was entered into to mitigate our exposure to foreign currency exchange risks associated with our insulin purchase obligation under the Insulin Supply Agreement with Amphastar.

Liquidity and Capital Resources

Our principal sources of liquidity are our cash, cash equivalents, and investments. Our primary uses of cash include the development of our product pipeline, the manufacturing and marketing of Afrezza and V-Go, manufacturing Tyvaso DPI, the funding of general and administrative expenses, and interest expense on our financing liability and debt.

To date, we have funded our operations primarily through the sale of equity and convertible debt securities, from the receipt of upfront and milestone payments from collaborations, from borrowings, from sales of Afrezza and V-Go, from royalties and manufacturing revenue from UT as well as from proceeds from the sale-leaseback transaction.

We believe we will be able to meet our liquidity needs over the next twelve months, as well as longer-term needs, based on the balance of cash, cash equivalents and investments on hand, projected sales of Afrezza and V-Go, and projected royalties and manufacturing revenue from the production and sale of Tyvaso DPI. The following table presents our material cash requirements as of December 31, 2022 associated with contractual commitments for future periods (in thousands):

	2023	2024 - 2025	2026 - 2027	Thereafter	Total
Senior convertible notes(1)	$ 5,750	$ 11,500	$ 232,875	$ —	$ 250,125
MidCap credit facility(2)	9,896	35,541	—	—	45,437
Mann Group convertible note(3)	—	9,233	—	—	9,233
Financing liability (4)	9,774	20,287	21,382	188,453	239,896
Insulin purchase agreement (5)	9,390	32,243	30,674	—	72,307
Total material cash requirements	$ 34,810	$ 108,804	$ 284,931	$ 188,453	$ 616,998

(1) $230.0 million aggregate principal amount of Senior convertible notes bearing interest at 2.50% payable semi-annually in arrears on March 1 and September 1 of each year, beginning on September 1, 2021 and maturing on March 1, 2026, unless earlier converted, redeemed or repurchased. The Senior convertible notes are convertible at an initial conversion price of approximately $5.21 per share of common stock. The conversion rate is subject to adjustment under certain circumstances in accordance with the terms of the Indenture.

(2) $40.0 million principal amount under the MidCap credit facility, bearing interest at an annual rate equal to one-month SOFR plus 6.25% (cap of 8.25%), subject to a one-month SOFR floor of 1.00%, payable in equal monthly installments beginning in September 2023 through maturity in August 2025.

(3) $8.8 million principal amount of indebtedness under the Mann Group convertible note bearing interest at a fixed rate of 2.50% per annum compounded quarterly and maturing in December 2025, which is convertible into shares of our common stock at the option of Mann Group at a conversion price of $2.50 per share. Interest was paid-in-kind from August 2019 until the end of 2020, after which we have the option to pay interest in-kind or in shares.

(4) On November 8, 2021, we sold a portion of our manufacturing facility located in Danbury, CT to an affiliate of Creative Manufacturing Properties (the “Purchaser”) for a sales price of $102.3 million. We leased the property from the Purchaser for an initial term of 20 years, with four renewal options of five years each. The total annual rent under the lease started at approximately $9.5 million per year, subject to a 50% rent abatement during the first year of the lease, and increases annually by (i) 2.5% in the second through fifth year of the lease and (ii) 3% in the sixth and each subsequent year of the lease, including any renewal term. We are responsible for payment of operating expenses, property taxes and insurance for the leased property. Pursuant to the terms of the lease, we have four options to repurchase the property, in 2026, 2031, 2036 and 2041, for the greater of (i) $102.3 million or (ii) the fair market value of the leased property. Interest expense is calculated using an incremental borrowing rate of 9%.

(5) The July 2014 Insulin Supply Agreement with Amphastar to manufacture and supply us certain quantities of recombinant human insulin for use in Afrezza was amended in May 2021 and expires on December 31, 2027. Unless terminated earlier, the agreement can be renewed for additional, successive two-year terms upon 12 months’ written notice given prior to the end of the initial term or any additional two-year term.

To date, we have been able to timely make our required interest payments, but we cannot guarantee that we will be able to do so in the future. If we fail to repurchase the Mann Group promissory notes, we will be in default under the applicable instrument for such indebtedness, and may also suffer an event of default under the terms of other borrowing arrangements that we may enter into from time to time. Any of these events could have a material adverse effect on our business, results of operations and financial condition, up to and including the noteholders initiating bankruptcy proceedings or causing us to cease operations altogether.

In July 2013, in connection with our entry into a loan agreement (which has since been repaid) with Deerfield Private Design Fund II, L.P. and Deerfield Private Design International II, L.P. we issued certain milestone rights (the “Milestone Rights”) to Deerfield Private Design Fund II, L.P. and Horizon Santé FLML SÀRL (the “Original Milestone Purchasers”). The Milestone Rights provided the Original Milestone Purchasers certain rights to receive payments of up to $90.0 million upon the occurrence of specified strategic and sales milestones, $60.0 million of which remains payable to Barings upon achievement of such milestones. See Note 16– *Commitments and Contingencies* and Note 10 – *Borrowings* for further information related to the Milestone Rights.

In addition to the above, we also expect to have material cash requirements relating to paying our employees and consultants, professional services fees, marketing expenses, manufacturing expenditures, and clinical trial expenses. In addition, we make substantial and often long-term investments in our supply chain in order to ensure we have enough inventory and drug product to meet current and future revenue forecasts, as well as clinical trial needs.

In February 2018, we entered into a controlled equity offering sales agreement (the “CF Sales Agreement”) with Cantor Fitzgerald & Co. (“Cantor Fitzgerald”), as sales agent, pursuant to which we may offer and sell, from time to time, through Cantor Fitzgerald, shares of our common stock. Under the Sales Agreement, Cantor Fitzgerald may sell shares by any method deemed to be an “at-the-market offering” as defined in Rule 415 under the Securities Act of 1933, as amended. In February 2022, we filed a sales agreement prospectus under a registration statement on Form S-3 (File No. 333-262981) covering the sale of up to $50.0 million of our common stock through Cantor Fitzgerald under the CF Sales Agreement.

During the year ended December 31, 2022, we used $80.7 million of cash for our operating activities, which primarily consisted of $75.1 million of selling, general and administrative expenses, $58.5 million of cost of goods sold, $23.8 million of costs for research and development, $8.9 million of cash paid for interest on notes and $9.6 million of cash paid for interest on the financing liability, partially offset by $108.3 million of revenue.

During the year ended December 31, 2021, we used $61.7 million of cash for our operating activities, which primarily consisted of $65.8 million of selling, general and administrative expenses, $35.5 million of cost of goods sold and cost of revenue, $11.7 million of costs for research and development and $6.5 million of cash paid for interest, partially offset by $47.6 million of revenue.

Cash provided from investing activities of $4.9 million for the year ended December 31, 2022 was primarily due to the maturity of $107.3 million of debt securities, partially offset by the up-front consideration of $15.3 million for certain assets and assumed liabilities related to V-Go, $5.0 million purchase of available-for-sale securities, the purchase of $74.5 million of debt securities and $7.6 million purchase of property and equipment.

Cash used in investing activities of $151.5 million for the year ended December 31, 2021 was primarily due to the purchase of debt securities of $196.1 million, partially offset by proceeds received from sales of debt securities of $59.1 million.

Cash provided by financing activities of $21.4 million for the year ended December 31, 2022 was primarily due to net proceeds from at-the-market offering of $19.8 million, partially offset by the milestone payment of $1.1 million.

Cash provided by financing activities of $270.3 million for the year ended December 31, 2021 was primarily due to net proceeds from the offering of Senior convertible notes of $222.7 million and net proceeds from the sale-leaseback transaction of $99.1 million, partially offset by the repayment of $35.1 million of Mann Group non-convertible notes and related unpaid accrued interest and the repayment of $10.0 million of principal and $1.0 million prepayment penalty for the MidCap credit facility.

Future Liquidity Needs

We are not currently profitable and have rarely generated positive net cash flow from operations. In addition, we expect to continue to incur expenditures for the foreseeable future in support of our manufacturing operations, sales and marketing costs for our products and development costs for other product candidates in our pipeline. We believe we will be able to meet our liquidity needs based on our cash, cash equivalents and investments on hand, sales of Afrezza and V-Go, royalties and manufacturing revenue from the production and sale of Tyvaso DPI. As of December 31, 2022, we had capital resources of $69.8 million in cash and cash equivalents, $101.0 million in short-term investments and $2.0 million in long-term investments, and total principal amount of outstanding borrowings of $278.8 million.

We believe our resources will be sufficient to fund our operations for the next twelve months from the date of issuance of our consolidated financial statements included in Item 8 – Financial Statements.

Recent Accounting Pronouncements

See Note 2 — *Summary of Significant Accounting Policies* of the Notes to Consolidated Financial Statements included in Part II, Item 8 — Financial Statements and Supplementary Data for information regarding accounting standards we adopted in 2022 and other new accounting standards that have been issued by the FASB but are not effective until after December 31, 2022.

Item 7A. *Quantitative and Qualitative Disclosures about Market Risk*

Interest Rate Risk

Interest on borrowings under the MidCap credit facility accrues interest at an annual rate equal to the lesser of (i) 8.25% and (ii) the one-month SOFR (subject to a one-month SOFR floor of 1.00%) plus 6.25%. Accordingly, our interest expense under the MidCap credit facility is subject to changes in the one-month SOFR rate.

All other debt has fixed interest rates, so the interest expense associated with such debt is not exposed to changes in market interest rates. Specifically, the interest rate on amounts borrowed under the Mann Group promissory notes is fixed at 2.50% and the interest rate under the Senior convertible notes is fixed at 2.50%. See Note 10 – *Borrowings* for information about the principal amount of outstanding debt.

If a hypothetical 10% change in the one-month SOFR interest rates on December 31, 2022 were to have occurred, this change would not have had a material effect on our annual interest payment obligation.

Foreign Currency Exchange Risk

In July 2022 and October 2022, we entered into two separate 90-day foreign currency hedging transactions to mitigate our exposure to foreign currency exchange risks associated with our insulin purchase obligation under the Insulin Supply Agreement. The hedging transaction hedges against short-term currency fluctuations for the remaining current year purchase obligation under the Insulin Supply Agreement for a total of €4.0 million. We realized a $0.1 million loss during the year ended December 31, 2022. This amount is recorded in other income and expense.

We incur and will continue to incur significant expenditures for insulin supply obligations under our Insulin Supply Agreement with Amphastar. Such obligations are denominated in Euros. At the end of each reporting period, the recognized gain or loss on purchase commitment is converted to U.S. dollars at the then-applicable foreign exchange rate. As a result, our business is affected by fluctuations in exchange rates between the U.S. dollar and the Euro. For the year ended December 31, 2022, we realized a $4.8 million currency gain, which was included in (gain) loss on foreign currency translation in the accompanying consolidated statements of operations.

Exchange rate fluctuations may adversely affect our expenses, results of operations, financial position and cash flows. If a change in the U.S. dollar to Euro exchange rate equal to 10% of the U.S. dollar to Euro exchange rate on December 31, 2022 were to have occurred, this change would have resulted in a foreign currency impact to our pre-tax loss of approximately $7.2 million.

Item 8. ***Financial Statements and Supplementary Data***

The information required by this Item is included in Items 15(a) (1) and (2) of Part IV of this Annual Report on Form 10-K.

Item 9. ***Changes in and Disagreements with Accountants on Accounting and Financial Disclosure***

None.

Item 9A. ***Controls and Procedures***

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures that are designed to ensure that information required to be disclosed in our periodic and current reports that we file with the SEC is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms, and that such information is accumulated and communicated to our management, including our Chief Executive Officer and our Chief Financial Officer, as appropriate, to allow timely decisions regarding required disclosure. In designing and evaluating our disclosure controls and procedures, we and our management recognize that there are inherent limitations to the effectiveness of any system of disclosure controls and procedures, including the possibility of human error and the circumvention or overriding of the controls and procedures. Accordingly, even effective disclosure controls and procedures can only provide reasonable assurance of achieving their desired control objectives. Additionally, in evaluating and implementing possible controls and procedures, our management was required to apply its reasonable judgment.

As required by Rule 13a-15 under the Securities Exchange Act of 1934, as amended (the "Exchange Act"), we carried out an evaluation under the supervision and with the participation of our management, including our Chief Executive Officer and our Chief Financial Officer, of the effectiveness of the design and operation of our disclosure controls and procedures as of December 31, 2022.

Based upon this evaluation, our Chief Executive Officer and Chief Financial Officer concluded that the design and operation of our disclosure controls and procedures were effective as of December 31, 2022.

Management's Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rule 13a-15(f) under the Exchange Act. Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Projections of any evaluation of effectiveness to future periods are subject to the risk that controls may not operate effectively because of changes in conditions such as replacing consulting resources with permanent personnel or that the degree of compliance with the policies or procedures may deteriorate. Our management assessed the effectiveness of our internal control over financial reporting as of December 31, 2022. In making this assessment, our management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in the Internal Control-Integrated Framework (2013 Framework).

Based on this assessment, our management concluded that, as of December 31, 2022, our internal control over financial reporting was effective based on those criteria.

The effectiveness of our internal control over financial reporting has been audited by Deloitte & Touche LLP, an independent registered public accounting firm, as stated in their attestation report herein, which expresses an unqualified opinion on the effectiveness of our internal control over financial reporting as of December 31, 2022.

Changes in Internal Control over Financial Reporting

An evaluation was also performed under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, of any changes in our internal control over financial reporting that occurred during our last fiscal quarter and that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting. That evaluation did not identify any change in our internal control over financial reporting that occurred during our latest fiscal quarter and that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of MannKind Corporation

Opinion on Internal Control over Financial Reporting

We have audited the internal control over financial reporting of MannKind Corporation and subsidiaries (the "Company") as of December 31, 2022, based on criteria established in *Internal Control — Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2022, based on criteria established in *Internal Control — Integrated Framework (2013)* issued by COSO.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated financial statements as of and for the year ended December 31, 2022, of the Company and our report dated February 23, 2023, expressed an unqualified opinion on those financial statements.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Deloitte & Touche LLP

Los Angeles, California
February 23, 2023

Item 9B. ***Other Information.***

None.

Item 9C. ***Disclosure Regarding Foreign Jurisdictions that Prevent Inspections.***

None.

PART III

Item 10. ***Directors, Executive Officers and Corporate Governance.***

The information required by this Item and not set forth below will be set forth in the sections headed "Proposal 1—Election of Directors" and "Corporate Governance Principles and Board and Committee Matters" in our definitive proxy statement for our 2023 Annual Meeting of Stockholders (the "Proxy Statement") to be filed with the SEC on or before May 1, 2023, and is incorporated herein by reference.

(a) *Executive Officers* — For information regarding the identification and business experience of our executive officers, see "Information about our Executive Officers" in Part I, Item 1 of this Annual Report on Form 10-K.

(b) *Directors* — Our board of directors consists of the following members:

James S. Shannon, M.D., MRCP (UK) rejoined our board in May 2015 after previously serving as a director from February 2010 until April 2012. Dr. Shannon was appointed Chairman of the Board of Directors in December 2020. From May 2012 until his retirement in April 2015, Dr. Shannon was the Chief Medical Officer of GlaxoSmithKline plc. He formerly held the position of Global Head of Pharma Development at Novartis AG, based in Basel, Switzerland from 2005 until 2008. After joining Sandoz in 1994 as Head of Drug Regulatory Affairs, Dr. Shannon led the Integration Office for R&D overseeing the creation of the Novartis R&D groups from those of Ciba-Geigy Ltd and Sandoz. Following the merger, he was appointed Head of the Cardiovascular Strategic Team and subsequently became Global Head of Project Management before being appointed Global Head of Clinical Development and Medical Affairs in 1999, a position that he held until 2005 when he was appointed to Head Pharma Development. Between 2008 and joining GSK, Dr. Shannon served on the boards of a number of companies, including Biotie, Circassia, Crucell and Endocyte. He also sat on the board of Cerimon Pharmaceuticals where he held the position of interim Chief Executive Officer and President from January 2009 until April 2010. Dr. Shannon currently serves on the boards of ProQR Therapeutics NV, Immodulon Therapeutics Limited, Kyowa Kirin, Inc. – U.S., Leyden Labs and Horizon Therapeutics plc. He first entered the pharmaceutical industry in 1987 joining Sterling Winthrop Inc., working initially in Europe and subsequently in the USA, where he held positions of increasing responsibility in the management of research and development ultimately serving as Senior Vice-President, Clinical Development. Dr. Shannon is trained in Medicine and Cardiology. He received his undergraduate and postgraduate degrees at Queen's University of Belfast and is a Member of the Royal College of Physicians (UK).

Michael E. Castagna, Pharm.D. has served as our Chief Executive Officer and as one of our directors since May 2017. Mr. Castagna also served as a Corporate Vice President, Chief Commercial Officer from March 2016 until May 2017. From November 2012 until he joined us, Mr. Castagna was at Amgen, Inc., where he initially served as Vice President, Global Lifecycle Management and was most recently Vice President, Global Commercial Lead for Amgen's Biosimilar Business Unit. From 2010 to 2012, he was Executive Director, Immunology, at Bristol-Myers Squibb Company (''BMS''). Before BMS, Mr. Castagna served as Vice President and Head, Biopharmaceuticals, North America, at Sandoz, a division of Novartis. Beginning in 1997, he held positions with commercial or medical affairs responsibilities at EMD (Merck) Serono, Pharmasset and DuPont Pharmaceuticals. He received his pharmacy degree from the University of the Sciences-Philadelphia College of Pharmacy, a Pharm.D. from Massachusetts College of Pharmacy & Sciences and an MBA from The Wharton School of Business at the University of Pennsylvania.

Ronald J. Consiglio has been one of our directors since October 2003. Since 1999, Mr. Consiglio has been the Managing Director of Synergy Trading, a securities-trading partnership. From 1999 to 2001, Mr. Consiglio was Executive Vice President and Chief Financial Officer of Trading Edge, Inc., a national automated bond-trading firm. From January 1993 to 1998 Mr. Consiglio served as Chief Executive Officer of Angeles Mortgage Investment Trust, a publicly traded Real Estate Investment Trust. His prior experience includes serving as Senior Vice President and Chief Financial Officer of Cantor Fitzgerald & Co. and as a member of its board of directors. Mr. Consiglio has served as a member of the board of trustees for the Metropolitan West Funds since 2003. Mr. Consiglio served as a certified public accountant for over 17 years and was a partner in the international accounting firm of Deloitte, Haskins & Sells. He holds a bachelor's degree in accounting from California State University at Northridge.

Michael A. Friedman, M.D. has been one of our directors since December 2003. In 2014, Dr. Friedman completed a decade of service as the President and Chief Executive Officer of the City of Hope National Medical Center. Previously, from September 2001 until April 2003, Dr. Friedman held the position of Senior Vice President of Research and Development, Medical and Public Policy, for Pharmacia Corporation and, from July 1999 until September 2001, was a Senior Vice President of Searle, a subsidiary of Monsanto Company. From 1995 until June 1999, Dr. Friedman served as Deputy Commissioner for Operations for the Food and Drug Administration, and was Acting Commissioner and Lead Deputy Commissioner from 1997 to 1998. He served on the board of Celgene Corporation from February 2011 to December 2019 and on the board of Smith & Nephew plc from April 2013 to April 2019. Dr. Friedman received a Bachelor of Arts degree, magna cum laude, from Tulane University, New Orleans, Louisiana, and a doctorate in medicine from the University of Texas, Southwestern Medical School.

Jennifer Grancio has been one of our directors since March 2020. Since October 2020, Ms. Grancio has served as the Chief Executive Officer of Engine No. 1, an impact investment firm. From November 2018 until October 2020, she consulted through Grancio Capital, where she worked with CEOs to accelerate high-growth company success. From 1999 to 2018, she served as a founder and executive with BlackRock's iShares business, where she spearheaded the distribution of iShares in the United States and Europe and acted as the Global Head of Marketing and Partnerships for BlackRock's index business. Prior to BlackRock, she was a senior associate with PricewaterhouseCoopers, a management consulting firm. Ms. Grancio serves as a board member for Ethic Inc., a sustainable investing firm, and for Harvest Savings & Wealth Technologies, Inc. She is also on the advisory boards of Say Technologies LLC and m+ funds (from Alaia Capital, LLC). Ms. Grancio

earned a bachelor's degree in economics and international relations from Stanford University, and an MBA degree in strategy and finance from Columbia Business School.

Anthony Hooper has been one of our directors since January 2020. He is also a director of BeiGene, Ltd. And Amplity Health. Mr. Hooper served as executive vice president of Global Commercial Operations for Amgen Inc. from Oct 2011 until August 2018. Prior to joining Amgen, Mr. Hooper spent more than 15 years at Bristol-Myers Squibb. His last role there was Senior Vice President, Global Commercial Operations and president of the company's pharmaceutical business in the Americas, Japan and intercontinental regions. Previously, he was Assistant Vice President of Global Marketing for Wyeth Laboratories and led the international marketing group for Lederle International. Mr. Hooper earned law and MBA degrees from the University of South Africa.

Sabrina Kay has been a member of our Board of Directors since December 2020. Currently, Dr. Kay serves as Founder and CEO of Fremont Private Investments, where she has led the operations and exits of several companies including The Art Institute of Hollywood (sold to Education Management Corp.), Premier Business Bank (sold to First Foundation Inc.), Fashion Umbrella, Fremont College, and Dale Carnegie of Los Angeles. Dr. Kay currently serves on the boards of East West Bank (NASDAQ: EWBC) and Hagerty (NYSE:HGTY). She is also a philanthropist, having served on more than 30 charitable and civic boards, including the Los Angeles Sports and Entertainment Commission, Petersen Automotive Museum, Portal Schools, the Leadership Council of International Medical Corps Leadership Council, the Board of Leaders of USC Marshall School and After-School All-Stars Los Angeles, which she chairs. Dr. Kay received Ed.D. and M.Sc. degrees in education from the University of Pennsylvania. She also holds an MBA from the University of Southern California.

Kent Kresa has been a member of our Board of Directors since June 2004 and served as Chairman of the Board from February 2017 until December 2020. From November 2011 until his appointment as our Chairman, Mr. Kresa served on our Board of Directors as our lead independent director. Mr. Kresa is Chairman Emeritus of Northrop Grumman Corporation, a defense company and from September 1990 until October 2003, he was also its Chairman. He also served as Chief Executive Officer of Northrop Grumman Corporation from January 1990 until March 2003 and as its President from 1987 until September 2001. From 2003 to August 2010, Mr. Kresa served as a director of General Motors Company (or its predecessor). Mr. Kresa has also served on the boards of Fluor Corporation and Avery Dennison Corporation. Mr. Kresa has been a member of the Caltech Board of Trustees since 1994 and also serves on the boards of several non-profit organizations. As a graduate of Massachusetts Institute of Technology, he received a B.S. in 1959, an M.S. in 1961, and an E.A.A. in 1966, all in aeronautics and astronautics.

Christine Mundkur has been one of our directors since November 2018. Ms. Mundkur most recently served as Chief Executive Officer and non-voting Chairman of the Board of Directors for Impopharma Inc., a developer of complex formulations focused on inhaled pharmaceutical products, from February 2013 to February 2017. While at Impopharma, Ms. Mundkur led the transition of the company from a successful clinical research organization into a generic pharmaceutical inhalation development company. Her work included the internal 8 development and filing of Abbreviated New Drug Applications for spray and inhalation products. Ms. Mundkur also previously served as President and Chief Executive Officer of the U.S. Division and Head of Commercial Operations for North America for Sandoz, Inc. from January 2009 to April 2010. She served as Chief Executive Officer of Barr Laboratories, Inc. from April 2008 to December 2008, where she started her career as quality and regulatory counsel in 1993. In addition, Ms. Mundkur has served as a strategic consultant advising several clients on global pharmaceutical business strategies. Ms. Mundkur currently serves on the board of directors of Cardinal Health and served on the board of directors of Lupin Limited from April 2019 through December 2022. Ms. Mundkur holds a J.D. from the St. Louis University School of Law and received her B.S. degree in chemistry from St. Louis University.

We have adopted a Code of Business Conduct and Ethics Policy that applies to our directors and employees, including our principal executive officer, principal financial officer, principal accounting officer or controller, and have posted the text of the policy on our website (*www.mannkindcorp.com*) in connection with "Corporate Governance" materials. In addition, we intend to promptly disclose on our website (i) the nature of any amendment to the policy that applies to our principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions and (ii) the nature of any waiver, including an implicit waiver, from a provision of the policy that is granted to one of these specified individuals, the name of such person who is granted the waiver and the date of the waiver, to the extent any such waiver is required to be disclosed pursuant to the rules and regulations of the SEC.

Item 11. ***Executive Compensation***

The information required by this Item will be set forth under the caption "Executive Compensation," "Compensation of Directors" and "Compensation Committee Report" in the Proxy Statement, and is incorporated herein by reference.

Item 12. ***Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters***

The information required by this Item will be set forth under the captions "Security Ownership of Certain Beneficial Owners and Management" and "Securities Authorized for Issuance under Equity Compensation Plans" in the Proxy Statement, and is incorporated herein by reference.

Item 13. ***Certain Relationships and Related Transactions, and Director Independence***

The information required by this Item will be set forth under the captions "Corporate Governance Principles and Board and Committee Matters" and "Related Party Transactions, Policy and Procedures" in the Proxy Statement, and is incorporated herein by reference.

Item 14. ***Principal Accountant Fees and Services***

The information required by this Item will be set forth under the captions “Principal Accounting Fees and Services” and “Pre-Approval Policies and Procedures” in the Proxy Statement and is incorporated herein by reference.

With the exception of the information specifically incorporated by reference from the Proxy Statement in this Annual Report on Form 10-K, the Proxy Statement shall not be deemed to be filed as part of this report. Without limiting the foregoing, the information under the captions “Report of the Audit Committee of the Board of Directors” in the Proxy Statement is not incorporated by reference.

PART IV

Item 15. ***Exhibits and Financial Statement Schedules***

(a) The following documents are filed as part of, or incorporated by reference into, this Annual Report on Form 10-K:

(1)(2) Financial Statements and Financial Statement Schedules. The following Financial Statements of MannKind Corporation, Financial Statement Schedules and Report of Independent Registered Public Accounting Firm are included in a separate section of this report beginning on page 63:

All financial statement schedules have been omitted because the required information is not applicable or not present in amounts sufficient to require submission of the schedule, or because the information required is included in the consolidated financial statements or the notes thereto.

(3) Exhibits. The exhibits listed under Item 15(b) hereof are filed or furnished with, or incorporated by reference into, this Annual Report on Form 10-K. Each management contract or compensatory plan or arrangement is identified separately in Item 15(b) hereof.

(b) Exhibits. The following exhibits are filed or furnished as part of, or incorporated by reference into, this Annual Report on Form 10-K:

Exhibit Number	Description of Document
2.1	Purchase Agreement, dated December 7, 2020 by and among the Company, the Acquired Company, the Sellers and the Securityholders' Representative (incorporated by reference to Exhibit 2.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on December 7, 2020).
3.1	Amended and Restated Certificate of Incorporation (incorporated by reference to Exhibit 3.1 to MannKind's Quarterly Report on Form 10-Q (File No. 000-50865), filed with the SEC on August 9, 2016).
3.2	Certificate of Amendment of Amended and Restated Certificate of Incorporation of MannKind Corporation (incorporated by reference to Exhibit 3.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on March 2, 2017).
3.3	Certificate of Amendment of Amended and Restated Certificate of Incorporation of MannKind Corporation (incorporated by reference to Exhibit 3.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on December 13, 2017).
3.4	Certificate of Amendment of Amended and Restated Certificate of Incorporation of MannKind Corporation (incorporated by reference to Exhibit 3.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on May 27, 2020).
3.5	Amended and Restated Bylaws (incorporated by reference to Exhibit 3.2 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on May 27, 2020).
4.1	Reference is made to Exhibits 3.1, 3.2, 3.3, 3.4 and 3.5.
4.2	Form of common stock certificate (incorporated by reference to Exhibit 4.2 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on March 16, 2017).
4.3	Description of Common Stock (incorporated by reference to Exhibit 4.3 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on February 25, 2021).
4.4	Milestone Rights Purchase Agreement, dated as of July 1, 2013, by and among MannKind, Deerfield Private Design Fund II, L.P. and Horizon Santé FLML SÁRL (incorporated by reference to Exhibit 99.3 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on July 1, 2013).
4.5	Form of Warrant to Purchase Stock issued to MidCap Financial Trust on August 6, 2019 (incorporated by reference to Exhibit 4.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on August 7, 2019).
4.6	Convertible Promissory Note made by MannKind Corporation in favor of The Mann Group LLC, dated August 6, 2019 (incorporated by reference to Exhibit 4.6 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on August 7, 2019).

Exhibit Number	Description of Document
4.7	Amendment No. 1 to Convertible Promissory Note, dated April 22, 2021, by and between MannKind Corporation and The Mann Group LLC (incorporated by reference to Exhibit 99.2 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on April 26, 2021).
4.8	Promissory Note made by MannKind Corporation in favor of The Mann Group LLC, dated August 6, 2019 (incorporated by reference to Exhibit 4.7 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on August 7, 2019).
4.9	Indenture, dated as of March 4, 2021, by and between MannKind Corporation and U.S. Bank National Association, as Trustee (incorporated by reference to Exhibit 4.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on March 5, 2021).
4.10	Form of Global Note, representing MannKind Corporation's 2.50% Convertible Senior Notes due 2026 (included as Exhibit A to the Indenture filed as Exhibit 4.15) (incorporated by reference to Exhibit 4.2 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on March 5, 2021).
10.1*	Offer Letter Agreement, dated July 12, 2017, by and between MannKind and Steven B. Binder (incorporated by reference to Exhibit 99.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on July 17, 2017).
10.2*	Offer Letter, dated March 9, 2016, by and between MannKind and Michael E. Castagna (incorporated by reference to Exhibit 10.38 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on March 15, 2016).
10.3*	Offer Letter, dated December 22, 2016, by and between MannKind and Stuart Tross (incorporated by reference to Exhibit 10.36 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on March 16, 2017).
10.4*	Offer Letter, dated May 7, 2020 by and between MannKind and Alejandro Galindo (incorporated by reference to Exhibit 10.4 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on February 25, 2021).
10.5*	Offer Letter, dated August 11, 2003, by and between MannKind and Joseph Kocinsky (incorporated by reference to Exhibit 10.5 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on February 25, 2021).
10.6*	Executive Severance Agreement, dated October 10, 2007, between MannKind and David Thomson (incorporated by reference to Exhibit 99.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), as amended, filed with the SEC on October 17, 2007).
10.7*	Form of Indemnity Agreement entered into between MannKind and each of its directors and officers (incorporated by reference to Exhibit 10.1 to MannKind's Registration Statement on Form S-1 (File No. 333-115020), filed with the SEC on April 30, 2004, as amended).
10.8*	Form of Change of Control Agreement (incorporated by reference to Exhibit 99.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on April 7, 2017).
10.9*	2004 Equity Incentive Plan, as amended (incorporated by reference to Appendix A to MannKind's proxy statement on Schedule 14A (File No. 000-50865), filed with the SEC on April 6, 2012).
10.10*	Form of Stock Option Agreement under the 2004 Equity Incentive Plan (incorporated by reference to Exhibit 10.2 MannKind's Registration Statement on Form S-1 (File No. 333-115020), originally filed with the SEC on April 30, 2004, as amended).
10.11*	Form of Phantom Stock Award Agreement under the 2004 Equity Incentive Plan (incorporated by reference to Exhibit 99.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on December 14, 2005).
10.12*	2004 Non-Employee Directors' Stock Option Plan and form of stock option agreement there under (incorporated by reference to Exhibit 10.20 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on March 16, 2006).
10.13*	Non-Employee Director Compensation Program (incorporated by reference to Exhibit 10.15 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on February 26, 2019).
10.14*	MannKind Corporation 2013 Equity Incentive Plan, as amended (incorporated by reference to Exhibit 10.1 to MannKind's Quarterly Report on Form 10-Q (File No. 000-50865), filed with the SEC on August 9, 2016).
10.15*	Form of Stock Option Grant Notice, Stock Option Agreement and Notice of Exercise under the MannKind 2013 Equity Incentive Plan (incorporated by reference to Exhibit 99.2 to MannKind's registration statement on Form S-8(File No. 000-188790), filed with the SEC on May 23, 2013).
10.16*	Form of Restricted Stock Unit Grant Notice and Restricted Stock Unit Award Agreement under the MannKind 2013 Equity Incentive Plan (incorporated by reference to Exhibit 99.3 to MannKind's registration statement on Form S-8 (File No. 000-188790), filed with the SEC on May 23, 2013).
10.17*	MannKind Corporation 2018 Equity Incentive Plan, as amended (incorporated by reference to Exhibit 10.1 to MannKind's Quarterly Report on Form 10-Q (File No. 000-50865), filed with the SEC on August 5, 2020).

Exhibit Number	Description of Document
10.18*	Form of Stock Option Grant Notice, Stock Option Agreement and Notice of Exercise under the MannKind 2018 Equity Incentive Plan (incorporated by reference to Exhibit 99.2 to MannKind's registration statement on Form S-8 (File No. 333-226648), filed with the SEC on August 7, 2018).
10.19*	Form of Restricted Stock Unit Grant Notice and Restricted Stock Unit Award Agreement under the MannKind 2018 Equity Incentive Plan (incorporated by reference to Exhibit 99.3 to MannKind's registration statement on Form S-8 (File No. 333-226648), filed with the SEC on August 7, 2018).
10.20*	MannKind Corporation 2004 Employee Stock Purchase Plan, as amended (incorporated by reference to Exhibit 99.4 to MannKind's registration statement Form S-8 (File No. 333-226648), filed with the SEC on August 7, 2018).
10.21*	MannKind Corporation Market Price Stock Purchase Plan (incorporated by reference to Exhibit 99.1 to MannKind's registration statement Form S-8 (File No. 333-225428), filed with the SEC on June 5, 2018).
10.22***	Supply Agreement, dated as of July 31, 2014, by and between MannKind and Amphastar France Pharmaceuticals S.A.S. (incorporated by reference to Exhibit 10.23 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on February 25, 2021)
10.23	First Amendment to Supply Agreement, dated October 31, 2014, by and between MannKind and Amphastar France Pharmaceuticals, S.A.S. and Amphastar Pharmaceuticals, Inc. (incorporated by reference to Exhibit 10.32 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on March 16, 2017).
10.24**	Second Amendment to Supply Agreement, dated November 9, 2016, by and between MannKind and Amphastar Pharmaceuticals, Inc. (incorporated by reference to Exhibit 10.33 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on March 16, 2017).
10.25**	Third Amendment to Supply Agreement, dated April 11, 2018, by and between MannKind and Amphastar Pharmaceuticals, Inc. (incorporated by reference to Exhibit 10.8 to MannKind's Quarterly Report on Form 10-Q (File No. 000-50865), filed with the SEC on May 9, 2018).
10.26**	Fourth Amendment to Supply Agreement, dated December 24, 2018, by and between MannKind and Amphastar Pharmaceuticals, Inc. (incorporated by reference to Exhibit 10.50 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on February 26, 2019).
10.27***	Fifth Amendment to Supply Agreement, dated August 2, 2019, by and between MannKind Corporation and Amphastar Pharmaceuticals, Inc. (incorporated by reference to Exhibit 99.5 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on August 7, 2019).
10.28***	Sixth Amendment to Supply Agreement, dated May 24, 2021, by and between MannKind Corporation and Amphastar Pharmaceuticals, Inc. (incorporated by reference to Exhibit 99.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on May 25, 2021).
10.29	Sublease Agreement, dated May 1, 2015, by and between MannKind and the Alfred Mann Foundation for Scientific Research (incorporated by reference to Exhibit 10.37 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on March 15, 2016).
10.30	Office Lease, dated May 5 2017, by and between MannKind and Russell Ranch Road II LLC. (incorporated by reference to Exhibit 10.3 to MannKind's Quarterly Report on Form 10-Q (file No. 000-50865), filed with the SEC on August 7, 2017).
10.31	Controlled Equity Offering℠ Sales Agreement, by and between MannKind and Cantor Fitzgerald & Co., dated February 27, 2018 (incorporated by reference to Exhibit 10.47 to MannKind's Annual Report on Form 10-K (File No. 000-50865), filed with the SEC on February 27, 2018).
10.32**	License and Collaboration Agreement, dated September 3, 2018 by and between MannKind and United Therapeutics Corporation (incorporated by reference to Exhibit 10.8 to MannKind's Quarterly Report on Form 10-Q (file No. 000-50865), filed with the SEC on November 1, 2018).
10.33**	Research Agreement, dated September 3, 2018 by and between MannKind and United Therapeutics Corporation (incorporated by reference to Exhibit 10.9 to MannKind's Quarterly Report on Form 10-Q (file No. 000-50865), filed with the SEC on November 1, 2018).
10.34***	Credit and Security Agreement, dated August 6, 2019, by and among MannKind Corporation, MannKind LLC, the lenders party thereto from time to time and MidCap Financial Trust, as agent (incorporated by reference to Exhibit 99.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on August 7, 2019).
10.35	Amendment No. 1 to Credit and Security Agreement, dated December 18, 2019, by and among MannKind Corporation, MannKind LLC, the lenders party thereto from time to time and MidCap Financial Trust, as agent (incorporated by reference to Exhibit 99.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on December 18, 2019).

Exhibit Number	Description of Document
10.36	Amendment No. 2 to Credit and Security Agreement, dated August 21, 2020, by and among MannKind Corporation, MannKind LLC and MidCap Financial Trust (incorporated by reference to Exhibit 99.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on August 25, 2020).
10.37	Amendment No. 3 to Credit and Security Agreement, dated November 30, 2020, by and among MannKind Corporation, MannKind LLC and MidCap Financial Trust (incorporated by reference to Exhibit 99.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on December 1, 2020).
10.38	Amendment No. 4 to Credit and Security Agreement, dated December 7, 2020 by and among the Company, MannKind LLC and MidCap Financial Trust (incorporated by reference to Exhibit 4.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on December 7, 2020).
10.39	Omnibus Joinder and Amendment No. 5 to Credit and Security Agreement and Amendment No. 1 to Pledge Agreement, dated December 29, 2020 by and among MannKind Corporation, MannKind LLC, QrumPharma, Inc., and MidCap Financial Trust (incorporated by reference to Exhibit 99.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on December 30, 2020).
10.40	Amendment No. 6 to Credit and Security Agreement, dated March 1, 2021, by and among MannKind Corporation, MannKind LLC, QrumPharma, Inc., and MidCap Financial Trust (incorporated by reference to Exhibit 99.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on March 5, 2021).
10.41	Amendment No. 7 to Credit and Security Agreement, dated April 22, 2021, by and among MannKind Corporation, MannKind LLC, QrumPharma, Inc., and MidCap Financial Trust (incorporated by reference to Exhibit 99.1 to MannKind's Current Report on Form 8-K (File No. 000-50865), filed with the SEC on April 26, 2021).
10.42	Amendment No. 8 to Credit and Security Agreement, dated November 3, 2021, by and among MannKind Corporation, MannKind LLC, QrumPharma, Inc., and MidCap Financial Trust.
10.43	Amendment No. 9 to Credit and Security Agreement, dated November 8, 2021, by and among MannKind Corporation, MannKind LLC, QrumPharma, Inc., and MidCap Financial Trust.
10.44	Amendment No. 10 to the Credit and Security Agreement, dated August 29, 2022, by and among MannKind Corporation, MannKind LLC, QrumPharma, Inc., and MidCap Financial Trust (incorporated by reference to Exhibit 10.1 to MannKind's Quarterly Report on Form 10-Q (File No. 000-50865), filed with the SEC on November 8, 2022).
10.45***	Commercial Supply Agreement, dated August 12, 2021, by and between MannKind Corporation and United Therapeutics Corporation (incorporated by reference to Exhibit 10.1 to MannKind's Quarterly Report on Form 10-Q (File No. 000-50865), filed with the SEC on November 9, 2021).
10.46***	First Amendment to Commercial Supply Agreement, dated October 16, 2021, by and between MannKind Corporation and United Therapeutics Corporation (incorporated by reference to Exhibit 10.2 to MannKind's Quarterly Report on Form 10-Q (File No. 000-50865), filed with the SEC on November 9, 2021).
10.47***	Purchase and Sale Agreement, dated September 23, 2021, by and between MannKind Corporation and 1 Casper, LLC (incorporated by reference to Exhibit 10.3 to MannKind's Quarterly Report on Form 10-Q (File No. 000-50865), filed with the SEC on November 9, 2021).
10.48	Third Amendment to Office Lease, dated April 8, 2022, between MannKind Corporation and Russell Ranch Road II LLC (incorporated by reference to Exhibit 10.1 to MannKind's Quarterly Report on Form 10-Q (File No. 000-50865), filed with the SEC on May 5, 2022).
10.49***	Second Amendment to Commercial Supply Agreement, dated June 15, 2022, by and between MannKind Corporation and United Therapeutics Corporation.
10.50***	Third Amendment to Commercial Supply Agreement, dated August 31, 2022, by and between MannKind Corporation and United Therapeutics Corporation.
10.51***	Fourth Amendment to Commercial Supply Agreement, dated December 22, 2022, by and between MannKind Corporation and United Therapeutics Corporation.
10.52	Office Lease, dated May 10, 2017, by and between Valeritas, Inc. and RFP Lincoln 293 LLC.
10.53	First Amendment to Office Lease, date February 11, 2019, by and between Valeritas, Inc. and BRP 293 Equity Partners, LLC.
23.1	Consent of Independent Registered Public Accounting Firm.
31.1	Certification of the Chief Executive Officer pursuant to Rules 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended.

Exhibit Number	Description of Document
31.2	Certification of the Chief Financial Officer pursuant to Rules 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended.
32.1	Certification of the Chief Executive Officer pursuant to Rules 13a-14(b) and 15d-14(b) of the Securities Exchange Act of 1934, as amended, and Section 1350 of Chapter 63 of Title 18 of the United States Code (18 U.S.C. §1350).
32.2	Certification of the Chief Financial Officer pursuant to Rules 13a-14(b) and 15d-14(b) of the Securities Exchange Act of 1934, as amended, and Section 1350 of Chapter 63 of Title 18 of the United States Code (18 U.S.C. §1350).
101	Inline Interactive Data Files pursuant to Rule 405 of Regulation S-T.
104	The cover page has been formatted in Inline XBRL.

* Indicates management contract or compensatory plan.
** Confidential treatment has been granted with respect to certain portions of this exhibit. Omitted portions have been filed separately with the SEC.
*** Certain portions of this exhibit have been omitted pursuant to Item 601(b)(10)(iv) of Regulation S-K.

Item 16. ***Form 10-K Summary***

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

MANNKIND CORPORATION

By: /s/ Michael E. Castagna
Michael E. Castagna
Chief Executive Officer

Dated: February 23, 2023

POWER OF ATTORNEY

KNOW ALL BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Michael E. Castagna and David Thomson, and each of them, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place, and stead, in any and all capacities, to sign any and all amendments to this report, and any other documents in connection therewith, and to file the same, with all exhibits thereto, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any of them or their or his substitute or substituted, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

Signature	Title	Date
/s/ Michael E. Castagna Michael E. Castagna	Chief Executive Officer and Director *(Principal Executive Officer)*	February 23, 2023
/s/ Steven B. Binder Steven B. Binder	Chief Financial Officer *(Principal Financial and Accounting Officer)*	February 23, 2023
/s/ James S. Shannon James S. Shannon, M.D., MRCP (UK)	Chairman of the Board of Directors	February 23, 2023
/s/ Ronald J. Consiglio Ronald J. Consiglio	Director	February 23, 2023
/s/ Michael Friedman Michael Friedman, M.D.	Director	February 23, 2023
/s/ Jennifer Grancio Jennifer Grancio	Director	February 23, 2023
/s/ Anthony C. Hooper Anthony C. Hooper	Director	February 23, 2023
/s/ Sabrina Kay Sabrina Kay	Director	February 23, 2023
/s/ Kent Kresa Kent Kresa	Director	February 23, 2023
/s/ Christine Mundkur Christine Mundkur	Director	February 23, 2023

MANNKIND CORPORATION AND SUBSIDIARIES

INDEX TO FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of MannKind Corporation

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of MannKind Corporation and subsidiaries (the "Company") as of December 31, 2022 and 2021, the related consolidated statements of operations, comprehensive loss, stockholders' deficit, and cash flows for each of the three years in the period ended December 31, 2022 and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2022 and 2021, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2022, in conformity with the accounting principles generally accepted in the United States of America.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2022, based on criteria established in Internal Control — Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated February 23, 2023, expressed an unqualified opinion on the Company's internal control over financial reporting.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current-period audit of the financial statements that was communicated or required to be communicated to the audit committee and that (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Net Revenue – Commercial Product Sales – Government Rebates – Refer to Note 2 and 9 to the financial statements

Critical Audit Matter Description

As more fully disclosed in Note 2 and 9 to the financial statements, the Company recognizes revenue for commercial product sales at the net sales price (transaction price), which includes estimates of variable consideration for which reserves are established. Components of variable consideration include trade discounts and allowances, product returns, provider chargebacks and discounts, government rebates, payer rebates, and other incentives, such as voluntary patient assistance, and other allowances that are offered within contracts between the Company and its Customers, payers, and other indirect customers relating to the Company's sale of its products. Government rebates are provided to Medicare and state Medicaid programs. Government rebates involve the use of significant assumptions and judgments to estimate for rebate claims related to prior period sales for which an invoice has not yet been received, and related estimates of claims for the current quarter, and estimated future claims that will be made for product sales that have been recognized as revenue, but which remains in the distribution channel inventories at the end of each reporting period. These significant assumptions and judgments include consideration of historical claims experience, contractual rebate provision, payer channel mix, current contract prices, unbilled claims, claim submission time lags and inventory in the distribution channel.

Given the complexity involved in determining the significant assumptions and judgments used in estimating the government rebates, auditing such estimates required a high degree of auditor judgment and increased extent of audit effort.

How the Critical Audit Matter Was Addressed in the Audit

Our audit procedures related to management's estimates of government rebate estimates, included the following, among others:

- We tested the effectiveness of controls over management's processes to account for the variable consideration associated with Government Rebates.
- We evaluated key inputs used in management's analysis of the government rebate estimates.
- We inspected contractual documents associated with the government rebates and evaluated the consistency of the methodology with the Company's obligations under such contractual documents.
- We tested the mathematical accuracy of the Company's calculation of the estimates for government rebates.
- We performed the following procedures to evaluate the significant assumptions and judgments used by management to estimate government rebates:
- Evaluated the reasonableness of government rebates by comparing the underlying data to historical adjustments.
- Evaluated management's ability to accurately forecast government rebates by comparing management's assumptions of expected government rebates to actuals incurred subsequent to year end.

/s/ Deloitte & Touche LLP

Los Angeles, California
February 23, 2023

We have served as the Company's auditor since 2001.

MANNKIND CORPORATION AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS

	December 31,	
	2022	2021
	(In thousands except share and per share data)	
ASSETS		
Current assets:		
Cash and cash equivalents	$ 69,767	$ 124,184
Short-term investments	101,079	79,932
Accounts receivable, net	16,801	4,739
Inventory	21,772	7,152
Prepaid expenses and other current assets	25,477	3,482
Total current assets	234,896	219,489
Property and equipment, net	45,126	36,612
Goodwill	2,428	—
Other intangible asset	1,153	—
Long-term investments	1,961	56,619
Other assets	9,718	8,441
Total assets	$ 295,282	$ 321,161
LIABILITIES AND STOCKHOLDERS' DEFICIT		
Current liabilities:		
Accounts payable	$ 11,052	$ 6,956
Accrued expenses and other current liabilities	35,553	27,419
Financing liability — current	9,565	6,977
Deferred revenue — current	1,733	827
Recognized loss on purchase commitments — current	9,393	6,170
Total current liabilities	67,296	48,349
Promissory notes	8,829	18,425
Accrued interest — promissory notes	55	404
Financing liability — long term	94,512	93,525
Midcap credit facility	39,264	38,833
Senior convertible notes	225,397	223,944
Recognized loss on purchase commitments — long term	62,916	76,659
Operating lease liability	5,343	1,040
Deferred revenue — long term	37,684	19,543
Milestone liabilities	4,524	4,838
Deposits from customer	—	4,950
Total liabilities	545,820	530,510
Commitments and contingencies (Note 16)		
Stockholders' deficit:		
Undesignated preferred stock, $0.01 par value — 10,000,000 shares authorized; no shares issued or outstanding at December 31, 2022 and 2021	—	—
Common stock, $0.01 par value — 400,000,000 shares authorized, 263,793,305 and 251,477,562 shares issued and outstanding at December 31, 2022 and 2021, respectively	2,638	2,515
Additional paid-in capital	2,964,293	2,918,205
Accumulated deficit	(3,217,469)	(3,130,069)
Total stockholders' deficit	(250,538)	(209,349)
Total liabilities and stockholders' deficit	$ 295,282	$ 321,161

See notes to consolidated financial statements.

MANNKIND CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF OPERATIONS

	Year Ended December 31,		
	2022	2021	2020
	(In thousands except per share data)		
Revenues:			
Net revenue — commercial product sales	$ 56,247	$ 39,168	$ 32,324
Revenue — collaborations and services	27,924	36,274	32,820
Royalties — collaborations	15,599	—	—
Total revenues	99,770	75,442	65,144
Expenses:			
Cost of goods sold	16,003	16,833	15,084
Cost of revenue — collaborations and services	41,494	22,024	9,557
In-process research and development	—	—	13,233
Research and development	19,721	12,312	6,248
Selling	53,753	45,528	34,365
General and administrative	37,720	31,889	24,675
Asset impairment	—	106	1,889
(Gain) loss on foreign currency translation	(4,811)	(6,567)	8,006
Loss on purchase commitments	—	339	—
Total expenses	163,880	122,464	113,057
Loss from operations	(64,110)	(47,022)	(47,913)
Other (expense) income:			
Interest income, net	2,513	112	167
Interest expense on financing liability	(9,758)	(1,373)	—
Interest expense on notes	(15,011)	(15,204)	(9,471)
Loss on available-for-sale securities	(932)	—	—
Loss on extinguishment of debt	—	(17,200)	(264)
Other (expense) income	(102)	(239)	23
Total other expense	(23,290)	(33,904)	(9,545)
Loss before income tax expense	(87,400)	(80,926)	(57,458)
Benefit from income taxes	—	—	218
Net loss	$ (87,400)	$ (80,926)	$ (57,240)
Net loss per share — basic and diluted	$ (0.34)	$ (0.32)	$ (0.26)
Shares used to compute net loss per share — basic and diluted	257,092	249,244	222,585

See notes to consolidated financial statements.

MANNKIND CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS

	Year Ended December 31,		
	2022	2021	2020
	(In thousands)		
Net loss	$ (87,400)	$ (80,926)	$ (57,240)
Other comprehensive loss:			
Cumulative translation loss	—	—	(19)
Comprehensive loss	$ (87,400)	$ (80,926)	$ (57,259)

See notes to consolidated financial statements.

MANNKIND CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' DEFICIT

	Common Stock		Additional	Accumulated Other	Accumulated	
	Shares	Amount	Paid-in Capital	Comprehensive Loss	Deficit	Total
	(In thousands)					
BALANCE, JANUARY 1, 2020	211,788	$ 2,118	$ 2,799,278	$ (19)	$ (2,991,903)	$ (190,526)
Net issuance of common stock in association with stock options and restricted stock units	653	6	227	—	—	233
Payment of principal on senior convertible notes through common stock issuance	2,612	26	5,235	—	—	5,261
Payment of interest on senior convertible notes through common stock issuance	188	2	286	—	—	288
Issuance of common stock pursuant to conversion of Mann Group convertible note principal	2,800	28	6,972	—	—	7,000
Issuance of common stock pursuant to conversion of the Mann Group convertible note interest	1,200	12	2,988	—	—	3,000
Issuance of common stock in at-the-market offering	11,853	118	23,412	—	—	23,530
Issuance cost associated with at-the-market offering	—	—	(519)	—	—	(519)
Issuance of common stock under Employee Stock Purchase Plan	627	6	678	—	—	684
Issuance of common stock from acquisition	3,067	31	9,219	—	—	9,250
Stock-based compensation expense	—	—	6,511	—	—	6,511
Issuance of common stock from the exercise of warrants	7,250	73	11,527	—	—	11,600
Issuance of common stock from market price stock purchase	80	1	214	—	—	215
Issuance of warrants pursuant to Midcap Credit Facility	—	—	275	—	—	275
Cumulative translation loss	—	—	—	19	—	19
Net loss	—	—	—	—	(57,240)	(57,240)
BALANCE, DECEMBER 31, 2020	242,118	$ 2,421	$ 2,866,303	$ —	$ (3,049,143)	$ (180,419)
Net issuance of common stock associated with stock options and restricted stock units	1,572	16	(514)	—	—	(498)
Issuance of common stock under Employee Stock Purchase Plan	527	5	1,085	—	—	1,090
Stock-based compensation expense	—	—	12,200	—	—	12,200
Issuance of common stock pursuant to conversion of the Mann Group convertible note	3,830	38	9,535	—	—	9,573
Issuance of common stock pursuant to conversion of the Mann Group convertible note interest	170	2	425	—	—	427
Issuance of common stock pursuant to conversion of the 2024 convertible notes	1,667	17	4,983	—	—	5,000
Issuance of common stock pursuant to payoff of the 2024 convertible note interest	27	—	143	—	—	143
Issuance of at-the-market placement	578	6	1,880	—	—	1,886
Issuance costs associated with at-the-market placement	—	—	(38)	—	—	(38)
Premium on Mann Group convertible note	—	—	22,107	—	—	22,107
Issuance of common stock from market price stock purchase	25	—	106	—	—	106
Issuance of common stock pursuant to a warrant conversion	964	10	(10)	—	—	—
Net loss	—	—	—	—	(80,926)	(80,926)
BALANCE, DECEMBER 31, 2021	251,478	$ 2,515	$ 2,918,205	$ —	$ (3,130,069)	$ (209,349)
Net issuance of common stock associated with stock options and restricted stock units	2,242	22	297	—	—	319
Issuance of common stock under Employee Stock Purchase Plan	686	6	2,076	—	—	2,082
Stock-based compensation expense	—	—	13,447	—	—	13,447
Issuance of common stock pursuant to conversion of the Mann Group convertible note	3,838	39	9,557	—	—	9,596
Issuance of common stock pursuant to conversion of the Mann Group convertible note interest	237	2	672	—	—	674
Issuance of at-the-market placement	5,060	51	19,739	—	—	19,790
Issuance costs associated with at-the-market placement	—	—	(381)	—	—	(381)
Issuance of common stock from market price stock purchase plan	252	3	681	—	—	684
Cumulative loss on available-for-sale securities	—	—	—	—	—	—
Net loss	—	—	—	—	(87,400)	(87,400)
BALANCE, DECEMBER 31, 2022	263,793	$ 2,638	$ 2,964,293	—	$ (3,217,469)	$ (250,538)

See notes to consolidated financial statements.

MANNKIND CORPORATION AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF CASH FLOWS

	Year Ended December 31,		
	2022	2021	2020
	(In thousands)		
CASH FLOWS FROM OPERATING ACTIVITIES:			
Net loss	$ (87,400)	$ (80,926)	$ (57,240)
Adjustments to reconcile net loss to net cash used in operating activities:			
Stock-based compensation expense	13,447	12,200	6,511
Depreciation, amortization and accretion	6,124	4,215	2,149
Interest expense on financing liability	9,552	1,372	—
Interest on milestone right	—	3,663	—
Write-off of inventory	2,202	1,902	496
Interest expense on Mann Group promissory notes	325	1,598	5,148
Amortization of right-of-use assets	2,987	1,258	1,177
Loss on available-for-sale securities	932	—	—
Loss on extinguishment of debt, net	—	17,200	264
Asset impairment	—	106	1,889
(Gain) loss on foreign currency translation	(4,811)	(6,567)	8,006
In-process research and development	—	—	13,233
Other, net	17	—	19
Changes in operating assets and liabilities:			
Accounts receivable, net	(11,807)	(776)	(705)
Inventory	(5,670)	(4,081)	(1,314)
Prepaid expenses and other current assets	(15,552)	(360)	(154)
Other assets	523	(138)	227
Accounts payable	4,096	1,374	793
Accrued expenses and other current liabilities	(723)	8,814	3,346
Deferred revenue	19,047	(14,567)	(5,910)
Recognized loss on purchase commitments	(5,709)	(5,892)	(4,751)
Operating lease liabilities	(3,309)	(2,135)	(1,312)
Accrued interest on Mann Group promissory notes	—	(4,919)	—
Deposits from customer	(4,950)	4,950	—
Net cash used in operating activities	(80,679)	(61,709)	(28,128)
CASH FLOWS FROM INVESTING ACTIVITIES:			
Purchase of held-to-maturity debt securities	(74,536)	(196,131)	—
Proceeds from maturity of debt securities	107,340	59,060	—
Acquisition of V-Go	(15,341)	—	—
Purchase of property and equipment	(7,589)	(11,466)	(801)
Purchase of available-for-sale securities	(5,000)	(3,000)	—
Proceeds from sale of treasury bills	—	—	20,000
Acquisition of in-process research and development, net of cash acquired	—	—	(3,983)
Net cash provided by (used in) investing activities	4,874	(151,537)	15,216
CASH FLOWS FROM FINANCING ACTIVITIES:			
Proceeds from at-the-market-offering	19,790	1,886	23,450
Milestone payment	(1,088)	(5,000)	—
Issuance costs associated with at the market offering	(381)	(38)	(518)
Net issuance of common stock associated with stock options and restricted stock units	319	(498)	233
Proceeds from market price stock purchase plan and from employee stock purchase plan	2,766	106	215
Payment on financing liability	(18)	—	—
Issuance of common stock from the exercise of warrants	—	—	11,600
Proceeds from MidCap credit facility	—	—	10,000
Proceeds from PPP loan	—	—	4,873
Proceeds from the Senior convertible notes	—	230,000	—
Issuance costs associated with Senior convertible notes	—	(7,268)	—
Proceeds from the sale-leaseback transaction	—	102,250	—
Issuance costs associated with the sale-leaseback transaction	—	(3,120)	—
Deposit for the sale-leaseback transaction	—	(2,000)	—
Principal payments on Mann Group promissory notes	—	(35,051)	—
Payment of MidCap credit facility	—	(10,000)	—
Payment of MidCap credit facility prepayment penalty	—	(1,000)	—
Net cash provided by financing activities	21,388	270,267	49,853
NET INCREASE IN CASH AND CASH EQUIVALENTS AND RESTRICTED CASH	(54,417)	57,021	36,941
CASH AND CASH EQUIVALENTS AND RESTRICTED CASH, BEGINNING OF PERIOD	124,184	67,163	30,222
CASH AND CASH EQUIVALENTS AND RESTRICTED CASH, END OF PERIOD	$ 69,767	$ 124,184	$ 67,163

MANNKIND CORPORATION AND SUBSIDIARIES

CONSOLIDATED STATEMENTS OF CASH FLOWS (CONTINUED)

	Year Ended		
	2022	2021	2020
	(In thousands)		
SUPPLEMENTAL CASH FLOWS DISCLOSURES:			
Interest paid in cash	$ 8,852	$ 11,268	$ 3,558
NON-CASH INVESTING AND FINANCING ACTIVITIES:			
Reclassification of investments from long-term to current	82,850	32,654	—
Reclassification of Thirona convertible notes and interest receivable from long-term to current	7,375	—	—
Premium on Mann Group convertible note	—	22,107	—
Payments on debt and interest through common stock issuance	10,270	15,143	15,549
Forgiveness of PPP loan	—	(4,873)	—
Addition of right-of-use-asset	1,812	1,425	—
Right-of-use asset modification	3,793	278	—
Non-cash construction in progress and property and equipment	1,298	1,264	92
Issuance of common stock under Employee Stock Purchase Plan	—	1,090	684
Contingent milestone liability	610	—	—
Issuance of common stock for acquisition of in-process research and development	—	—	9,250
Issuance of warrants associated with the MidCap Credit Facility	—	—	275
Receivable from at-the-market offering	—	—	226

See notes to consolidated financial statements.

1. Description of Business

Business — MannKind Corporation and its subsidiaries (the "Company") is a biopharmaceutical company focused on the development and commercialization of innovative therapeutic products and devices to address serious unmet medical needs for those living with endocrine and orphan lung diseases. The Company is currently commercializing Afrezza (insulin human) Inhalation Powder, an ultra rapid-acting inhaled insulin indicated to improve glycemic control in adults with diabetes, and the V-Go wearable insulin delivery device, which provides continuous subcutaneous infusion of insulin in adults that require insulin. The Company also collaborates with third parties to formulate their drugs on the Company's Technosphere drug delivery platform. Tyvaso DPI (treprostinil) inhalation powder received FDA approval in May 2022, for the treatment of pulmonary arterial hypertension and for the treatment of pulmonary hypertension associated with interstitial lung disease. UT began commercializing Tyvaso DPI in June 2022 and is obligated to pay the Company a royalty on net sales of the product. The Company also receives a margin on supplies of Tyvaso DPI that it manufactures for UT.

Basis of Presentation — The accompanying consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America ("GAAP").

Principles of Consolidation — The consolidated financial statements include the accounts of the Company and its wholly-owned subsidiaries. Intercompany balances and transactions have been eliminated.

Reclassifications — Certain prior year reported amounts have been reclassified to conform with the current year presentation. Changes were made to the consolidated statements of operations to present selling expense as a separate line item and to disclose a single caption for interest expense on all outstanding notes. Changes were made to the consolidated balance sheets to reclassify interest receivable from investments from accounts receivable, net to other assets.

Segment Information — Operating segments are identified as components of an enterprise about which separate discrete financial information is available for evaluation by the chief operating decision-maker in making decisions regarding resource allocation and assessing performance. To date, the Company has viewed its operations and manages its business as one segment operating in the United States of America.

2. Summary of Significant Accounting Policies

Financial Statement Estimates — The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. Actual results could differ from those estimates or assumptions. Management considers many factors in selecting appropriate financial accounting policies, and in developing the estimates and assumptions that are used in the preparation of the financial statements. Management must apply significant judgment in this process. These effects could have a material impact on the estimates and assumptions used in the preparation of the accompanying consolidated financial statements. The more significant estimates include revenue recognition, including gross-to-net adjustments, stand-alone selling price considerations for recognition of collaboration revenue assessing long-lived assets for impairment, clinical trial expenses, inventory costing and recoverability, recognized loss on purchase commitment, stock-based compensation and the determination of the provision for income taxes and corresponding deferred tax assets and liabilities, and the valuation allowance recorded against net deferred tax assets.

Revenue Recognition — The Company recognizes revenue when its customers obtain control of promised goods or services, in an amount that reflects the consideration which the Company expects to be entitled in exchange for those goods or services.

To determine revenue recognition for arrangements that are within the scope of Accounting Standards Codification ("ASC") Topic 606, *Revenue from Contracts with Customers* ("ASC 606"), the Company performs the following five steps: (i) identify the contract(s) with a customer, (ii) identify the performance obligations in the contract, (iii) determine the transaction price, (iv) allocate the transaction price to the performance obligations in the contract, and (v) recognize revenue when (or as) the entity satisfies a performance obligation. The Company only applies the five-step model to arrangements that meet the definition of a contract under ASC 606, including when it is probable that the entity will collect the consideration it is entitled to in exchange for the goods or services it transfers to the customer.

At contract inception, once the contract is determined to be within the scope of ASC 606, the Company assesses the goods or services promised within each contract, determines those that are performance obligations, and assesses whether each promised good or service is distinct. The Company has two types of contracts with customers: (i) contracts for commercial product sales with wholesale distributors, specialty and retail pharmacies and (ii) collaboration arrangements.

Revenue Recognition – Net Revenue – Commercial Product Sales – The Company sells its products to a limited number of wholesale distributors, specialty and retail pharmacies, and durable medical equipment suppliers ("DME") in the U.S. (collectively, its "Customers"). Wholesale distributors subsequently resell the Company's products to retail pharmacies and certain medical centers or hospitals. Specialty and retail pharmacies sell directly to patients. In addition to distribution agreements with Customers, the Company enters into arrangements with payers that provide for government mandated and/or privately negotiated rebates, chargebacks, and discounts with respect to the purchase of the Company's products.

The Company recognizes revenue on product sales when the Customer obtains control of the Company's product, which occurs at delivery for wholesale distributors and generally at delivery for specialty pharmacies. The Company recognizes revenue on product sales to a retail pharmacy as the product is dispensed to patients. Product revenues are recorded net of applicable reserves, including discounts, allowances, rebates, returns and other incentives. See *Reserves for Variable Consideration* below.

Free Goods Program – From time to time, the Company offers programs to potential new patients that allow them to obtain free goods (prescription fills) from a pharmacy. The Company excludes such amounts related to these programs from both gross and net revenue. The cost of product associated with the free goods program is recognized as cost of goods sold in the consolidated statements of operations.

Reserves for Variable Consideration — Revenues from product sales are recorded at the net sales price (transaction price), which includes estimates of variable consideration for which reserves are established. Components of variable consideration include trade discounts and allowances, product returns, provider chargebacks and discounts, government rebates, payer rebates, and other incentives, such as voluntary patient assistance, and other allowances that are offered within contracts between the Company and its Customers, payers, and other indirect customers relating to the Company's sale of its products. These reserves, as further detailed below, are based on the amounts earned, or to be claimed on the related sales, and result in a reduction of accounts receivable or establishment of a current liability. Significant judgments are required in making these estimates.

Where appropriate, these estimates take into consideration a range of possible outcomes, which are probability-weighted in accordance with the expected value method in ASC 606 for relevant factors such as current contractual and statutory requirements, specific known market events and trends, industry data, and forecasted customer buying and payment patterns. Overall, these reserves reduce recognized revenue to the Company's best estimates of the amount of consideration to which it is entitled based on the terms of the respective underlying contracts.

The amount of variable consideration that is included in the transaction price may be constrained, and is included in the net sales price only to the extent that it is probable that a significant reversal in the amount of the cumulative revenue recognized under the contract will not occur in a future period. The Company's analysis also contemplates application of the constraint in accordance with the guidance, under which it determined a material reversal of revenue would not occur in a future period for the estimates of gross-to-net adjustments as of December 31, 2022 and, therefore, the transaction price was not reduced further during the year ended December 31, 2022. Actual amounts of consideration ultimately received may differ from the Company's estimates. If actual results in the future vary from the Company's estimates, the Company will adjust these estimates, which would affect net revenue — commercial product sales and earnings in the period such variances become known.

Significant judgment is required in estimating gross-to-net adjustments, historical experience, payer channel mix, unbilled claims, claim submission time lags and inventory levels in the distribution channel.

Trade Discounts and Allowances — The Company generally provides Customers with discounts which include incentives, such as prompt pay discounts, that are explicitly stated in the Company's contracts and are recorded as a reduction of revenue in the period the related product revenue is recognized. In addition, the Company compensates (through trade discounts and allowances) its Customers for sales order management, data, and distribution services. However, the Company has determined such services received to date are not distinct from the Company's sale of products to the Customer and, therefore, these payments have been recorded as a reduction of revenue and as a reduction to accounts receivable, net.

Product Returns — Consistent with industry practice, the Company generally offers Customers a right of return for unopened product that has been purchased from the Company for a period beginning six months prior to and ending 12 months after its expiration date, which lapses upon shipment to a patient. The Company estimates the amount of its product sales that may be returned by its Customers and records this estimate as a reduction of revenue in the period the related product revenue is recognized, as well as reductions to accounts receivable, net. The Company currently estimates product returns using available industry data and its own sales information, including its visibility into the inventory remaining in the distribution channel. The Company's current return reserve percentage is estimated to be in the single-digits. Adjustments to the returns reserve have been made in the past and may be necessary in the future based on revised estimates to the Company's assumptions.

Provider Chargebacks and Discounts — Chargebacks for fees and discounts to providers represent the estimated obligations resulting from contractual commitments to sell products to qualified healthcare providers at prices lower than the list prices charged to Customers who directly purchase products from the Company. Customers charge the Company for the difference between what they pay for products and the ultimate selling price to the qualified healthcare providers. These reserves are established in the same period that the related revenue is recognized, resulting in a reduction of product revenue and the establishment of a current liability that is recorded in accrued expenses and other current liabilities. Chargeback amounts are generally determined at the time of resale to the qualified healthcare provider by Customers, and the Company generally issues credits for such amounts within a few weeks of the Customer's notification to the Company of the resale. Reserves for chargebacks consist of credits that the Company expects to issue for units that remain in the distribution channel inventories at each reporting period-end that the Company expects will be sold to qualified healthcare providers, and chargebacks that Customers have claimed, but for which the Company has not yet issued a credit.

Government Rebates — The Company is subject to discount obligations under Medicare and state Medicaid programs. These reserves are recorded in the same period the related revenue is recognized, resulting in a reduction of product revenue and the establishment of a current liability that is included in accrued expenses and other current liabilities. Estimates around Medicaid have historically required significant

judgment due to timing lags in receiving invoices for claims from states. For Afrezza, the Company also estimates the number of patients in the prescription drug coverage gap for whom the Company will owe an additional liability under the Medicare Part D program. The Company's liability for these rebates consists of invoices received for claims from prior quarters that have not been paid or for which an invoice has not yet been received, estimates of claims for the current quarter, and estimated future claims that will be made for products that have been recognized as revenue, but which remains in the distribution channel inventories at the end of each reporting period. The Company's estimates include consideration of historical claims experience, payer channel mix, current contract prices, unbilled claims, claim submission time lags and inventory in the distribution channel.

Payer Rebates — The Company contracts with certain private payer organizations, primarily insurance companies and pharmacy benefit managers, for the payment of rebates with respect to utilization of its products. The Company estimates these rebates, including estimates for product that has been recognized as revenue, but which remains in the distribution channel, and records such estimates in the same period the related revenue is recognized, resulting in a reduction of product revenue and the establishment of a current liability which is included in accrued expenses and other current liabilities. The Company's estimates include consideration of historical claims experience, payer channel mix, current contract prices, unbilled claims, claim submission time lags and inventory in the distribution channel.

Other Incentives — Other incentives which the Company offers include voluntary patient support programs, such as the Company's co-pay assistance program, which are intended to provide financial assistance to qualified commercially-insured patients with co-payments required by payers. The calculation of the accrual for co-pay assistance is based on an estimate of claims and the cost per claim that the Company expects to receive associated with the products that have been recognized as revenue, but remains in the distribution channel inventories at the end of each reporting period. The adjustments are recorded in the same period the related revenue is recognized, resulting in a reduction of product revenue and the establishment of a current liability that is included in accrued expenses and other current liabilities.

Revenue Recognition — Revenue — Collaborations and Services — The Company enters into licensing, research or other agreements under which the Company licenses certain rights to its product candidates to third parties, conducts research or provides other services to third parties. The terms of these arrangements may include, but are not limited to payment to the Company of one or more of the following: up-front license fees; development, regulatory, and commercial milestone payments; payments for commercial manufacturing and clinical supply services the Company provides; and royalties on net sales of licensed products and sublicenses of the rights. As part of the accounting for these arrangements, the Company must develop assumptions that require judgment such as determining the performance obligation in the contract and determining the stand-alone selling price for each performance obligation identified in the contract. With respect to our significant collaboration and service agreement with UT that includes a long-term commercial supply agreement ("as amended, the CSA"), we have identified three distinct performance obligations: (1) the license, supply of product to be used in clinical development, and continued development and approval support for Tyvaso DPI ("R&D Services and License'), (2) development activities for the next generation of the product ("Next-Gen R&D Services"), and (3) a material right associated with current and future manufacturing and supply of product ("Manufacturing Services"). Pre-production activities under the CSA, such as facility expansion services and other administrative services, were considered bundled services under the Manufacturing Services performance obligation as required by ASC 606. Following the FDA's approval of Tyvaso DPI, UT began issuing purchase orders for the supply of product, which represents distinct contracts and performance obligations under ASC 606. Revenue is recognized for the supply of product at a point in time, once control is transferred to UT. See Note 11 – *Collaboration, Licensing and Other Arrangements*.

If an arrangement has multiple performance obligations, the allocation of the transaction price is determined from observable market inputs, and the Company uses key assumptions to determine the stand-alone selling price, which may include development timelines, reimbursement rates for personnel costs, discount rates, and probabilities of technical and regulatory success. Revenue is recognized based on the measurement of progress as the performance obligation is satisfied and consideration received that does not meet the requirements to satisfy the revenue recognition criteria is recorded as deferred revenue. Current deferred revenue consists of amounts that are expected to be recognized as revenue in the next 12 months. Amounts that the Company expects will not be recognized within the next 12 months are classified as long-term deferred revenue. For further information, see Note 11 – *Collaboration, Licensing and Other Arrangements.*

The Company recognizes upfront license payments as revenue upon delivery of the license only if the license is determined to be a separate unit of accounting from the other undelivered performance obligations. The undelivered performance obligations typically include manufacturing or development services or research and/or steering committee services. If the license is not considered as a distinct performance obligation, then the license and other undelivered performance obligations would be evaluated to determine if such should be accounted for as a single unit of accounting. If concluded to be a single performance obligation, the transaction price for the single performance obligation is recognized as revenue over the estimated period of when the performance obligation is satisfied. If the license is considered to be a distinct performance obligation, then the estimated revenue is included in the transaction price for the contract, which is then allocated to each performance obligation based on the respective standalone selling prices.

Whenever the Company determines that an arrangement should be accounted for over time, the Company determines the period over which the performance obligations will be performed, and revenue will be recognized over the period the Company is expected to complete its performance obligations. Significant management judgment is required in determining the level of effort required under an arrangement and the period over which the Company is expected to complete its performance obligations under an arrangement.

The Company's collaboration agreements typically entitle the Company to additional payments upon the achievement of development, regulatory and sales milestones. If the achievement of a milestone is considered probable at the inception of the collaboration, the related milestone payment is included with other collaboration consideration, such as upfront fees and research funding, in the Company's revenue

calculation. If these milestones are not considered probable at the inception of the collaboration, the milestones will typically be recognized in one of two ways depending on the timing of when the milestone is achieved. If the milestone is improbable at inception and subsequently deemed probable of achievement, such will be added to the transaction price, resulting in a cumulative adjustment to revenue. If the milestone is achieved after the performance period has been completed and all performance obligations have been delivered, the Company will recognize the milestone payment as revenue in its entirety in the period the milestone was achieved.

The Company's collaborative agreements, for accounting purposes, represent contracts with customers and therefore are not subject to accounting literature on collaborative agreements. The Company grants licenses to its intellectual property, supplies raw materials, semi-finished goods or finished goods, provides research and development services and offers sales support for the co-promotion of products, all of which are outputs of the Company's ongoing activities, in exchange for consideration. Accordingly, the Company concluded that its collaborative agreements must generally be accounted for pursuant to ASC 606.

For collaboration agreements that allow collaboration partners to select additional optioned products or services, the Company evaluates whether such options contain material rights (i.e., have exercise prices that are discounted compared to what the Company would charge for a similar product or service to a new collaboration partner). The exercise price of these options includes a combination of licensing fees, event-based milestone payments and royalties. When these amounts in aggregate are not offered at a discount that exceeds discounts available to other customers, the Company concludes the option does not contain a material right, and therefore is not included in the transaction price at contract inception. The Company assessed the CSA agreement with UT and determined that a material right existed for the manufacturing services performance obligation. The transaction price is allocated to the material right as well as the remaining performance obligations in accordance with ASC 606. The Company also evaluates grants of additional licensing rights upon option exercises to determine whether such should be accounted for as separate contracts.

Revenue Recognition — Royalties — The Company recognizes royalty revenue for a sales-based or usage-based royalty if it is promised in exchange for an intellectual property license. The royalty revenue is recognized as the latter of the subsequent sale of the product occurs or if the performance obligation to which the royalty has been allocated has been satisfied or partially satisfied. The Company's collaborative agreement with UT entitles it to receive low double-digit royalties on net sales of Tyvaso DPI for the license of the Company's IP that was considered to be interdependent with the development activities that supported the approval of Tyvaso DPI.

The Company's net revenue and cost of revenue and goods sold as shown on the consolidated statement of operations is comprised of revenue generated from product sales, services and royalties as shown below (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Net revenue			
Product sales (1)	81,073	39,435	32,324
Services (2)	3,098	36,007	32,820
Royalties (3)	15,599	—	—
Total net revenue	$ 99,770	$ 75,442	$ 65,144

(1) Amounts represent the net sales of Afrezza and V-Go to wholesalers and specialty pharmacies and Tyvaso DPI to UT.

(2) Amounts represent revenue generated from the Company's collaboration arrangements, including Next-Gen R&D Services (as defined in Note 11) for UT as well as arrangements with other collaboration partners. See Note 11 – *Collaboration, Licensing and Other Arrangements*.

(3) Amounts represent royalties on UT's net sales of Tyvaso DPI.

	Year Ended December 31,		
	2022	2021	2020
Cost of goods sold and cost of revenue			
Product sales	$ 55,071	$ 16,833	$ 15,084
Services	2,426	22,024	9,557
Total cost of goods sold and cost of revenue	$ 57,497	$ 38,857	$ 24,641

The Company follows detailed accounting guidance in measuring revenue and certain judgments affect the application of its revenue policy. For example, in connection with its existing collaboration agreements, the Company has recorded on its consolidated balance sheets short-term and long-term deferred revenue based on its best estimate of when such revenue will be recognized. Short-term deferred revenue consists of amounts that are expected to be recognized as revenue in the next 12 months. Amounts that the Company expects will not be recognized within the next 12 months are classified as long-term deferred revenue. However, this estimate is based on the Company's current project development plan and, if the development plan should change in the future, the Company may recognize a different amount of deferred revenue over the next 12-month period.

Milestone Payments — At the inception of each arrangement that includes development milestone payments, the Company evaluates whether the milestones are considered probable of being reached and estimates the amount to be included in the transaction price using the most likely amount method. If it is probable that a significant revenue reversal would not occur, the associated milestone value is included in the transaction price. Milestone payments that are not within the control of the Company or the customer, such as regulatory approvals, are not considered probable of being achieved until those approvals are received. The transaction price is then allocated to each performance obligation on a relative stand-alone selling price basis, for which the Company recognizes revenue as, or when, the performance obligations under the contract are satisfied. At the end of each subsequent reporting period, the Company will re-evaluate the probability of achievement of such development milestones and any related constraint, and if necessary, adjusts its estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis, which would affect license, collaboration, other revenue, and earnings in the period of adjustment.

Cost of Goods Sold — Cost of goods sold includes material, labor costs and manufacturing overhead. Cost of goods sold also includes a component of current period manufacturing costs in excess of costs capitalized into inventory ("excess capacity costs"). These costs, in addition to the impact of the revaluation of inventory for standard costing, and write-offs of inventory are recorded as expenses in the period in which they are incurred, rather than as a portion of inventory costs. Cost of goods sold excludes the cost of insulin purchased under the Company's Insulin Supply Agreement (the "Insulin Supply Agreement") with Amphastar Pharmaceuticals, Inc. ("Amphastar"). All insulin inventory on hand was written off and the full purchase commitment contract to purchase future insulin was accrued as a recognized loss on purchase commitments as of the end of 2016.

Cost of Revenues – Collaborations and Services — Cost of revenues – collaborations and services includes material, labor costs, manufacturing overhead, and excess capacity costs. These costs, in addition to the write-offs of inventory are recorded as expenses in the period in which they are incurred, rather than as a portion of inventory costs. Cost of revenues – collaborations and services also includes the cost of product development.

Cash and Cash Equivalents and Restricted Cash — The Company considers all highly liquid investments with original or remaining maturities of 90 days or less at the time of purchase, that are readily convertible into cash to be cash equivalents. As of December 31, 2022 and 2021, cash equivalents were comprised of money market, corporate bonds and commercial paper accounts with original maturities less than 90 days from the date of purchase.

The Company records restricted cash when cash and cash equivalents are restricted as to withdrawal or usage. The Company presents amounts of restricted cash that will be available for use within 12 months of the reporting date as restricted cash in current assets.

Held-to-Maturity Investments — The Company's investments generally consist of commercial paper, corporate notes or bonds and U.S. Treasury securities. For the year ended December 31, 2022, the Company held short-term and long-term investments of debt securities, including commercial paper and bonds. The Company assesses whether it has any intention to sell the investment before maturity, whether any declines in fair value are the result of credit losses, as well as whether there were other-than-temporary impairments associated with the available for sale investment. The Company intends to hold its investments until maturity; therefore, these investments are stated at amortized cost. The investments with maturities less than 12 months are included in short-term investments and investments with maturities in excess of twelve months are included in long-term investments in the consolidated balance sheets. The amortization or accretion of the Company's investments is recognized as interest income in the consolidated statements of operations.

Available-for-Sale Investment — In June 2021, the Company purchased a $3.0 million convertible promissory note (the "Thirona convertible note") issued by Thirona Bio, Inc. ("Thirona"). In January 2022, the Company purchased an additional $5.0 million convertible promissory note issued by Thirona. Unless earlier converted into conversion shares pursuant to the note purchase agreement, the principal and accrued interest shall be due and payable by Thirona on demand by the Company at any time after the maturity date of December 31, 2023. Interest accrues at a rate of 6% per annum. The Thirona convertible notes are general unsecured obligations of Thirona. The Thirona convertible notes are classified as an available-for-sale security and are included in other assets in the consolidated balance sheet. Available-for-sale investments are subsequently measured at fair value. Unrealized holding gains and losses are excluded from earnings and reported in other comprehensive income until realized. The Company assesses whether it has any intention to sell the investment, determines fair value of its available-for-sale investments using level 3 inputs as well as assesses its allowance for credit losses associated with the available for sale investment. In June 2021, the Company and Thirona also entered into a collaboration agreement to develop a compound for the treatment of fibrotic lung diseases. See Note 11 – *Collaboration, Licensing and Other Arrangements* for additional information.

Concentration of Credit Risk — Financial instruments that potentially subject the Company to concentration of credit risk consist of cash and cash equivalents and investments. Cash and cash equivalents are held in high credit quality institutions. Cash equivalents consist of interest-bearing money market funds and U.S. Treasury securities with original or remaining maturities of 90 days or less at the time of purchase. Investments generally consist of commercial paper, corporate notes or bonds and U.S. Treasury securities. The cash equivalents and investments are regularly monitored by management.

Accounts Receivable and Allowance for Credit Losses — Accounts receivable are recorded at the invoiced amount and are not interest bearing. Accounts receivable are presented net of an allowance for credit losses if there are estimated losses resulting from the inability of its customers to make required payments. The Company makes ongoing assumptions relating to the collectability of its accounts receivable in its calculation of the allowance for credit losses. The allowance for expected credit losses is based primarily on past collections experience relative to the length of time receivables are past due. However, when available evidence reasonably supports an assumption that future economic conditions will differ from current and historical payment collections, an adjustment is reflected in the allowance for expected credit losses. Accounts receivable are also presented net of an allowance for product returns and trade discounts and allowances because the Company's customers have the right of setoff for these amounts against the related accounts receivable.

Pre-Launch Inventory — An improvement to the manufacturing process for the Company's primary excipient fumaryl diketopiperazine ("FDKP") was demonstrated to be viable and management expects to realize an economic benefit in the future as a result of such process improvement. Accordingly, the Company is required to assess whether to capitalize inventory costs related to such excipient prior to regulatory approval of the new supplier and the improved manufacturing process. In doing so, management must consider a number of factors in order to determine the amount of inventory to be capitalized, including the historical experience of achieving regulatory approvals for the Company's manufacturing process, feedback from regulatory agencies on the changes being effected and the amount of inventory that is likely to be used in commercial production. The shelf life of the excipient will be determined as part of the regulatory approval process; in the interim, the Company must assess the available stability data to determine whether there is likely to be adequate shelf life to support anticipated future sales occurring beyond the expected approval date of the new raw material. If management is aware of any specific material risks or contingencies other than the normal regulatory review and approval process, or if the criteria for capitalizing inventory produced prior to regulatory approval are otherwise not met, the Company would not capitalize such inventory costs, choosing instead to recognize such costs as a research and development expense in the period incurred.

Inventories — Inventories are stated at the lower of cost or net realizable value. The Company determines the cost of inventory using the first-in, first-out, or FIFO, method. The Company capitalizes inventory costs associated with the Company's products based on management's judgment that future economic benefits are expected to be realized; otherwise, such costs are expensed as incurred as cost of goods sold. The Company uses a contract manufacturing organization outside of the U.S. for certain stages of V-Go inventory.

The Company periodically analyzes its inventory levels to identify inventory that may expire or has a cost basis in excess of its estimated realizable value and writes down such inventories, as appropriate. In addition, the Company's products are subject to strict quality control and monitoring which the Company performs throughout the manufacturing process. If certain batches or units of product no longer meet quality specifications or may become obsolete or are forecasted to become obsolete due to expiration, the Company will record a charge to write down such unmarketable inventory to its estimated net realizable value.

The Company analyzes its inventory levels to identify inventory that may expire or has a cost basis in excess of its estimated realizable value. The Company performs an assessment of projected sales and evaluates the lower of cost or net realizable value and the potential excess inventory on hand at the end of each reporting period.

Property and equipment — Property and equipment is recorded at historical cost, net of accumulated depreciation. Depreciation expense is recorded over the assets' useful lives on a straight-line basis. See Note 7 – *Property and Equipment*.

Impairment of Long-Lived Assets — Long-lived assets include property and equipment, operating lease right-of-use assets and other intangible asset. The Company evaluates long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying value of an asset may not be recoverable. Assets are considered to be impaired if the carrying value is considered to be unrecoverable.

If the Company believes an asset to be impaired, the impairment recognized is the amount by which the carrying value of the asset exceeds the fair value of the asset. Fair value is determined using the market, income or cost approaches as appropriate for the asset. Any write-downs are treated as permanent reductions in the carrying amount of the asset and recognized as an operating loss.

In August 2019, the Company recorded a $1.5 million commitment asset and a $0.4 million other asset for deferred debt issuance costs related to the future funding commitments of the MidCap Credit Facility. A quarterly assessment was performed during the second quarter of 2020 to determine if the Company was on target to achieve certain required milestone conditions in order for the Company to access further borrowings under the MidCap Credit Facility. The Company determined that such milestone conditions related to Afrezza trailing net revenue were unlikely to be achieved. As a result, an asset impairment of $1.9 million was recognized during the second quarter of 2020 and is reflected in the Company's consolidated statement of operations. See Note 10 – *Borrowings* for further information on the MidCap Credit Facility.

The Company recorded $0.1 million of asset impairments for the year ended December 31, 2021. There were no asset impairments for the year ended December 31, 2022.

Acquisitions — The Company first determines whether a set of assets acquired constitute a business and should be accounted for as a business combination. If the assets acquired do not constitute a business, the Company accounts for the transaction as an asset acquisition. Business combinations are accounted for by means of the acquisition method of accounting. Under the acquisition method, assets acquired,

including in-process research and development ("IPR&D") projects, and liabilities assumed are recorded at their respective fair values as of the acquisition date in the Company's consolidated financial statements. The excess of the fair value of consideration transferred over the fair value of the net assets acquired is recorded as goodwill. Contingent consideration obligations incurred in connection with a business combination (including the assumption of an acquiree's liability arising from an acquisition it consummated prior to the Company's acquisition) are recorded at their fair values on the acquisition date and remeasured at their fair values each subsequent reporting period until the related contingencies have been resolved. The resulting changes in fair values are recorded in earnings. In contrast, asset acquisitions are accounted for by using a cost accumulation and allocation model. Under this model, the cost of the acquisition is allocated to the assets acquired and liabilities assumed. IPR&D projects with no alternative future use are recorded in R&D expense upon acquisition, and contingent consideration obligations incurred in connection with an asset acquisition are recorded when it is probable that they will occur and they can be reasonably estimated. See Note 3 – *Acquisitions*.

Goodwill and Other Intangible Assets — The fair value of acquired intangible assets is determined using an income-based approach referred to as the excess earnings method utilizing Level 3 fair value inputs. Market participant valuations assume a global view considering all potential jurisdictions and indications based on discounted after-tax cash flow projections, risk adjusted for estimated probability of technical and regulatory success.

The Company tests for impairment annually on a reporting unit basis, at the beginning of the Company's fourth fiscal quarter and between annual tests if events and circumstances indicate it is more likely than not that the fair value of a reporting unit is less than its carrying amount. To the extent the carrying amount of a reporting unit is less than its estimated fair value, an impairment charge will be recorded.

Finite-lived intangible assets are amortized on a straight-line basis over the estimated useful life. Estimated useful lives are determined considering the period assets are expected to contribute to future cash flows. Finite-lived intangible assets are tested for impairment when facts or circumstances suggest that the carrying value of the asset may not be recoverable. If the carrying value exceeds the projected undiscounted pretax cash flows of the intangible asset, an impairment loss equal to the excess of the carrying value over the estimated fair value (discounted after-tax cash flows) is recognized.

No impairments to goodwill or other intangible assets were recorded during the year ended December 31, 2022.

Recognized Loss on Purchase Commitments — The Company assesses whether losses on long-term purchase commitments should be accrued. Losses that are expected to arise from firm, non-cancellable, commitments for the future purchases are recognized unless recoverable. When making the assessment, the Company also considers whether it is able to renegotiate with its vendors. The recognized loss on purchase commitments is reduced as inventory items are received. If, subsequent to an accrual, a purchase commitment is successfully renegotiated, the gain is recognized in the Company's consolidated statements of operations. The liability balance of the recognized loss on insulin purchase commitments as of December 31, 2022 and 2021 was $72.3 million and $82.8 million, respectively. No *new contracts were identified in 2022 that required a new loss on purchase commitment accrual.*

Milestone Rights Liability — In July 2013, in conjunction with the execution of a (now repaid) loan agreement with Deerfield Private Design Fund II, L.P. and Deerfield Private Design International II, L.P. (collectively, "Deerfield"), the Company entered into Milestone Rights Purchase Agreement (the "Milestone Rights Agreement") pursuant to which the Company issued certain milestone rights to Deerfield Private Design Fund II, L.P. and Horizon Santé FLML SÀRL, (the "Original Milestone Purchasers"). The foregoing milestone rights provided the Original Milestone Purchasers certain rights to receive payments of up to $90.0 million upon the occurrence of specified strategic and sales milestones, $60.0 million of which remains payable upon achievement of such milestones (collectively, the "Milestone Rights'). In December 2021, the Milestone Rights were purchased by Barings Global Special Situations Credit Fund 4 (Delaware), L.P. and Barings Global Special Situations Credit 4 (LUX) S.ar.l. (together the "Milestone Purchasers"). As a result, the Milestone Purchasers have assumed the obligations of the Original Milestone Purchasers and is now entitled to all rights under the Milestone Rights Agreement. As of December 31, 2022, $60.0 million remained payable pursuant to the Milestone Rights Agreement upon achievement of Afrezza net sales milestones. The Milestone Rights liability is reported at fair value at the date of the agreement which is periodically offset against payments. See Note 12 – *Fair Value of Financial Instruments.*

The initial fair value estimate of the Milestone Rights was calculated using the income approach in which the cash flows associated with the specified contractual payments were adjusted for both the expected timing and the probability of achieving the milestones and discounted to present value using a selected market discount rate. The expected timing and probability of achieving the milestones was developed with consideration given to both internal data, such as progress made to date and assessment of criteria required for achievement, and external data, such as market research studies. The discount rate was selected based on an estimation of required rate of returns for similar investment opportunities using available market data. The Milestone Rights liability will be remeasured as the specified milestone events are achieved. Specifically, as each milestone event is achieved, the portion of the initially recorded Milestone Rights liability that pertains to the milestone event being achieved, will be remeasured to the amount of the specified related milestone payment. The resulting change in the balance of the Milestone Rights liability due to remeasurement will be recorded in the Company's consolidated statements of operations as interest expense. Furthermore, the Milestone Rights liability will be reduced upon the settlement of each milestone payment. As a result, each milestone payment would be effectively allocated between a reduction of the recorded Milestone Rights liability and an expense representing a return on a portion of the Milestone Rights liability paid to the investor for the achievement of the related milestone event. See Note 10 – *Borrowings*.

Fair Value of Financial Instruments —The Company applies various valuation approaches in determining the fair value of its financial assets and liabilities within a hierarchy that maximizes the use of observable inputs and minimizes the use of unobservable inputs by requiring that observable inputs be used when available. Observable inputs are inputs that market participants would use in pricing the asset or liability based on market data obtained from sources independent of the Company. Unobservable inputs are inputs that reflect the Company's assumptions about the inputs that market participants would use in pricing the asset or liability and are developed based on the best information available in the circumstances. The fair value hierarchy is broken down into three levels based on the source of inputs as follows:

Level 1 — Quoted prices for identical instruments in active markets.

Level 2 — Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations whose inputs are observable or whose significant value drivers are observable.

Level 3 — Significant inputs to the valuation model are unobservable.

Income Taxes — The provisions for federal, foreign, state and local income taxes are calculated on pre-tax income based on current tax law and include the cumulative effect of any changes in tax rates from those used previously in determining deferred tax assets and liabilities. Deferred income tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the year in which the temporary differences are expected to be recovered or settled. A valuation allowance is recorded to reduce net deferred income tax assets to amounts that are more likely than not to be realized.

For uncertain tax positions, the Company determines whether it is "more likely than not" that a tax position will be sustained upon examination by the appropriate taxing authorities before any part of the benefit can be recorded in the financial statements. For those tax positions where it is "not more likely than not" that a tax benefit will be sustained, no tax benefit is recognized. Penalties, if probable and reasonably estimable, are recognized as a component of income tax expense. The Company has reduced its deferred tax assets for uncertain tax positions but has not recorded liabilities for income tax expense, penalties, or interest.

Contingencies — The Company records a loss contingency for a liability when it is both probable that a liability has been incurred and the amount of the loss can be reasonably estimated. These accruals represent management's best estimate of probable loss. Disclosure also is provided when it is reasonably possible that a loss will be incurred or when it is reasonably possible that the amount of a loss will exceed the recorded provision. On a quarterly basis, the Company reviews the status of each significant matter and assesses its potential financial exposure. Significant judgment is required in both the determination of probability and the determination as to whether an exposure is reasonably estimable. Because of uncertainties related to these matters, accruals are based only on the best information available at the time. As additional information becomes available, the Company reassesses the potential liability related to pending claims and litigation and may revise its estimates.

Stock-Based Compensation — Share-based payments to employees, including grants of RSUs, performance-based non-qualified stock options awards ("PNQs"), restricted stock units with market conditions ("Market RSUs"), options and the compensatory elements of employee stock purchase plans, are recognized in the consolidated statements of operations based upon the fair value of the awards at the grant date. RSUs are valued based on the market price on the grant date. Market RSUs are valued using a Monte Carlo valuation model and RSUs with performance conditions are evaluated for the probability that the performance conditions will be met and estimates the date at which the performance conditions will be met in order to properly recognize stock-based compensation expense over the requisite service period. The Company uses the Black-Scholes option valuation model to estimate the grant date fair value of employee options and the compensatory elements of employee stock purchase plans.

Clinical Trial Expenses — Clinical trial expenses, which are primarily reflected in research and development expenses in the accompanying consolidated statements of operations, result from obligations under contracts with vendors, consultants and clinical site agreements in addition to internal costs associated with conducting clinical trials.

Net Income (Loss) Per Share of Common Stock — Basic net income or loss per share excludes dilution for potentially dilutive securities and is computed by dividing net income or loss by the weighted average number of common shares outstanding during the period. Diluted net income or loss per share reflects the potential dilution under the treasury method that could occur if securities or other contracts to issue common stock were exercised or converted into common stock. For periods where the Company has presented a net loss, potentially dilutive securities are excluded from the computation of diluted net loss per share as they would be anti-dilutive.

Recently Adopted Accounting Standards — In March 2020, the Financial Accounting Standards Board ("FASB") issued a new accounting standard to ease the financial reporting burdens caused by the expected market transition from LIBOR and other interbank offered rates to alternative reference rates, commonly referred to as reference rate reform. The new standard provides temporary optional expedients and exceptions to current GAAP guidance on contract modifications and hedge accounting. In January 2021, the FASB issued a new accounting standard that expanded the scope of the original March 2020 standard to include derivative instruments on discounting transactions. In December 2022, the FASB deferred the sunset date to an alternative reference rate from December 31, 2022 to December 31, 2024. The Company adopted these standards in the third quarter of 2022 using the prospective method and determined there was no impact on the Company's consolidated financial statements.

Recently Issued Accounting Standards — In November 2021, the FASB issued a new accounting standard around the recognition and measurement of contract assets and contract liabilities from revenue contracts with customers acquired in a business combination. The new standard clarifies that contract assets and contract liabilities acquired in a business combination from an acquiree should initially be recognized by applying revenue recognition principles and not at fair value. The standard is effective for interim and annual periods beginning on January 1, 2023, and early adoption is permitted. The impact of this standard will depend on the facts and circumstances of future transactions.

From time to time, new accounting pronouncements are issued by the FASB or other standard setting bodies that are adopted by the Company as of the specified effective date. Unless otherwise discussed, the Company believes that the impact of recently issued standards that are not yet effective will not have a material impact on the Company's consolidated financial position or results of operations upon adoption.

3. Acquisitions

V-Go

In May 2022, the Company entered into an Asset Purchase Agreement (the "APA") to purchase from Zealand Pharma A/S and Zealand Pharma US, Inc. (together "Zealand") certain assets and assume certain liabilities associated with the V-Go wearable insulin delivery device. The transaction closed on May 31, 2022 (the "Acquisition Date").

Under the terms of the APA, the Company paid up-front consideration of $15.3 million for certain assets and assumed liabilities related to V-Go. In addition, the Company will be obligated to make one-time, sales-based milestone payments to Zealand totaling up to a maximum of $10.0 million upon the achievement of specified annual revenue milestones between $40 million and $100 million.

The total preliminary purchase consideration for V-Go was as follows (in thousands):

Fair value of consideration:		**Amount**
Cash consideration	$	15,341
Fair value of contingent consideration		610
Total	$	15,951

The transaction was accounted for using the acquisition method of accounting, which requires, among other things, the assets acquired and liabilities assumed to be recognized at their respective fair values as of the Acquisition Date. The excess of the purchase price over those fair values was recorded as goodwill, which will be amortized over a period of 15 years for tax purposes. The estimates and assumptions used include the projected timing and amount of future cash flows and discount rates to reflect the risk inherent in the future cash flows. The estimated fair values of assets acquired and liabilities assumed and resulting goodwill are subject to adjustment as the Company finalizes its purchase price accounting. The significant items for which a final fair value has not been determined include, but are not limited to the valuation of the intangible asset and assumed liabilities for rebates and return reserves. The Company does not expect its fair value determinations to materially change; however, there may be differences between the amounts recorded at the Acquisition Date and the final fair value analysis, which is expected to be complete no later than the second quarter of 2023.

The information below reflects the preliminary amounts of identifiable assets acquired and liabilities assumed as of the Acquisition Date (in thousands):

		Amount
Assets:		
Inventory	$	11,152
Property and equipment		2,921
Goodwill		2,428
Intangible asset - Developed technology		1,200
Operating lease right-of-use assets		1,812
Total assets		19,513
Liabilities:		
Liabilities assumed		1,750
Operating lease liability		1,812
Total liabilities		3,562
Net assets acquired	$	15,951

Inventory of $11.2 million consisted of raw materials, semi-finished goods and finished goods. The fair value of the inventory was determined based on the estimated selling price to be generated from the finished goods, less costs to sell, including a reasonable margin, which are level 3 inputs not observable in the market. Property and equipment and assumed liabilities were recorded at their carrying amounts which were deemed to approximate their fair values based on level 3 unobservable inputs. The fair values of the right-of-use assets and lease liabilities for assumed operating leases were assessed in accordance with ASC Topic 842, Leases, based on discounted cash flow from lease payments, utilizing the Company's incremental borrowing rate of 7.25%.

The fair value of the intangible asset was determined by applying the income approach based on significant level 3 unobservable inputs.

The income approach estimates fair value based on the present value of cash flow that the assets could be expected to generate in the future. We developed internal estimates for expected cash flows in the present value calculation using inputs and significant assumptions that include historical revenues and earnings, long-term growth rate, discount rate, contributory asset charges and future tax rates, among others.

The fair value of the contingent milestone liability was estimated using the Monte Carlo simulation method for the calculation of the potential payment and the Geometric Brownian Motion forecasting model to estimate the underlying revenue. Market based inputs and other level 3 inputs were used to forecast future revenue. The key inputs used included a risk-free rate of 2.95%, dividend yield of 0%, volatility of 65%, period of 15 years and credit risk of 12%.

The Company incurred acquisition-related costs of approximately $0.4 million for the year ended December 31, 2022.

Net revenue and loss from operations for the year ended December 31, 2022 was $12.9 million and $0.3 million, respectively, since the Acquisition Date. The following unaudited pro-forma summary presents consolidated information of the Company as if the acquisition had occurred on January 1, 2021 (in thousands):

Supplemental Pro Forma Information (unaudited)

	December 31,	
	2022	2021
Net revenue	$ 109,933	$ 98,278
Net loss	(86,967)	(80,806)
Net loss per share - basic and diluted	$ (0.34)	$ (0.32)

QrumPharma

In December 2020, the Company acquired QrumPharma, Inc., a privately held pharmaceutical company developing inhalation treatments for severe chronic and recurrent pulmonary infections. The Company purchased all of the outstanding capital stock of QrumPharma for consideration consisting of cash and shares of the Company's common stock, subject to adjustment for cash on hand, unpaid indebtedness, unpaid transaction expenses, and net working capital as follows (in thousands):

Consideration	
Cash consideration	$ 3,574
Stock consideration (3,067,179 shares at $3.01 per share)	9,250
Transaction costs	531
Repayment of debt	11
Liabilities assumed	22
Cash acquired	(155)
Total consideration paid for IPR&D	$ 13,233

The stock purchase of QrumPharma was accounted for under ASC 805, Business Combinations, as an asset acquisition since the transaction did not include the acquisition of inputs or processes and the fair value of the assets acquired were concentrated in a single identifiable asset, MNKD-101, which consisted of an in-process research and development asset ("IPR&D"). Under ASC 805, an entity that acquires IPR&D in an asset acquisition should follow the guidance in ASC 730, Research and Development, which requires that both tangible and intangible identifiable research and development assets with no alternative future use be allocated a portion of the consideration transferred and charged to expense at the acquisition date. Due to the stage of development of MNKD-101 at the date of acquisition, significant risk remained that the product would not obtain regulatory approval and it was not yet probable that there would be future economic benefit for the Company. Absent successful clinical results and regulatory approval, it was determined that there was no alternative future use associated with MNKD-101. Accordingly, the value of this asset was expensed at the time of acquisition and the total accumulated cost of $13.2 million, was allocated to the IPR&D asset using a relative fair value basis and the total consideration was recognized as in-process research and development expense in the consolidated statement of operations.

The acquisition of QrumPharma also included a potential future royalty payment of 1.5% of net sales in each of the calendar years in which the total annual and global adjusted net sales of specified products exceeds $50 million and a royalty payment of 1.0% of net sales in each of the calendar years in which the total annual and global adjusted net sales of nebulized clofazimine are greater than or equal to $200 million. The contingent consideration in the form of royalty payments will be expensed as incurred since the probability of MNKD-101 obtaining FDA approval and generating net sales that exceed the specified thresholds could not be reasonably estimated on the date of acquisition.

4. Investments

Cash Equivalents — Cash equivalents consist of highly liquid investments with original or remaining maturities of 90 days or less at the time of purchase that are readily convertible into cash. As of December 31, 2022 and 2021, the Company held $69.8 million and $124.2 million, respectively, of cash and cash equivalents.

Available-for-Sale Investment — The Thirona convertible note is classified as an available-for-sale security and is included in other assets in the consolidated balance sheet. Available-for-sale investments are subsequently measured at fair value. Unrealized holding gains and losses are excluded from earnings and reported in other comprehensive income until realized. The Company determines fair value of its available-for-sale investments using level 3 inputs. As of December 31, 2022, the Company evaluated the fair value of its investment in Thirona using a Monte Carlo simulation which resulted in a fair value of $7.1 million. In addition, the Company determined that there was a related credit loss of $0.9 million on the investment which was recognized in the consolidated statements of operations for the year ended December 31, 2022.

Held-to-Maturity Investments — Investments consist of highly liquid investments that are intended to facilitate liquidity and capital preservation. As of December 31, 2022, the Company held $101.1 million of short-term investments and $2.0 million of long-term investments. As of December 31, 2021, the Company held $79.9 million of short-term investments and $56.6 million of long-term investments. *The amortization or accretion of the Company's investments is recognized as interest income in the consolidated statements of operations and was approximately $0.7 million and $0.5 million for the years ended December 31, 2022 and 2021, respectively. No allowance for credit losses on held-to-maturity securities was required as of December 31, 2022 or 2021.*

The contractual maturities of the Company's held to maturity investments as of December 31, 2022 and 2021 are summarized below (in thousands):

	December 31, 2022		December 31, 2021	
	Amortized Cost Basis	Aggregate Fair Value	Amortized Cost Basis	Aggregate Fair Value
Due in one year or less(1)	152,862	156,976	$ 103,733	$ 103,669
Due after one year through five years	1,961	1,948	56,619	56,433
Total	154,823	158,924	$ 160,352	$ 160,102

(1) The investments due in one year or less include cash equivalents of $51.8 million as of December 31, 2022 and $23.8 million as of December 31, 2021.

The fair value of the cash equivalents, long-term and short-term investments are disclosed below (in millions):

		December 31, 2022		
	Investment Level	Amortized Cost (Carrying Value)	Gross Unrealized Holding Losses	Estimated Fair Value
Commercial bonds and paper	Level 2	$ 66.8	$ (0.6)	$ 66.2
Money market funds	Level 1	51.8	—	$ 51.8
U.S. Treasuries	Level 2	36.3	(0.6)	$ 35.7
Total cash equivalents and investments		$ 154.9	$ (1.2)	$ 153.7
Less cash equivalents		(51.8)	—	(51.8)
Total Investments		$ 103.1	$ (1.2)	$ 101.9

		December 31, 2021		
	Investment Level	Amortized Cost (Carrying Value)	Gross Unrealized Holding Losses	Estimated Fair Value
Commercial bonds and paper	Level 2	$ 115.2	$ 0.2	$ 115.0
Money market funds	Level 1	21.3	—	21.3
U.S. Treasuries	Level 2	23.9	0.1	23.8
Total cash equivalents and investments		$ 160.4	$ 0.3	$ 160.1
Less cash equivalents		(23.8)	—	(23.8)
Total Investments		$ 136.6	$ 0.3	$ 136.3

As of December 31, 2022, there was $0.6 million of accrued interest receivable and $5.1 million of amount receivable on matured investment recognized as prepaid expense and other current assets in our consolidated balance sheets. As of December 31, 2021, there was $0.3 million of accrued interest receivable recognized as other assets in our consolidated balance sheets.

5. Accounts Receivable

Accounts receivable, net consists of the following (in thousands):

	December 31, 2022	December 31, 2021
Accounts receivable – commercial		
Accounts receivable, gross	$ 19,359	$ 7,939
Wholesaler distribution fees and prompt pay discounts	(2,536)	(1,696)
Reserve for returns	(4,108)	(2,797)
Total accounts receivable – commercial, net	12,715	3,446
Accounts receivable – collaborations and services		
Accounts receivable, gross	4,086	2,060
Allowance for credit losses	—	(767)
Total accounts receivable – collaborations and services, net	4,086	1,293
Total accounts receivable, net	$ 16,801	$ 4,739

As of December 31, 2022 and December 31, 2021, the allowance for credit losses was *de minimis*. As of December 31, 2022 and December 31, 2021, the Company had three wholesale distributors representing approximately 74% and 80% of gross sales and 79% and 79% of accounts receivable, respectively.

As of December 31, 2022, there was no allowance for credit losses for accounts receivable – collaborations and revenue. The Company had one collaboration partner, United Therapeutics, that comprised 100% of the collaboration and services net accounts receivable as of December 31, 2022 and approximately 98% of gross revenue from collaborations and services for the year ended December 31, 2022.

The Company recognizes revenue net of gross-to-net adjustments. The activities and ending reserve balance consists of the following (in thousands):

	December 31, 2022	December 31, 2021
Prompt Pay Discount Reserve, Allowance for Wholesale Distribution Fees and Accounts Receivables Return Reserve:		
Beginning balance	$ 4,493	$ 3,873
Provisions	17,471	11,494
Deductions	(15,320)	(10,874)
Ending balance	$ 6,644	$ 4,493

6. Inventories

Inventories consist of the following (in thousands):

	December 31, 2022	December 31, 2021
Raw materials	$ 5,739	$ 2,703
Work-in-process	13,815	2,522
Finished goods	2,218	1,927
Total inventory	$ 21,772	$ 7,152

Work-in-process and finished goods as of December 31, 2022 and 2021 include conversion costs and exclude the cost of insulin. All insulin inventory on hand was written off and the projected loss on the purchase commitment contract to purchase future insulin was accrued as of the end of 2016. Raw materials inventory included $0.8 million of pre-launch inventory as of December 31, 2022 and 2021, which consisted of FDKP received in November 2019 that will be used to manufacture Afrezza under an enhanced manufacturing process for FDKP. The Company expects to receive FDA approval of the new source of FDKP in 2024.

The Company analyzed its inventory levels to identify inventory that may expire or has a cost basis in excess of its estimated realizable value. The Company also performed an assessment of projected sales and evaluated the lower of cost or net realizable value and the potential excess inventory on hand at December 31, 2022 and 2021. Inventory that was forecasted to become obsolete due to expiration as well as inventory that does not meet acceptable standards is recorded in costs of goods sold in the accompanying consolidated statements of operations. There was an inventory write-off of $2.2 million as a result of this assessment for the year ended December 31, 2022. For the year ended December 31, 2021, there was an inventory write-off of $1.9 million as a result of this assessment, including $0.7 million related to the start of an agreement with a retail pharmacy. There was an inventory write-off of $0.5 million for the year ended December 31, 2020.

7. Property and Equipment

Property and equipment consist of the following (in thousands):

	Estimated Useful Life (Years)	December 31, 2022	December 31, 2021	
Land	—	$ 875	$ 875	
Buildings	39-40	17,389	17,389	
Building improvements	5-40	38,952	38,651	
Machinery and equipment	3-15	58,542	55,334	
Furniture, fixtures and office equipment	5-10	2,976	2,969	
Computer equipment and software	3	8,246	8,163	
Construction in progress	—	16,706	10,892	(1)
		143,686	134,273	
Less accumulated depreciation		(98,560)	(97,661)	
Total property and equipment, net		$ 45,126	$ 36,612	

(1) As of December 31, 2021 construction in progress included $4.7 million of equipment under construction for the manufacturing expansion for UT (the "UT Equipment"). There is no balance under construction for the UT Equipment as of December 31, 2022. The Company acts as agent on behalf of UT for the procurement of the UT Equipment. The Company has received $5.0 million in deposit for this service, which was recognized as deposits from customer in the consolidated balance sheet as of December 31, 2021. In April 2022, the Company and UT agreed that UT would hold title to the UT Equipment at all times. As such, there is no balance related to the UT Equipment included in construction in progress or deposits from customer in our consolidated balance sheet as of December 31, 2022. See Note 11 – *Collaboration, Licensing and Other Arrangements.*

Depreciation expense related to property and equipment for the years ended December 31, 2022, 2021 and 2020 was $3.3 million, $2.0 million and $1.8 million, respectively. During the years ended December 31, 2022 and 2021, the Company retired $2.4 million and $1.1 million, respectively of manufacturing equipment, computer hardware and software, computer equipment, lab equipment, and building improvements, as it was no longer in service. The net book value for the disposed assets was *de minimis*.

On November 8, 2021, the Company sold certain land, building and improvements located in Danbury, CT (the "Property") to an affiliate of Creative Manufacturing Properties (the "Purchaser") for a sales price of $102.3 million, subject to the terms and the conditions contained in a purchase and sale agreement. Effective with the closing of this transaction, the Company entered into a 20-year lease agreement with the Purchaser (the "Sale-Leaseback Transaction"). The sale of the Property and subsequent lease did not result in the transfer of control of the Property to the Purchaser; therefore, the Sale-Leaseback Transaction qualified as a failed sale leaseback transaction whereby the lease is accounted for as finance lease and the Property remains as a long-lived asset of the Company and is depreciated at its remaining useful life of 20 years or less. See Note 16 – *Commitments and Contingencies*.

8. Goodwill and Other Intangible Asset

Goodwill — Goodwill represents the excess of the purchase price over the identifiable tangible and intangible assets acquired plus liabilities assumed arising from business combinations. The balance of goodwill was approximately $2.4 million as of December 31, 2022 as a result of our acquisition of V-Go in May 2022. Goodwill is tested at least annually for impairment by assessing qualitative factors in determining whether it is more likely than not that the fair value of net assets is below their carrying amounts. See Note 2 – *Summary of Significant Accounting Policies*.

Other Intangible Asset — Other intangible asset consisted of the following (in thousands):

	Estimated Useful Life (Years)	December 31, 2022 Cost	Accumulated Amortization	Net Book Value
Developed technology	15	$ 1,200	$ (47)	$ 1,153

Amortization expense related to the other intangible asset was *de minimis* for the year ended December 31, 2022.

The estimated annual amortization expense for the other intangible asset for the years ended December 31, 2023 through 2027 will be approximately $0.1 million per year and $0.7 million, thereafter.

The Company evaluates its other intangible asset for potential impairment when events or changes in circumstances indicate that the carrying amount of an asset or asset group may not be recoverable. *See Note 2 – Summary of Significant Accounting Policies*.

9. Accrued Expenses and Other Current Liabilities

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

	December 31,	
	2022	2021
Salary and related expenses	$ 14,906	$ 14,022
Discounts and allowances for commercial product sales	8,504	4,227
Returns reserve for acquired product	1,013	—
Professional fees	1,136	895
Deferred lease liability	1,304	1,380
Current portion of milestone rights liability	924	1,088
Accrued interest	2,201	2,166
Retail inventory purchase	—	875
Danbury facility buildout	846	786
Other	4,719	1,980
Accrued expenses and other current liabilities	$ 35,553	$ 27,419

The provision for discounts and allowances for commercial product sales is reflected as a component of net revenues. The activities and ending balance consists of the following (in thousands):

	December 31,	
	2022	2021
Discounts and allowances for commercial product sales:		
Beginning balance	$ 4,227	$ 3,688
Provisions	23,369	13,057
Deductions	(20,603)	(12,518)
V-Go opening balance sheet	1,511	—
Ending balance	$ 8,504	$ 4,227

10. Borrowings

Carrying amount of the Company's borrowings consist of the following (in thousands):

	December 31,	
	2022	2021
Senior convertible notes	$ 225,397	$ 223,944
Mann Group promissory notes(1)	8,829	18,425
MidCap credit facility	39,264	38,833
Total debt — net carrying amount	$ 273,490	$ 281,202

(1) The amendment to the Mann Group convertible note in the second quarter of 2021 resulted in a substantial premium of $22.1 million based on the fair value post modification, which contributed to the loss on extinguishment in the consolidated statement of operations for the year ended December 31, 2021 and was recognized as additional paid-in capital in the consolidated balance sheet as of December 31, 2021. The accounting for the $22.1 million loss on extinguishment did not result in a change in the financial position of the Company.

The following table provides a summary of the Company's debt and key terms:

	Amount Due		Terms		
	December 31, 2022	December 31, 2021	Annual Interest Rate	Maturity Date	Conversion Price
Senior convertible notes	$230.0 million	$230.0 million	2.50%	March 2026	$5.21 per share
MidCap credit facility(1)	$40.0 million	$40.0 million	one-month SOFR (1% floor) plus 6.25%; cap of 8.25% (1)	August 2025 (1)	N/A
Mann Group convertible note	$8.8 million	$18.4 million (plus $0.4 million accrued interest paid-in-kind)	2.50% (2)	December 2025 (2)	$2.50 per share

(1) In April 2021, the Company prepaid $10.0 million principal balance and amended the MidCap credit facility. The interest rate prior to the amendment was one-month LIBOR (2% floor) plus 6.75% and the maturity date was in August 2024. In August 2022, the Company amended the MidCap credit facility and transitioned to the benchmark interest rate from LIBOR to the Secured Overnight Financing Rate ("SOFR"). The interest rate prior to the amendment was one-month LIBOR (1% floor) plus 6.25% (cap of 8.25%).

(2) In April 2021, the Mann Group convertible note was amended. The interest rate prior to the amendment was 7.00% and the maturity date was in November 2024.

The maturities of the Company's borrowings as of December 31, 2022 are as follows (in thousands):

	Amounts
2023	$ 6,667
2024	20,000
2025	22,163
2026	230,000
Total principal payments	278,830
Unamortized discount	(235)
Debt issuance costs	(5,105)
Total debt	$ 273,490

Senior convertible notes – In March 2021, the Company issued $200.0 million aggregate principal amount of Senior convertible notes in a private offering. Pursuant to an option to purchase additional senior convertible notes in the purchase agreement between the Company and the initial purchasers of the Senior convertible notes, the Company issued an additional $30.0 million aggregate principal amount of Senior convertible notes on March 15, 2021. The Senior convertible notes were issued pursuant to an indenture, dated March 4, 2021 (the "Indenture"), between the Company and U.S. Bank National Association, as trustee.

The Senior convertible notes are general unsecured obligations of the Company and will mature on March 1, 2026, unless earlier converted, redeemed or repurchased. The Senior convertible notes will bear cash interest from March 4, 2021 at an annual rate of 2.50% payable semi-annually in arrears on March 1 and September 1 of each year, beginning on September 1, 2021. The Senior convertible notes are convertible at the option of the holders at any time prior to the close of business on the business day immediately preceding December 1, 2025, only under the following circumstances: (1) during any calendar quarter commencing after the calendar quarter ending on June 30, 2021 (and only during such calendar quarter), if the last reported sale price of the Company's common stock, par value $0.01 per share, for at least 20 trading days (whether or not consecutive) during a period of 30 consecutive trading days ending on, and including, the last trading day of the immediately preceding calendar quarter is greater than or equal to 130% of the conversion price for the Senior convertible notes on each applicable trading day; (2) during the five business day period after any ten consecutive trading day period in which the trading price (as defined in the Indenture) per $1,000 principal amount of the Senior convertible notes for each trading day of the measurement period was less than 98% of the product of the last reported sale price of the common stock and the conversion rate on each such trading day; (3) if the Company calls such Notes for redemption, at any time prior to the close of business on the scheduled trading day immediately preceding the redemption date, but only with respect to the Senior convertible notes called (or deemed called) for redemption; or (4) upon the occurrence of specified corporate events as set forth in the Indenture. On or after December 1, 2025 until the close of business on the business day immediately preceding the maturity date, holders may convert all or any portion of their Notes at any time, regardless of the foregoing circumstances. Upon conversion, the Company will pay or deliver, as the case may be, cash, shares of the common stock or a combination of cash and shares of common stock, at the Company's election, in the manner and subject to the terms and conditions provided in the Indenture.

The initial conversion rate is 191.8281 shares of common stock per $1,000 principal amount of Notes (equivalent to an initial conversion price of approximately $5.21 per share of common stock). The initial conversion price of the Senior convertible notes represents a premium of approximately 30% to the last reported sale price of the common stock on the Nasdaq Global Market on March 1, 2021. The conversion rate for the Senior convertible notes is subject to adjustment under certain circumstances in accordance with the terms of the Indenture, but will not be adjusted for any accrued and unpaid interest. In addition, following certain corporate events that occur prior to the maturity date of the Senior convertible notes or if the Company delivers a notice of redemption in respect of the Senior convertible notes, the Company will, in certain circumstances, increase the conversion rate of the Senior convertible notes for a holder who elects to convert its Senior convertible notes in connection with such a corporate event or convert its Notes called for redemption during the related redemption period (as defined in the Indenture), as the case may be.

The Company may not redeem the Senior convertible notes prior to March 6, 2024. The Company may redeem for cash all or any portion of the Senior convertible notes, at its option, on or after March 6, 2024 and prior to the 36th scheduled trading day immediately preceding the maturity date, if the last reported sale price of common stock has been at least 130% of the conversion price for the Senior convertible notes then in effect for at least 20 trading days (whether or not consecutive) during any 30 consecutive trading day period (including the last trading day of such period) ending on, and including, the trading day immediately preceding the date on which the Company provides notice of redemption at a redemption price equal to 100% of the principal amount of the Senior convertible notes to be redeemed, plus accrued and unpaid interest to, but excluding, the redemption date. If the Company elects to redeem less than all of the outstanding Senior convertible notes, at least $75.0 million aggregate principal amount of Senior convertible notes must be outstanding and not subject to redemption as of the relevant redemption notice date. No sinking fund is provided for the Senior convertible notes.

If the Company undergoes a fundamental change (as defined in the Indenture), then, subject to certain conditions and except as described in the Indenture, holders may require the Company to repurchase for cash all or any portion of their Notes at a fundamental change repurchase price equal to 100% of the principal amount of the Senior convertible notes to be repurchased, plus accrued and unpaid interest to, but excluding, the fundamental change repurchase date.

The Indenture includes customary covenants and sets forth certain events of default after which the Senior convertible notes may be declared immediately due and payable.

If certain bankruptcy and insolvency-related events of default involving the Company (and not just any of its significant subsidiaries) occur, 100% of the principal of and accrued and unpaid interest on the Senior convertible notes will automatically become due and payable. If an event of default with respect to the Senior convertible notes, other than certain bankruptcy and insolvency-related events of default involving the Company (and not just any of its significant subsidiaries), occurs and is continuing, the trustee, by notice to the Company, or the holders of at least 25% in principal amount of the outstanding Senior convertible notes by notice to the Company and the trustee, may, and the trustee at the request of such holders shall, declare 100% of the principal of and accrued and unpaid interest, if any, on all the Senior convertible notes to be due and payable. Notwithstanding the foregoing, the Indenture provides that, to the extent the Company so elects, the sole remedy for an event of default relating to certain failures by the Company to comply with certain reporting covenants in the Indenture will, for the first 365 days after the occurrence of such an event of default consist exclusively of the right to receive additional interest on the Senior convertible notes as set forth in the Indenture.

The Indenture provides that the Company shall not consolidate with or merge with or into, or sell, convey, transfer or lease all or substantially all of the consolidated properties and assets of the Company and its subsidiaries, taken as a whole, to, another person (other than any such sale, conveyance, transfer or lease to one or more of the Company's direct or indirect wholly owned subsidiaries), unless: (i) the resulting, surviving or transferee person (if not the Company) is a corporation organized and existing under the laws of the United States of America, any State thereof or the District of Columbia, and such corporation (if not the Company) expressly assumes by supplemental indenture all of the Company's obligations under the Senior convertible notes and the Indenture; and (ii) immediately after giving effect to such transaction, no default or event of default has occurred and is continuing under the Indenture.

During the year ended December 31, 2021, the Company's net proceeds from the offering were approximately $222.7 million, after deducting the initial purchasers' discounts and commissions and the estimated offering expenses payable by the Company. As of December 31, 2022 and 2021, the unamortized debt issuance cost was $4.6 million and $6.1 million, respectively.

MidCap credit facility — In August 2019, the Company entered into the MidCap credit facility and borrowed the first advance of $40.0 million ("Tranche 1") in August 2019 and the second advance of $10.0 million ("Tranche 2") in December 2020. In April 2021, $10.0 million was prepaid. Under the terms of the MidCap credit facility, a third advance of $60.0 million ("Tranche 3") became available to the Company after the Tyvaso DPI approval by the FDA through June 30, 2022 (see Note 11 – Collaboration, Licensing and Other Arrangements). The Company did not exercise its right to borrow Tranche 3.

The Mid Cap credit facility has been amended several times, including in April 2021, when the parties agreed to, among other things, (i) increase the amount available under the third advance from $25.0 million to $60.0 million and extend the date through which the third advance is available to June 30, 2022, (ii) amend the conditions to the third advance of $60.0 million being available to draw, including certain milestone conditions associated with Tyvaso DPI, (iii) remove the Company's obligation to issue a warrant to purchase shares of the Company's common stock upon drawing down the third advance, (iv) extend the interest-only period until September 1, 2023 and extend the maturity date until August 1, 2025, (v) amend the financial covenant relating to trailing 12 month minimum Afrezza net revenue, (vi) decrease the minimum cash covenant, (vii) decrease the interest rate on any amounts outstanding, now or in the future, under the MidCap credit facility, (viii) permit the Company to make certain acquisitions, subject to requirements, and (ix) permit the Company to make investments of up to an additional $9.0 million so long as the Company has $90.0 million or more of unrestricted cash and short-term investments following such investment. Concurrent with entering into this amendment, the Company made a $10.0 million principal prepayment against outstanding term loans under the MidCap credit facility and paid a related $1.0 million exit fee in lieu of the unaccrued portion of the original exit fee and prepayment penalties that would otherwise have been due with respect to the partial prepayment.

During the year ended December 31, 2021, the prepayment penalty of $1.0 million related to the payment of $10.0 million was capitalized and will be amortized over the remaining life of the debt. As of December 31, 2022, the unamortized debt discount was $0.2 million and the unamortized prepayment penalty was $0.5 million. As of December 31, 2021, the unamortized debt discount was $0.4 million and the unamortized prepayment penalty was $0.8 million.

In August 2022, the Company entered into the tenth amendment to the MidCap credit facility to change the benchmark interest rate from LIBOR to the Secured Overnight Financing Rate ("SOFR").

Tranche 1 and Tranche 2 accrue interest at an annual rate equal to the lesser of (i) 8.25% and (ii) the one-month SOFR (subject to a one-month SOFR floor of 1.00%) plus 6.25%. Interest on each term loan advance is due and payable monthly in arrears. Principal on each term loan advance under Tranche 1 and Tranche 2 are payable in 24 equal monthly installments beginning September 1, 2023, until paid in full on August 1, 2025. The Company has the option to prepay its existing term loans, in whole or in part, subject to early termination fees in an amount equal to 3.00% of principal prepaid if prepayment occurs on or prior to April 22, 2022; 2.00% of principal prepaid if prepayment occurs on or after April 23, 2022 through and including April 22, 2023; and 1.00% of principal prepaid if prepayment occurs on or after April 23, 2023 through the maturity date.

The Company's obligations under the MidCap credit facility are secured by a security interest on substantially all of its assets, including intellectual property.

The MidCap credit facility, as amended, contains customary affirmative covenants and customary negative covenants limiting the Company's ability and the ability of the Company's subsidiaries to, among other things, dispose of assets, undergo a change in control, merge or consolidate, make acquisitions, incur debt, incur liens, pay dividends, repurchase stock and make investments, in each case subject to certain exceptions. The Company must also comply with a financial covenant relating to trailing twelve month minimum Afrezza net revenue, tested on a monthly basis, unless the Company has $90.0 million or more of unrestricted cash and short-term investments. As of December 31, 2022, the Company was in compliance with the financial covenants.

The MidCap credit facility also contains customary events of default relating to, among other things, payment defaults, breaches of covenants, a material adverse change, listing of the Company's common stock, bankruptcy and insolvency, cross defaults with certain material indebtedness and certain material contracts, judgments, and inaccuracies of representations and warranties. Upon an event of default, the agent and the lenders may declare all or a portion of the Company's outstanding obligations to be immediately due and payable and exercise other rights and remedies provided for under the MidCap credit facility. During the existence of an event of default, interest on the term loans could be increased by 2.00%.

The Company also agreed to issue warrants to purchase shares of the Company's common stock (the "MidCap warrants") upon the drawdown of Tranches 1 and 2 in an aggregate amount equal to 3.25% of the amount drawn, divided by the exercise price per share for that tranche. The exercise price per share is equal to the volume-weighted average closing price of the Company's common stock for the ten business days immediately preceding the second business day before the issue date. As a result of Tranche 1, the Company issued warrants to purchase an aggregate of 1,171,614 shares of the Company's common stock, at an exercise price equal to $1.11 per share. As a result of Tranche 2, the Company issued warrants to purchase an aggregate of 111,853 shares of the Company's common stock, at an exercise price equal to $2.91 per share. The Company determined that these warrants met the criteria for equity classification and accounted for such warrants in additional paid-in capital. During the year ended December 31, 2021, the Tranche 1 and Tranche 2 MidCap warrants were exercised in full.

Mann Group promissory notes — In August 2019, the Company issued a $35.0 million note that is convertible into shares of the Company's common stock at $2.50 per share (the "Mann Group convertible note") and issued a non-convertible note to Mann Group in an aggregate principal amount of $35.1 million (the "Mann Group non-convertible note" and, together with the Mann Group convertible note, the "Mann Group promissory notes") as part of a restructuring of its then existing indebtedness to Mann Group.

The Mann Group promissory notes originally accrued interest at the rate of 7.00% per year on the principal amount, payable quarterly in arrears on the first day of each calendar quarter beginning October 1, 2019. In April 2021, the Company repaid the entire principal amount of $35.1 million outstanding under the Mann Group non-convertible note, together with all accrued and unpaid interest thereon. On the same date, the Company and Mann Group amended the Mann Group convertible note, pursuant to which the parties agreed to (i) reduce the interest rate from 7.0% to 2.5% effective on April 22, 2021, and (ii) extend the maturity date from November 3, 2024 to December 31, 2025.

The amendment to the Mann Group convertible note resulted in a debt extinguishment with a substantial premium based on the fair value post extinguishment. The fair value in excess of the face amount of $18.4 million contributed to a loss on extinguishment of $22.1 million in the consolidated statement of operations for the year ended December 31, 2021 and resulted in a corresponding debt premium of $22.1 million which was recognized as additional paid-in capital in the consolidated balance sheet as of December 31, 2021. The accounting for the $22.1 million loss on extinguishment did not result in a change in the financial position of the Company. The Company wrote off a *de minimis* amount of debt issuance cost.

The principal and any accrued and unpaid interest under the Mann Group convertible note may be converted, at the option of Mann Group, at any time on or prior to the close of business on the business day immediately preceding the stated maturity date, into shares of the Company's common stock at a conversion rate of 400 shares per $1,000 of principal and/or accrued and unpaid interest, which is equal to a conversion price of $2.50 per share. The conversion rate will be subject to adjustment under certain circumstances described in the Mann Group convertible note. Interest on the convertible note will be payable in kind by adding the amount thereof to the principal amount; provided that with respect to interest accruing from and after January 1, 2021, the Company may, at its option, elect to pay any such interest on any interest payment date, if certain conditions are met, in shares of the Company's common stock at a price per shall equal to the last reported sale price on the trading day immediately prior to the payment date.

Pursuant to the terms of the Mann Group convertible note, Mann Group converted $3.0 million of accrued interest and $7.0 million of principal into 1.2 million shares and 2.8 million shares, respectively, of the Company's common stock in the fourth quarter of 2020. During the year ended December 31, 2021, Mann Group converted $0.4 million of interest and $9.6 million of principal into 4,000,000 shares of common stock. During the year ended December 31, 2022, Mann Group converted $10.0 million of principal and capitalized interest into 4,000,000 shares of common stock. In addition, the Company paid $0.3 million of interest by issuing the Mann Group 75,487 shares of common stock during the year ended December 31, 2022.

PPP loan – In April 2020, the Company received the proceeds from the PPP loan from JPMorgan Chase Bank, N.A., as lender, in the amount of approximately $4.9 million pursuant to the PPP of the CARES Act. In July 2021, the Company received notification from the U.S Small Business Administration that the full principal amount of the PPP loan was forgiven. The Company recognized a $4.9 million gain on extinguishment of debt for the forgiveness of the principal amount and accrued but unpaid interest for the year ended December 31, 2021.

Prior to being forgiven, the PPP loan was evidenced by a promissory note dated April 9, 2020 that matured on April 9, 2022 and bore interest at a rate of 0.98% per annum (which was being deferred). The Company used all proceeds from the PPP loan to retain employees, maintain payroll and make lease, interest and utility payments.

Amortization of the premium and accretion of debt issuance costs related to all borrowings for the years ended December 31, 2022, 2021 and 2020 are as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Amortization of debt discount	$ 431	$ 377	$ 268
Amortization of debt issuance cost	1,453	1,215	101

Milestone Rights — As of December 31, 2022 and 2021, the remaining Milestone Rights liability balance was $4.8 million and $5.9 million, respectively, which was based on initial fair value estimates calculated using the income approach and reduced by milestone achievement payments made. During the second quarter of 2022, the Company achieved an Afrezza net sales milestone specified by the Milestone Rights. The carrying value of the Milestone Rights liability related to the $5.0 million payment, which was made in the third quarter of 2022, was approximately $1.1 million and represented the fair value as determined in 2013 (the most recent measurement date). As of December 31, 2022, the $4.8 million liability consisted of a $0.9 million current liability which was presented as accrued expenses and other current liabilities and a $3.9 million long-term liability which was presented in milestone liabilities in our consolidated balance sheets.

During the first quarter of 2021, the Company achieved the second Afrezza net sales milestone specified by the Milestone Rights. The milestone carrying value of the Milestone Rights liability related to the $5.0 million payment, which was made in the second quarter of 2021, was approximately $1.3 million, and represented the fair value as determined in 2013 (the most recent measurement date). As of December 31, 2021, the $5.9 million liability consisted of a $1.1 million current liability which was presented as accrued expenses and other current liabilities and a $4.8 million long-term liability which was presented in milestone liabilities in our consolidated balance sheets.

The Milestone Rights Agreement includes customary representations and warranties and covenants by the Company, including restrictions on transfers of intellectual property related to Afrezza. The Milestone Rights are subject to acceleration in the event the Company transfers its intellectual property related to Afrezza in violation of the terms of such agreement.

11. Collaboration, Licensing and Other Arrangements

Revenue from collaborations and services for the years ended December 31, 2022, 2021 and 2020 are as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
UT CSA Agreement (1)	$ 24,826	$ 267	$ —
UT License Agreement (2)	2,426	34,145	32,213
Vertice Pharma Co-Promotion Agreement	325	1,147	—
Other	200	323	—
Cipla License and Distribution Agreement	147	147	147
Receptor CLA	—	245	250
UT Research Agreement	—	—	210
Total revenue from collaborations and services	$ 27,924	$ 36,274	$ 32,820

(1) Amount consists of revenue recognized for Manufacturing Services and sales of product to UT for the periods presented.

(2) Amount consists of revenue recognized for Next-Gen R&D Services and R&D Services and License for the periods presented.

The activity related to deferred revenue and the related revenue recognized for collaborations and services is as follows (in thousands):

	December 31,	
	2022	2021
Deferred revenue:		
Beginning balance	$ 20,370	$ 34,937
Additions	46,971	21,707
Revenue — collaborations and services	(27,924)	(36,274)
Ending balance	$ 39,417	$ 20,370

United Therapeutics License Agreement — In September 2018, the Company and UT entered into an exclusive global license and collaboration agreement (the "UT License Agreement"), pursuant to which UT is responsible for global development, regulatory and commercial activities with respect to Tyvaso DPI. The Company is responsible for manufacturing clinical supplies and commercial supplies of Tyvaso DPI.

Revenue from UT for the years ended December 31, 2022, 2021 and 2020 are as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
UT Revenue			
UT CSA Agreement	$ 24,826	$ 267	$ —
UT License Agreement	2,426	34,145	32,213
Royalties — Collaborations (1)	15,599	—	—
Total revenue from UT	$ 42,851	$ 34,412	$ 32,213

(1) Amount consists of royalties associated with the UT License Agreement.

The current portion of contract assets related to the royalties is included in prepaid expense and other current assets in the consolidated balance sheets.

Under the terms of the UT License Agreement, the Company received an upfront payment of $45.0 million in October 2018 and four $12.5 million milestone payments between April 2019 and November 2020. The Company will also be entitled to receive low double-digit royalties on net sales of Tyvaso DPI as well as a manufacturing margin on commercial supplies of the product. UT, at its option, may expand the scope of the products covered by the UT License Agreement to include products with certain other active ingredients for the treatment of pulmonary arterial hypertension. Each such optioned product would be subject to UT's payment to the Company of up to $40.0 million in additional option exercise and development milestone payments, as well as a low double-digit royalty on net sales of any such product.

At the inception of the agreement, the Company identified one distinct, performance obligation. The Company determined that the key deliverables include the license, supply of product to be used in clinical development, and certain research services upon achievement of specified development targets ("R&D Services"). Due to the specialized and unique nature of these services and their direct relationship with the license, the Company has determined that these deliverables represent one distinct bundle and thus, one performance obligation. The Company also determined that UT's option to expand the scope of the products to include products with other active ingredients is not a material right, and thus, not a performance obligation at the onset of the agreement. The consideration for the option will be accounted for upon exercise of the option.

The Company expected to complete the activities specified in the initial development plan and to achieve the milestone events by December 31, 2021 for total consideration of approximately $105.8 million, which included an upfront payment, four milestone payments, various pass-through costs and payments for clinical supplies. Revenue was allocated as follows:

Distinct Performance Obligation	Transaction Price	Allocation of Price	Recognition Method	Progress Measure	Recognition Period	
	(in millions)					
R&D Services and License	$ 105.8	100%	Over time	Ratably	Sep 2018 - Dec 2021	(1)

(1) Recognition period represents the estimated period to satisfy the performance obligation.

In May 2021, UT and the Company updated the development plan under the UT License Agreement to provide for additional process-development and stability-testing activities as well as the expansion of the Company's commercial manufacturing capacity. The activities and deliverables under the current development plan resulted in four distinct performance obligations which include: (1) the continued development and approval process for an NDA ("R&D Services"); (2) certain pre-commercial services in preparation for commercial launch of Tyvaso DPI ("Pre-Commercial Services"); (3) development activities for the next generation of Tyvaso DPI ("Next-Gen R&D Services"); and (4) certain design and construction activities in anticipation of expansion of the Company's commercial manufacturing facility ("Facility Expansion Services").

The total consideration for the updated development plan of $50.9 million was allocated to the four distinct performance obligations based on management's assessment of the stand-alone selling price of each performance obligation. Revenue was allocated as follows:

Description	Transaction Price	Allocation of Price[1]	Recognition Method	Progress Measure	Revenue Recognition	
	(in millions)					
Total transaction price	$ 50.9					
Distinct Performance Obligation						
R&D Services and License		$ 18.4	Over time	Ratably	May 2021 - Oct 2021	(2)
Pre-Commercial Services		$ 4.6	Over time	Input	% of completion of costs	(3)
Next-Gen R&D Services		$ 7.2	Over time	Input	% of completion of costs	(3)
Facility Expansion Services[4]		$ 20.7	Point in time		Transfer of control	(5)

(1) Allocation is based on management's assessment of the stand-alone selling price of each performance obligation.

(2) Represents the estimated period when the R&D Services performance obligation will be substantially complete.

(3) Pre-Commercial Services and Next-Gen R&D Services performance obligations will be satisfied over time using the input method based on the costs incurred to date as a percentage of the total estimated costs to fulfill the contract. Incurred cost represents work performed, which corresponds with, and thereby best depicts, the transfer of control to the customer.

(4) The Company also acts as agent for the procurement of equipment for the manufacturing expansion for the UT Equipment. The Company received $5.0 million from UT for the UT Equipment, which was recognized as deposits from customer on the consolidated balance sheet and will be released as the title is transferred to UT.

(5) The Facility Expansion Services performance obligation would be recognized as control of manufactured products is transferred to the customer.

In August 2021, the Company and UT entered into a commercial supply agreement (as amended, the "CSA"), pursuant to which the Company is responsible for manufacturing and supplying to UT, and UT is responsible for purchasing from the Company on a cost-plus basis, Tyvaso DPI and BluHale inhalation profiling devices, as required for commercial distribution and sale by UT. In addition, UT is responsible for supplying treprostinil at its expense in quantities necessary to enable the Company to manufacture Tyvaso DPI as required by the CSA. Also pursuant to the CSA, UT will remit a reimbursement of certain pre-production costs incurred by the Company to support the manufacturing and supply of Tyvaso DPI.

The activities and deliverables under the CSA and the current development plan resulted in three distinct performance obligations which include: (1) the license, supply of product to be used in clinical development, and continued development and approval support for Tyvaso DPI ("R&D Services and License"); (2) development activities for the next generation of Tyvaso DPI ("Next-Gen R&D Services"); and (3) a material right associated with current and future commercial manufacturing and supply of product ("Manufacturing Services").

The total revised anticipated cash flows of $221.5 million from the transaction was allocated to the three distinct performance obligations as follows.

Description	Anticipated Cash Flow	Anticipated Revenue Allocation[1]	Recognition Method	Progress Measure	Revenue Recognition	
	(in millions)					
Total anticipated cash flow	$ 221.5					
Distinct Performance Obligation						
R&D Services and License[2]		$ 6.0	Over time	Ratably	Aug 2021 - Oct 2021	(3)
Next-Gen R&D Services		$ 8.8	Over time	Input	% of completion of costs	(4)
Manufacturing Services		$ 206.7	Point in time		Transfer of control	(5)

(1) Allocation is based on management's assessment of the stand-alone selling price of each performance obligation.

(2) The license for the Company's IP was considered to be interdependent with the development activities to support approval of Tyvaso DPI. A sales-based royalty is promised in exchange for the IP license; therefore, the royalties associated with the license are excluded from the determination of the transaction price and the Company will recognize revenue as the sale of Tyvaso DPI to a patient occurs.

(3) Represents the estimated period when the R&D Services performance obligation will be substantially complete.

(4) The Next-Gen R&D Services performance obligation will be satisfied over time using the input method based on the costs incurred to date as a percentage of the total estimated costs to fulfill the contract. Incurred cost represents work performed, which corresponds with, and thereby best depicts, the transfer of control to the customer.

(5) The Manufacturing Services performance obligation will be recognized as control of manufactured products is transferred to the customer; therefore, no revenue associated with this obligation was recognized during the year ended December 31, 2021. The allocation of transaction price includes a material right related to manufacturing services. The total anticipated cash flow is based on the Company's estimated production and the ultimate cash flows may vary as manufacturing purchase orders are received.

As amended , the term of the CSA continues until December 31, 2031 (unless earlier terminated) and is thereafter renewed automatically for additional, successive two-year terms unless (i) United Therapeutics provides notice to the Company at least 24 months in advance of such renewal that United Therapeutics does not wish to renew the CSA or (ii) the Company provides notice to United Therapeutics at least 48 months in advance of such renewal that the Company does not wish to renew the CSA. The Company and United Therapeutics each have normal and customary termination rights, including termination for material breach that is not cured within a specific timeframe or in the event of liquidation, bankruptcy or insolvency of the other party.

The Company accounted for the contract modification as if it were part of the existing contract since the amendment modified the scope and price of the CSA by extending the term and increasing the occupancy rate. The effect of the modification on the transaction price and on the measure of progress is recognized as an adjustment to revenue as of the date of the modification. The modification did not result in a change the activities and deliverables under the CSA. The total revised anticipated cash flows of $463.5 million from the transaction was allocated to the three distinct performance obligations as follows.

Description	Anticipated Cash Flow	Revenue Allocation(1)	Recognition Method	Progress Measure	Revenue Recognition	
	(in millions)					
Total anticipated cash flow(2)	$ 463.5					
Distinct Performance Obligation						
R&D Services and License(3)		$ —	Over time	Ratably	Aug 2021 - Oct 2021	(4)
Next-Gen R&D Services(5)		$ 4.8	Over time	Input	% of completion of costs	(6)
Manufacturing Services(7)		$ 458.7	Point in time		Transfer of control	(8)

(1) Allocation is based on management's assessment of the stand-alone selling price of each performance obligation.

(2) The total anticipated cash flow includes a transaction price of $64.3 million for the contractual obligations under the CSA for the Manufacturing Services and the Next-Gen R&D Services performance obligations and $399.2 million for future supply of Tyvaso DPI over the remaining term of the CSA.

(3) The license for the Company's IP was considered to be interdependent with the development activities to support approval of Tyvaso DPI. A sales-based royalty is promised in exchange for the IP license; therefore, the royalties associated with the license are excluded from the determination of the transaction price and the Company will recognize revenue as the sale of Tyvaso DPI to a patient occurs.

(4) Represents the period when the revenue for the R&D Services performance obligation was recognized.

(5) The standalone selling price ("SSP") for the Next-Gen R&D Services performance obligation was based on industry ratios as well as the Company's historical R&D projects. The transaction price for the Next-Gen R&D Services was based on fixed consideration which was allocated between performance obligations as discussed in note (2) above.

(6) The Next-Gen R&D Services performance obligation will be satisfied over time using the input method based on the costs incurred to date as a percentage of the total estimated costs to fulfill the contract. Incurred cost represents work performed, which corresponds with, and thereby best depicts, the transfer of control to the customer.

(7) Pre-production activities under the CSA, such as facility expansion services and certain other administrative services, were considered bundled services that are part of the Company's Manufacturing Services performance obligation, given the nature of the Company's contractual responsibilities and ASC 606 requirements.

(8) The Manufacturing Services performance obligation will be recognized as control of manufactured products is transferred to the customer. The modification did not result in a cumulative catch-up adjustment as a result of the revenue being deferred for the performance obligations that were affected by the modification. The allocation of the transaction price for the Manufacturing Services includes a material right related to the Company's estimated production of product in the amount of $144.5 million. The Company will sell product to UT under individual purchase orders, which represent distinct performance obligations. The total anticipated cash flow is based on the Company's estimated production and the ultimate cash flows may vary as manufacturing purchase orders are received.

In April 2022, the Company and UT agreed to fund $2.3 million in capital improvements to support commercialization and continuous improvement activities and $0.7 million in the development of alternative manufacturing processes. The Company determined that the capital improvements and continuous improvements should be combined with the manufacturing services performance obligation and the alternative manufacturing processes should be combined with the Next-Gen R&D Services and as such no additional performance obligations were noted. The total revised anticipated cash flows of $483.2 million from the transaction was allocated to the three distinct performance obligations as follows.

Description	Anticipated Cash Flow	Anticipated Revenue Allocation	Recognition Method	Progress Measure	Revenue Recognition
	(in millions)				
Total anticipated cash flow[1]	$ 483.2				
Distinct Performance Obligation					
R&D Services and License		$ —	Over time	Ratably	Aug 2021 - Oct 2021
Next-Gen R&D Services		$ 5.9	Over time	Input	% of completion of costs
Manufacturing Services and Product Sales[2]		$ 477.2	Point in time		Transfer of control

(1) The total anticipated cash flow includes a transaction price of $71.5 million for the contractual obligations under the CSA for the Manufacturing Services and the Next-Gen R&D Services performance obligations and $411.7 million for future supply of Tyvaso DPI over the remaining term of the CSA.

(2) The Manufacturing Services performance obligation will be recognized as control of manufactured products is transferred to UT. The modification did not result in a cumulative catch-up adjustment as a result of the revenue being deferred for the performance obligations that were affected by the modification. The allocation of the transaction price for the Manufacturing Services includes a material right related to the Company's estimated production of product in the amount of $150.2 million. The Company will sell product to UT under individual purchase orders, which represent distinct performance obligations. The ultimate cash flows may vary as manufacturing purchase orders are received.

In December 2022, the Company and UT agreed to fund an additional $39.5 million to support capital and continuous improvement activities and $2.3 million in the development of alternative manufacturing processes. The Company determined that the capital and continuous improvements should be combined with the manufacturing services performance obligation and the alternative manufacturing processes should be combined with the Next-Gen R&D Services. The total revised anticipated cash flows of $722.3 million from the transaction was allocated to the three distinct performance obligations as follows.

Description	Anticipated Cash Flow	Anticipated Revenue Allocation	Recognition Method	Progress Measure	Revenue Recognition
	(in millions)				
Total anticipated cash flow[1]	$ 722.3				
Distinct Performance Obligation					
R&D Services and License		$ —	Over time	Ratably	Aug 2021 - Oct 2021
Next-Gen R&D Services		$ 10.0	Over time	Input	% of completion of costs
Manufacturing Services and Product Sales[2]		$ 712.3	Point in time		Transfer of control

(1) The total anticipated cash flow includes a transaction price of $120.0 million for the contractual obligations under the CSA for the Manufacturing Services and the Next-Gen R&D Services performance obligations and $602.3 million for future supply of Tyvaso DPI over the remaining term of the CSA.

(2) The Manufacturing Services performance obligation will be recognized as control of manufactured products is transferred to UT. The modification did not result in a cumulative catch-up adjustment as a result of the revenue being deferred for the performance obligations that were affected by the modification. The allocation of the transaction price for the Manufacturing Services includes a material right related to the Company's estimated production of product in the amount of $220.8 million. The Company will sell product to UT under individual purchase orders, which represent distinct performance obligations. The ultimate cash flows may vary as manufacturing purchase orders are received.

As of December 31, 2022, deferred revenue consisted of $37.9 million, of which $1.6 million was classified as current and $36.3 million was classified as long-term on the consolidated balance sheet. As of December 31, 2021, deferred revenue consisted of $18.6 million, of which $0.6 million was classified as current and $18.0 million was classified as long-term on the consolidated balance sheet.

Vertice Pharma Co-Promotion Agreement — In December 2020, the Company entered into a co-promotion agreement with Vertice Pharma pursuant to which the Company's sales force promoted Thyquidity to healthcare providers who treat hypothyroidism. Vertice Pharma was obligated to pay fixed quarterly payments to the Company, as well as variable consideration based on gross profits resulting from all sales of Thyquidity. Vertice Pharma launched Thyquidity in collaboration with the Company in February 2021.

At inception of the agreement, the Company identified a single performance obligation that the Company will satisfy over time. The Company estimated the total transaction price was approximately $6.3 million, consisting of fixed consideration and the unconstrained amount of estimated variable consideration, which was based on gross profit applied to defined revenue benchmarks. The amount of variable consideration was constrained to the amount for which it was probable that a significant reversal of cumulative revenue recognized will not occur and the payments will be received. At the end of each subsequent reporting period, the Company re-evaluated the estimated variable consideration included in the transaction price and any related constraint, and if necessary, adjusted its estimate of the overall transaction price. Any such adjustments were recorded on a cumulative catch-up basis in the period of adjustment. The total transaction price was recognized over a two-year period during which the Company was required to satisfy its performance obligation, using the input method based on the costs incurred to date as a percentage of the total estimated costs to fulfill the contract. Incurred cost represents work performed, which corresponded with, and thereby best depicts, the transfer of control to the customer. In July 2021, the Company and Vertice Pharma entered into an amendment to the Vertice Pharma Co-Promotion Agreement that modified the terms of payment where 50% of the previously fixed consideration was subject to certain promotional conditions, resulting in variable consideration.

In September 2021, the Company and Vertice Pharma mutually agreed that the Company would cease promotional activities under the co-promotion agreement effective September 30, 2021, other than certain transitional activities that continued until October 15, 2021.

As of December 31, 2021, the Company fully reserved $0.8 million of revenue from the co-promotion of Thyquidity, which was recognized as allowance for credit losses – collaborations and services, which is included in accounts receivable, net in the consolidated balance sheet. In addition, the Company recognized an impairment on contract assets of $0.1 million related to variable consideration from gross profits which was recognized during the year ended December 31, 2021.

In June 2022, the Company and Vertice Pharma reached a final settlement of all obligations related to the termination of the co-promotion agreement of $0.3 million, which was recognized as revenue from collaboration and services in the Company's consolidated statement of operations and the balance was written off against the reserve.

Thirona Collaboration Agreement — In June 2021, the Company and Thirona entered into a collaboration agreement to evaluate the therapeutic potential of Thirona's compound for the treatment of pulmonary fibrosis. If initial studies are promising, the Company can exercise certain rights to seek a full license to the compound for clinical development and commercialization. The parties will perform their respective obligations and provide reasonable support for research, clinical development and regulatory strategy. The collaboration agreement will be accounted for under ASC 808, Collaborative Agreements; however, no consideration will be exchanged between the parties. The Company will expense the costs incurred as research and development in the consolidated statements of operations. In December 2022, the Company and Thirona extended the collaboration agreement through February 28, 2023.

Biomm Supply and Distribution Agreement — In May 2017, the Company and Biomm S.A. ("Biomm") entered into a supply and distribution agreement for the commercialization of Afrezza in Brazil. Under this agreement, Biomm was responsible for pursuing regulatory approvals of Afrezza in Brazil, including from the ANVISA and, with respect to pricing matters, from the Camara de Regulação de Mercado de Medicamentos ("CMED"), both of which have been received. Biomm commenced product sales in January 2020. During the year ended December 31, 2020, the Company sold $0.2 million of product to Biomm. No shipments of product were made to Biomm during the years ended December 31, 2022 and 2021.

Cipla License and Distribution Agreement — In May 2018, the Company and Cipla Ltd. ("Cipla") entered into an exclusive agreement for the marketing and distribution of Afrezza in India and the Company received a $2.2 million nonrefundable license fee. Under the terms of the agreement, Cipla is responsible for obtaining regulatory approvals to distribute Afrezza in India and for all marketing and sales activities of Afrezza in India. The Company is responsible for supplying Afrezza to Cipla. The Company has the potential to receive an additional regulatory milestone payment, minimum purchase commitment revenue and royalties on Afrezza sales in India once cumulative gross sales have reached a specified threshold.

The nonrefundable licensing fee was recorded in deferred revenue and is being recognized in net revenue – collaborations over 15 years, representing the estimated period to satisfy the performance obligation. The additional milestone payments represent variable consideration for which the Company has not recognized any revenue because of the uncertainty of obtaining marketing approval.

As of December 31, 2022, the deferred revenue balance was $1.5 million, of which $0.1 million is classified as current and $1.4 million is classified as long term in the consolidated balance sheets. As of December 31, 2021, the deferred revenue balance was $1.7 million, of which $0.1 million is classified as current and $1.6 million is classified as long term in the consolidated balance sheets.

12. Fair Value of Financial Instruments

The availability of observable inputs can vary among the various types of financial assets and liabilities. To the extent that the valuation is based on models or inputs that are less observable or unobservable in the market, the determination of fair value requires more judgment. In certain cases, the inputs used to measure fair value may fall into different levels of the fair value hierarchy. In such cases, for financial statement disclosure purposes, the level in the fair value hierarchy within which the fair value measurement is categorized is based on the lowest level input that is significant to the overall fair value measurement. The Company uses the exit price method for estimating the fair

value of loans for disclosure purposes. Inputs used in the valuation techniques to derive fair values are classified based on a three-level hierarchy, as follows:

Level 1 — Quoted prices for identical instruments in active markets.

Level 2 — Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations whose inputs are observable or whose significant value drivers are observable.

Level 3 — Significant inputs to the valuation model are unobservable.

The carrying amounts reported in the accompanying consolidated financial statements for cash, accounts receivable, accounts payable, and accrued expenses and other current liabilities (excluding the Milestone Rights liability) approximate their fair value due to their relatively short maturities. The fair value of the cash equivalents, long- and short-term investments, MidCap credit facility, Mann Group promissory notes, 2024 convertible notes, Senior convertible notes, Milestone Rights liabilities and Financing liability are disclosed below (amounts in millions).

Cash Equivalents — Cash equivalents consist of highly liquid investments with original or remaining maturities of 90 days or less at the time of purchase that are readily convertible into cash. As of December 31, 2022 and 2021, the Company held $69.8 million and $124.2 million, respectively, of cash and cash equivalents.

Financial Liabilities — The following tables set forth the fair value of the Company's financial instruments (Level 3 in the fair value hierarchy) (in millions):

	December 31, 2022		
		Fair Value	
	Carrying Amount	Significant Unobservable Inputs (Level 3)	Total Fair Value
Financial liabilities:			
Senior convertible notes(1)	$ 225.4	$ 253.9	$ 253.9
MidCap credit facility(2)	39.3	41.1	41.1
Mann Group convertible note(3)	8.8	20.8	20.8
Milestone rights(4)	4.8	12.6	12.6
Contingent milestone liability (4)	0.6	1.0	1.0

(1) Fair value determined by applying a discounted cash flow analysis to the straight note with a hypothetical yield of 13%, volatility of 75.8% and a Monte Carlo simulation for the value of the conversion feature. A change in yield of + or – 2% would result in a fair value of $245.0 million and $263.4 million, respectively.

(2) Fair value determined by applying a discounted cash flow analysis with a hypothetical yield of 12%. A change in yield of + or – 2% would result in a fair value of $40.0 million and $42.4 million, respectively.

(3) The April 2021 amendment to the Mann Group convertible note resulted in a substantial premium of $22.1 million based on the fair value post modification which was recognized as additional paid-in capital in the consolidated balance sheet as of December 31, 2021. The accounting for the $22.1 million loss on extinguishment did not result in a change in the financial position of the Company. The fair value assessed as of December 31, 2022 was determined by applying a discounted cash flow analysis with a hypothetical yield of 13% and volatility of 77.8% to the straight note and a binomial option pricing model for the value of the conversion feature. A change in yield of + or – 2% would result in a fair value of $20.5 million and $21.2 million, respectively.

(4) Fair value determined by applying a Monte Carlo simulation.

	December 31, 2021		
		Fair Value	
	Carrying Value	Significant Unobservable Inputs (Level 3)	Total Fair Value
Financial liabilities:			
Senior convertible notes (1)	$ 223.9	$ 237.5	$ 237.5
MidCap credit facility (2)	38.8	40.8	40.8
Mann Group convertible note(3)	18.4	37.8	37.8
Milestone Rights (4)	5.9	18.1	18.1

(1) Fair value determined by applying a discounted cash flow analysis to the straight note with a hypothetical yield of 12%, volatility of 90% and a Monte Carlo simulation for the value of the conversion feature. A change in yield of + or – 2% would result in a fair value of $226.6 million and $249.4 million, respectively.

(2) Fair value determined by applying a discounted cash flow analysis with a hypothetical yield of 10%. A change in yield of + or – 2% would result in a fair value of $39.1 million and $42.7 million, respectively.

(3) The April 2021 amendment to the Mann Group convertible note resulted in a substantial premium of $22.1 million based on the fair value post modification which was recognized as additional paid-in capital in the consolidated balance sheet as of December 31, 2021. The accounting for the $22.1 million loss on extinguishment did not result in a change in the financial position of the Company. The fair value assessed as of December 31, 2021 was determined by applying a discounted cash flow analysis with a hypothetical yield of 12% and volatility of 85% to the straight note and a binomial option pricing model for the value of the conversion feature. A change in yield of + or – 2% would result in a fair value of $36.9 million and $38.8 million, respectively.

(4) Fair value determined by applying a Monte Carlo simulation.

Milestone Rights Liability — The fair value measurement of the Milestone Rights liability is sensitive to the discount rate and the timing of achievement of milestones. The Company utilized Monte-Carlo Simulation Method to simulate the Afrezza net sales under a neutral framework to estimate the payment. The Company then discounted the future expected payments at cost of debt with a term equal to the simulated time to payout based on cumulative sales.

Contingent milestone liability — The acquisition of V-Go in May 2022 resulted in a contingent milestone liability which could result in obligations to the seller if certain revenue thresholds are met. The initial fair value of the contingent milestone liability was recorded as an adjustment to the purchase price. Subsequent changes in the fair value are reported in general and administrative expenses.

Financing Liability — The failed Sale Leaseback Transaction in November 2021 resulted in a financing liability which is included in the Company's consolidated balance sheets as a current financing liability of $9.6 million and a long-term financing liability of $94.5 million. The fair value of $103.2 million was determined using level 3 inputs. As of December 31, 2022, the fair value was determined using a discounted cash flow analysis with a hypothetical yield of 10%. As December 31, 2021, the Company evaluated the fair value of its financing liability and determined that the fair value approximates the carrying value.

13. Common and Preferred Stock

The Company is authorized to issue 400,000,000 shares of common stock, par value $0.01 per share, and 10,000,000 shares of undesignated preferred stock, par value $0.01 per share, issuable in one or more series as designated by the Company's board of directors. No other class of capital stock is authorized. As of December 31, 2022 and 2021, 263,793,305 and 251,477,562 shares of common stock, respectively, were issued and outstanding and no shares of preferred stock were outstanding.

In February 2018, the Company entered into a controlled equity offering sales agreement (the "CF Sales Agreement") with Cantor Fitzgerald & Co. ("Cantor Fitzgerald"), as sales agent, pursuant to which the Company may offer and sell, from time to time, through Cantor Fitzgerald, shares of the Company's common stock in such amount as may be permitted by the Sales Agreement. The original amount of common stock authorized for sale under the CF Sales Agreement was $50.0 million. Under the Sales Agreement, Cantor Fitzgerald may sell shares by any method deemed to be an "at-the-market offering" as defined in Rule 415 under the Securities Act of 1933, as amended. In February 2022, the Company filed a sales agreement prospectus under a registration statement on Form S-3 (File No. 333-262981) covering the sale of up to $50.0 million of common stock through Cantor Fitzgerald under the CF Sales Agreement. For the year ended December 31, 2022, the Company sold 5,059,856 shares of common stock at a weighted average purchase price of $3.91 per share for gross proceeds of approximately $19.8 million pursuant to the CF Sales Agreement. For the year ended December 31, 2021, the Company sold an aggregate of 578,063 shares of the Company's common stock at a weighted average purchase price of $3.26 per share for aggregate gross proceeds of approximately $1.9 million pursuant to the Sales Agreement. For the year ended December 31, 2020, the Company sold an aggregate of 11,851,566 shares of the Company's common stock at a weighted average purchase price of $1.99 per share for aggregate gross proceeds of approximately $23.5 million pursuant to the CF Sales Agreement.

In June 2020, the Company prepaid the June 2020 note with the issuance of 1,235,094 shares of the Company's common stock, in accordance with the terms of the June 2020 note. In October 2020, the Company prepaid the December 2020 note with the issuance of 1,377,356 shares of the Company's common stock, in accordance with the terms of the December 2020 note. The number of shares issued for the prepayments in June and October 2020 were determined based on the Company's closing stock price on the day preceding the settlement date. See Note 10 – *Borrowings*.

In June 2020, 7,250,000 warrants were exercised at a price of $1.60 per share. The warrants were issued pursuant to an underwriting agreement with Leerink Partners LLC for a public offering of 26,666,667 shares of the Company's common stock and warrants to purchase up to an aggregate of 26,666,667 shares of the Company's common stock. There are no remaining warrants outstanding under this agreement.

In the fourth quarter of 2020, the Mann Group converted $3.0 million of accrued interest and $7.0 million of principal under the Mann Group convertible note into 1.2 million shares and 2.8 million shares, respectively, of the Company's common stock, in accordance with the terms of the convertible note.

In December 2020, the Company issued 111,853 warrants to purchase shares of the Company's common stock in connection with the third amendment to the Midcap Credit Facility.

In December 2020, the Company issued 3,067,179 shares of the Company's common stock as consideration for the acquisition of QrumPharma. See Note 3 – *Acquisitions*.

In February 2021, the Company converted $5.0 million principal amount of 2024 convertible notes into 1,666,667 shares of the Company's common stock.

In October 2021, MidCap exercised 1,171,614 and 111,853 warrants issued in association with Tranches 1 and 2, respectively, under the MidCap credit facility, as amended, to purchase an aggregate of 1,283,467 shares of the Company's common stock through a cashless exercise that resulted in the net issuance of 964,113 shares. See Note 10 – *Borrowings*.

In December 31, 2021, the Mann Group converted $0.4 million of interest and $9.6 million of principal into 4.0 million shares of common stock. See Note 10 – *Borrowings*.

During the year ended December 31, 2021, the Company received $0.1 million from the market price stock purchase plan ("MPSPP") for 25,000 shares and a *de minimis* amount during the year ended December 31, 2020.

During the year ended December 31, 2022, pursuant to the terms of the Mann Group convertible note, Mann Group converted $10.0 million of principal and capitalized interest into 4,000,000 shares of common stock. In addition, the Company paid quarterly interest payments on the Mann Group convertible note on April 1, 2022, July 1, 2022 and October 1, 2022 by issuing Mann Group an aggregate of 75,487 shares of common stock.

During the year ended December 31, 2022, the Company received $0.7 million from the market price stock purchase plan ("MPSPP") for 252,176 shares.

14. Earnings per Common Share ("EPS")

Basic EPS excludes dilution for potentially dilutive securities and is computed by dividing net income (loss) by the weighted average number of common shares outstanding during the period. Diluted EPS reflects the potential dilution under the treasury method that could occur if securities or other contracts to issue common stock were exercised or converted into common stock. For periods where the Company has presented a net loss, potentially dilutive securities are excluded from the computation of diluted EPS as they would be antidilutive.

The following tables summarize the components of the basic and diluted EPS computations (in thousands, except per share amounts):

	Year Ended December 31,		
	2022	2021	2020
EPS — basic and diluted:			
Net loss (numerator)	$ (87,400)	$ (80,926)	$ (57,240)
Weighted average common shares (denominator)	257,092	249,244	222,585
Net loss per share	$ (0.34)	$ (0.32)	$ (0.26)

Common shares issuable represents incremental shares of common stock which consist of stock options, restricted stock units, warrants, and shares that could be issued upon conversion of the Senior convertible notes and the Mann Group convertible notes.

Potentially dilutive securities outstanding that are considered antidilutive are summarized as follows (in shares):

	Year Ended December 31,		
	2022	2021	2020
Senior convertible notes	44,120,463	44,120,463	—
Common stock options and PNQs	9,074,587	10,655,146	12,264,616
Mann Group convertible notes	3,370,000	7,370,000	11,200,000
Warrants associated with MidCap credit facility	—	—	1,283,467
2024 convertible notes	—	—	1,666,667
RSUs and Market RSUs[1]	18,886,710	7,609,025	6,037,542
Employee stock purchase plan	—	243,375	292,981
Total shares	75,451,760	69,998,009	32,745,273

(1) Market RSUs are included at the maximum share delivery percentage.

15. Stock Award Plans

In May 2018, the Company adopted the 2018 Equity Incentive Plan (the "2018 Plan") as the successor to and continuation of the 2013 Equity Incentive Plan (the "2013 Plan"). The 2018 Plan initially consisted of 12,000,000 new shares plus the number of unallocated shares remaining available for grant for new awards under the 2013 Plan. In May 2020, the 2018 Plan was amended to increase the number of shares of common stock that may be issued under the 2018 Plan by 12,500,000 shares.

Effective upon the approval of the 2018 Plan by the Company's stockholders in May 2018, no additional awards have been or may be granted under the 2013 Plan. Any Prior Plans' (as defined below) returning shares will increase the number of shares issuable under the 2018 Plan. The Prior Plans' returning shares are shares subject to outstanding stock awards granted under the 2013 Plan or the 2004 Equity Incentive Plan (collectively, "Prior Plans") that, from and after the effective date of the 2018 Plan, (i) expire or terminate for any reason prior to exercise or settlement, (ii) are forfeited, cancelled or otherwise returned to the Company because of the failure to meet a contingency or condition required for the vesting of such shares, or (iii) other than with respect to outstanding stock options and stock appreciation rights granted under the Prior Plans with an exercise or strike price of at least 100% of the fair market value of the underlying common stock on the date of grant, are reacquired or withheld (or not issued) by the Company to satisfy a tax withholding obligation in connection with a stock award.

The 2018 Plan provides for the granting of stock awards including stock options and restricted stock units to employees, directors and consultants.

The Company's board of directors or its compensation committee determines eligibility, vesting schedules and criteria, and exercise prices for stock awards granted under the 2018 Plan. Options and restricted stock unit awards under the 2018 Plan, or the Prior Plans expire not more than ten years from the date of the grant and are exercisable upon vesting. Stock options that vest over time generally vest over four years. Current time-based vesting stock option grants vest and become exercisable at the rate of 25% after one year and ratably on a monthly basis over a period of 36 months thereafter. The Company also issues PNQ awards with performance conditions. For PNQs, the Company evaluates the probability that the performance conditions will be met and estimates the service period for recognition of the associated expense. RSUs with time-based vesting generally vest at a rate of 25% per year over four years with consideration satisfied by service to the Company. Certain RSUs issued to nonemployee directors vest immediately upon grant, but the underlying shares of common stock will not be delivered until there is a separation of service such as resignation, retirement or death. The Company also issued Market RSUs. The grant date fair value and the effect of the market conditions was estimated using a Monte Carlo valuation.

Market RSUs issued during the year ended December 31, 2022 had a grant date fair value of $6.10 per share and will vest on May 10, 2025 provided that the closing price of the Company's common stock on such vesting date is not less than the closing price on May 10, 2022. The fair value of the Market RSUs was determined using a share price of $2.95, risk-free interest rate of 2.81%, volatility of 75%, and a dividend yield of 0%. The number of shares delivered on the vesting date is determined by the percentile ranking of MannKind total shareholder return (TSR) over the period from May 10, 2022 until May 10, 2025 relative to the TSR of the Russell 3000 Pharmaceutical & Biotechnology Index over the same period, as follows: less than 25th percentile=0% of target, 25th percentile=50% of target, 50th percentile=100% of target, 75th percentile=200% of target, 90th percentile or higher=300% maximum. Payout values will be interpolated between the percentile rankings above. The resulting stock-based compensation expense will be recognized over the service period regardless of whether the market conditions are achieved, as long as the service condition is satisfied.

The following table summarizes information about the Company's stock-based award plans as of December 31, 2022:

	Outstanding Options	Outstanding Restricted Stock Units	Shares Available for Future Issuance
2004 Equity Incentive Plan	1,320	—	—
2013 Equity Incentive Plan	3,240,690	—	—
2018 Equity Incentive Plan	5,832,577	11,838,329	2,802,796
Total	9,074,587	11,838,329	2,802,796

Share-based payment transactions are recognized as compensation cost based on the fair value of the instrument on the date of grant. The Company uses the Black-Scholes option valuation model to estimate the grant date fair value of employee stock options. The expected term of an option granted is based on combining historical exercise data with expected weighted time outstanding. Expected weighted time outstanding is calculated by assuming the settlement of outstanding awards is at the midpoint between the remaining weighted average vesting date and the expiration date. The Company recognizes forfeitures as they occur. During the years ended December 31, 2022, 2021 and 2020, the Company recorded RSU and option-based stock compensation expense of $12.8 million, $11.5 million and $6.2 million, respectively and employee stock purchase plan compensation of $0.6 million, $0.7 million and $0.3 million, respectively.

Total stock-based compensation expense recognized in the accompanying consolidated statements of operations is included in the following categories (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Cost of goods sold	$ 329	$ 407	$ 446
Cost of revenue — collaborations and services	1,425	1,708	626
Research and development	1,044	614	338
Selling	1,194	2,578	1,158
General and administrative	9,455	6,893	3,943
Total	$ 13,447	$ 12,200	$ 6,511

The expected volatility assumption used in the Company's Black-Sholes option valuation model is based on an assessment of the historical volatility derived from an analysis of historical trade activity. The Company has selected risk-free interest rates based on U.S. Treasury securities with an equivalent expected term in effect on the date the options were granted. Additionally, the Company uses historical data and management judgment to estimate stock option exercise behavior and employee turnover rates to estimate the number of stock option awards that will eventually vest. There were no options issued in the years ended December 31, 2022 and 2021. The Company calculated the fair value of employee stock options granted during the year ended December 31, 2020 using the following assumptions:

	Year Ended December 31, 2020
Risk-free interest rate	0.39% — 1.52%
Expected lives	5.67 — 7.0 years
Volatility	93.83% — 94.25%
Dividends	—

The following table summarizes information relating to stock options:

	Number of Shares	Weighted Average Exercise Price per Share	Weighted Average Remaining Contractual Term (Years)	Aggregate Intrinsic Value ($000)
Outstanding at January 1, 2022	10,732,513	$ 3.01	5.49	$ 34,543
Granted	—	—		
Exercised	(1,196,391)	1.79		
Forfeited	(116,767)	1.82		
Expired	(344,768)	6.31		
Outstanding at December 31, 2022	9,074,587	$ 3.06	5.10	$ 29,512
Exercisable at December 31, 2022	7,776,518	$ 3.23	5.15	$ 25,315

There were no options granted in the years ended December 31, 2022 and 2021. The weighted average grant date fair value of the stock options granted during the year ended December 31, 2020 was $0.97. Total fair value of stock options vested during the years ended December 31, 2022, 2021 and 2020 was 3.2 million, $2.3 million and $4.5 million, respectively. The total intrinsic value of options exercised during the years ended December 31, 2022, 2021 and 2020 was $2.4 million, $1.7 million and $0.5 million, respectively. Intrinsic value is measured using the fair market value at the date of exercise for options exercised or at December 31 for outstanding options, less the applicable exercise price.

Cash received from the exercise of options during the years ended December 31, 2022, 2021 and 2020 was approximately $3.0 million, $1.0 million and $0.6 million, respectively.

As of December 31, 2022, 2021 and 2020, the Company recognized $0.1 million, $0.1 million and $0.2 million, respectively, of compensation costs related to the performance-based stock options. As of December 31, 2022 and 2021, there were $0.2 million and $0.3 million, respectively of unrecognized compensation costs related to performance-based stock options subject to performance conditions.

The following table summarizes information relating to restricted stock units:

	Number of Shares	Weighted Average Grant Date Fair Value per Share
Outstanding at January 1, 2022	9,538,032	$ 3.40
Granted	5,120,682	3.95
Vested	(1,551,088)	2.82
Forfeited	(1,269,297)	3.97
Outstanding at December 31, 2022	11,838,329	3.65

Total fair value of restricted stock units vested during the years ended December 31, 2022, 2021 and 2020 was $4.4 million $6.7 million and $2.5 million, respectively. Intrinsic value of restricted stock units vested is measured using the closing share price on the day prior to the vest date. The total grant date fair value of restricted stock units outstanding as of December 31, 2022, 2021 and 2020 was $43.2 million, $19.3 million and $13.3 million, respectively.

As of December 31, 2022, there was $0.6 million of unrecognized compensation expense related to options and PNQs and $25.0 million of unrecognized compensation expense related to restricted stock units and market based stock units, which are expected to be recognized over the weighted average period of 2.08 to 2.22 years. The Company evaluates stock awards with performance conditions as to the probability that

the performance conditions will be met and uses that information to estimate the date at which those performance conditions will be met in order to properly recognize stock-based compensation expense over the requisite service period.

Employee Stock Purchase Plan

The Company provides all employees, including executive officers, the ability to purchase its common stock at a discount under the Company's 2004 employee stock purchase plan (the "ESPP"). The ESPP is designed to comply with Section 423 of the Internal Revenue Code ("IRC") and provides all employees with the opportunity to purchase up to $25,000 worth of common stock (based on the undiscounted fair market value at the commencement of the offering period) each year at a purchase price that is the lower of 85% of the fair market value of the common stock on either the date of purchase or the commencement of the offering period. An employee may not purchase more than 5,000 shares of common stock on any purchase date. The executives' rights under the ESPP are identical to those of all other employees.

The Company issued 0.7 million, 0.5 million and 0.6 million shares of common stock pursuant to the ESPP for the years ended December 31, 2022, 2021 and 2020, respectively. There were approximately 0.4 million shares of common stock available for issuance under the ESPP as of December 31, 2022.

16. Commitments and Contingencies

Guarantees and Indemnifications — In the ordinary course of its business, the Company makes certain indemnities, commitments and guarantees under which it may be required to make payments in relation to certain transactions. The Company, as permitted under Delaware law and in accordance with its Bylaws, indemnifies its officers and directors for certain events or occurrences, subject to certain limits, while the officer or director is or was serving at the Company's request in such capacity. The term of the indemnification period is for the officer's or director's lifetime. The maximum amount of potential future indemnification is unlimited; however, the Company has a director and officer insurance policy that may enable it to recover a portion of any future amounts paid. The Company believes the fair value of these indemnification agreements is minimal. The Company has not recorded any liability for these indemnities in the accompanying consolidated balance sheets. However, the Company accrues for losses for any known contingent liability, including those that may arise from indemnification provisions, when future payment is probable and the amount can be reasonably estimated. No such losses have been recorded to date.

Litigation — The Company is subject to legal proceedings and claims which arise in the ordinary course of its business. As of December 31, 2022, the Company believes that the final disposition of such matters will not have a material adverse effect on the financial position, results of operations or cash flows of the Company and no accrual has been recorded. The Company maintains liability insurance coverage to protect the Company's assets from losses arising out of or involving activities associated with ongoing and normal business operations. The Company records a provision for a liability when it is both probable that a liability has been incurred and the amount of the loss can be reasonably estimated. The Company's policy is to accrue for legal expenses in connection with legal proceedings and claims as they are incurred.

Contingencies — In July 2013, the Company entered into the Milestone Rights Agreement with the Original Milestone Purchasers, pursuant to which the Company granted the Milestone Rights to receive payments up to $90.0 million upon the occurrence of specified strategic and sales milestones, $60.0 million of which remains payable to the Original Purchasers upon achievement of such milestones (see Note 10 — *Borrowings*). As of December 31, 2022, the initial fair value of the Milestone Rights is recorded in the consolidated balance sheet, including $0.9 million in accrued expenses and other current liabilities and $3.9 million in milestone rights liability.

Sale-Leaseback Transaction — In November 2021, the Company sold the Property to the Purchaser for a sales price of $102.3 million, subject to terms and the conditions contained in a purchase and sale agreement.

Effective with the closing of the Sale-Leaseback Transaction, the Company and the Purchaser entered into a lease agreement (the "Lease"), pursuant to which the Company leased the Property from the Purchaser for an initial term of 20 years, with four renewal options of five years each. The total annual rent under the Lease starts at approximately $9.5 million per year, subject to a 50% rent abatement during the first year of the Lease, and will increase annually by (i) 2.5% in the second through fifth year of the Lease and (ii) 3% in the sixth and each subsequent year of the Lease, including any renewal term. The Company is responsible for payment of operating expenses, property taxes and insurance for the Property. The Purchaser will hold a security deposit of $2.0 million during the Lease term. Pursuant to the terms of the Lease, the Company has four options to repurchase the Property, in 2026, 2031, 2036 and 2041, for the greater of (i) $102.3 million and (ii) the fair market value of the Property.

Effective with the closing of the Sale-Leaseback Transaction, the Company and the Purchaser also entered into a right of first refusal agreement (the "ROFR"), pursuant to which the Company has a right to re-purchase the Property from the Purchaser in accordance with terms and conditions set forth in the ROFR. Specifically, if the Purchaser receives, and is willing to accept, a bona fide purchase offer for the Property from a third-party purchaser, the Company has certain rights of first refusal to purchase the Property on the same material terms as proposed in such bona fide purchase offer.

As of December 31, 2022, the related financing liability was $104.1 million, which was recognized in the Company's consolidated balance sheet as $94.5 million of financing liability — long-term and $9.6 million of financing liability — short-term. As of December 31,

2021, the related financing liability was $100.5 million, which was recognized in our consolidated balance sheet as $93.5 million of financing liability — long-term and $7.0 million of financing liability — short-term.

Financing liability information is as follows (in thousands):

	December 31, 2022	December 31, 2021
Weighted average remaining lease term (in years)	18.8	19.8
Weighted average discount rate	9.0%	9.0%

	December 31,	
	2022	2021
Interest expense on financing liability	$ 9,758	$ 1,373

Financing liability payments as of December 31, 2022 was as follows (in thousands):

	December 31, 2022
2023	$ 9,774
2024	10,018
2025	10,269
2026	10,533
2027	10,849
Thereafter	188,453
Total	239,896
Interest payments	(132,936)
Debt issuance costs	(2,883)
Total financing liability	$ 104,077

Commitments — In July 2014, the Company entered into the Insulin Supply Agreement with Amphastar pursuant to which Amphastar manufactures for and supplies to the Company certain quantities of recombinant human insulin for use in Afrezza. Under the terms of the Insulin Supply Agreement, Amphastar is responsible for manufacturing the insulin in accordance with the Company's specifications and agreed-upon quality standards.

In May 2021, the Company and Amphastar amended the Insulin Supply Agreement to extend the term and restructure the annual purchase commitments. In connection with the amendment, the Company agreed to pay $2.0 million of amendment fees, which were recognized in cost of goods sold for the year ended December 31, 2021. The remaining purchase commitments as of December 31, 2022 were as follows (€ in millions):

	December 31, 2022
2023	8.8
2024	14.6
2025	15.5
2026	19.4
2027	9.2

Pursuant to the amendment, the term of the Insulin Supply Agreement expires on December 31, 2027, unless terminated earlier, and can be renewed for additional, successive two-year terms upon 12 months' written notice given prior to the end of the initial term or any additional two-year term. The Company and Amphastar each have normal and customary termination rights, including termination for a material breach that is not cured within a specific time frame or in the event of liquidation, bankruptcy or insolvency of the other party. In addition, the Company may terminate the Insulin Supply Agreement upon two years' prior written notice to Amphastar without cause or upon 30 days' prior written notice to Amphastar if a controlling regulatory authority withdraws approval for Afrezza, provided, however, in the event of a termination pursuant to either of the latter two scenarios, the provisions of the Insulin Supply Agreement require the Company to pay the full amount of all unpaid purchase commitments due over the initial term within 60 calendar days of the effective date of such termination.

Vehicle Leases – During the second quarter of 2018, the Company entered into a lease agreement with Enterprise Fleet Management Inc. During 2021, 85 vehicles were retired and all of those vehicles were replaced, resulting in a fleet size of 89 vehicles. The Company received proceeds for the gain on the retired vehicles residual value in the amount of $0.5 million, which is included as a reduction to the Company's lease expense. The revised monthly payment inclusive of maintenance fees, insurance and taxes is approximately $0.1 million. The lease expense is included in selling expenses in the consolidated statements of operations.

Office Leases — In May 2017, the Company executed an office lease with Russell Ranch Road II LLC for offices in Westlake Village, California. The office lease commenced in August 2017. The Company agreed to pay initial monthly lease payments of $40,951, subject to 3% annual increases, plus the estimated cost of maintaining the property and common areas by the landlord, with a five-month concession from

October 2017 through February 2018. The lease also provides for allowances for tenant alterations and maintenance. The lease expense is included in general and administrative expenses in the accompanying consolidated statement of operations.

In November 2017, the Company executed an office lease with Russell Ranch Road II LLC to expand the office space for the Company's corporate offices in Westlake Village, California which was renewed in April 2022. Pursuant to the renewal, the Company will pay initial monthly lease payments of $79,543, beginning in February 2023, subject to a 3% annual increase, plus the estimated operating cost of maintaining the property by the landlord. The Company will receive a six-month concession at the start of the lease extension period on July 31, 2023. The Company has no further right to extend the lease term beyond the extension period.

The Company assumed certain leased real property (the "Marlborough Lease") pursuant to the APA entered into in May 2022. The Marlborough Lease pertains to certain premises in a building located in Marlborough, Massachusetts. The Company has paid initial monthly payments of $28,895, beginning in June 2022, subject to approximately 3% annual increases through February 28, 2026.

The Company also acquired rights to a manufacturing service agreement where V-Go is manufactured using Company-owned equipment located at the manufacturing facility. The Company determined that this arrangement results in an embedded lease which grants the Company exclusive use of space within the manufacturing facility. The Company assessed the embedded lease cost to be $14,370 per month through February 28, 2026.

Lease information is as follows (in thousands):

	December 31, 2022	December 31, 2021
Operating lease right-of-use assets(1)	$ 6,714	$ 2,284
Operating lease liability-current (2)	$ 1,304	$ 1,380
Operating lease liability-long-term	5,343	1,040
Total	$ 6,647	$ 2,420
Weighted average remaining lease term (in years)	4.6	2.6
Weighted average discount rate	7.3%	7.3%

(1) Operating right-of-use assets related to vehicles, offices and the manufacturing facility are included in other assets in the consolidated balance sheets.
(2) Operating lease liability – current are included in accrued expenses and other current liabilities in the consolidated balance sheets.

	December 31,		
	2022	2021	2020
Operating lease costs	$ 1,525	$ 863	$ 1,403
Variable lease costs	274	515	394
Cash paid	1,823	1,867	1,797

Future minimum office and vehicle lease payments as of December 31, 2022 are as follows (in thousands):

	December 31, 2022
2023	$ 1,368
2024	1,892
2025	1,861
2026	1,140
2027	1,072
Thereafter	643
Total	7,976
Interest expense	(1,329)
Total operating lease liability	$ 6,647

17. Employee Benefit Plans

The Company administers a defined contribution 401(k) savings retirement plan for its employees. The Company may make discretionary matching contributions. For the years ended December 31, 2022 and 2021, the Company matched each participant's deferral at the rate of 50% of each participant's deferral up to the first 10% of compensation. Participants hired after March 31, 2021 became vested in Company contributions at 100% after two years of service. For the year ended December 31, 2020, the Company matched each participant's deferral at the rate of 50% of each participant's deferral up to the first 6% of compensation. Participants are vested in Company contributions at 50% after one year of service and are 100% vested after two years of service.

The Company's total discretionary matching contributions were $1.8 million, $1.5 million and $0.9 million for the years ended December 31, 2022, 2021 and 2020, respectively.

18. Income Taxes

Loss from continuing operations before provision for income taxes for the Company's domestic and international operations was as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
United States	$ (87,400)	$ (80,926)	$ (57,458)
Foreign	—	—	—
Loss before provision for income taxes	$ (87,400)	$ (80,926)	$ (57,458)

At December 31, 2022, the Company has concluded that it is more likely than not that the Company may not realize the benefit of its deferred tax assets due to its history of losses. The Company has incurred operating losses since inception. Accordingly, the net deferred tax assets have been fully reserved. The provision for income taxes consists of the following (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Current			
U.S. federal	$ —	$ —	$ —
U.S. state	—	—	—
Non-U.S.	—	—	(218)
Total current	—	—	(218)
Deferred			
U.S. federal	(5,606)	(5,170)	(4,377)
U.S. state	(4,334)	(14,461)	(469)
Non-U.S.	—	—	—
Total deferred	(9,940)	(19,631)	(4,846)
Valuation allowance	9,940	19,631	4,846
Total	$ —	$ —	$ (218)

Deferred income taxes reflect the tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting and income tax purposes. A valuation allowance is established when uncertainty exists as to whether all or a portion of the net deferred tax assets will be realized. Components of the net deferred tax assets as of December 31, 2022 and 2021, are approximately as follows (in thousands):

	December 31,	
	2022	2021
Deferred tax assets:		
Net operating loss carryforwards	$ 542,537	$ 542,800
Research and development credits	78,804	78,804
Capitalized research costs	4,369	-
Milestone Rights	1,331	1,440
Accrued expenses	2,675	2,591
Loss on purchase commitment	23,117	24,845
Non-qualified stock option expense	7,686	5,684
Capitalized patent costs	8,058	7,518
Other	3,204	2,568
Lease liability	1,624	588
Interest expense limitation	10,991	5,696
Depreciation	22,157	22,983
Deferred Product Revenue & Costs	370	404
Total net deferred tax assets	706,923	695,921
Valuation allowance	(705,034)	(695,094)
Net deferred tax assets	$ 1,889	$ 827
Deferred tax liabilities:		
Right of use asset	$ (1,640)	$ (555)
Other prepaids	(249)	(272)
Total deferred tax liabilities	(1,889)	(827)
Net deferred tax assets	$ —	$ —

The Company’s effective tax rate differs from the statutory federal income tax rate as follows for the years ended December 31, 2022, 2021 and 2020:

	Year Ended December 31,		
	2022	2021	2020
Federal tax benefit rate	21.0%	21.0%	21.0%
Permanent items	-1.2%	-4.4%	-6.1%
Stock based compensation	0.4%	0.3%	-0.5%
Tax attribute expirations	-13.2%	-5.9%	-6.6%
Foreign withholding tax	0.0%	0.0%	0.4%
Valuation allowance	-7.2%	-11.2%	-7.8%
Other	0.2%	0.2%	0.0%
Effective income tax rate	0.0%	0.0%	0.4%

As of December 31, 2022 and 2021, management assessed the realizability of deferred tax assets. Management evaluated the need for an amount of any valuation allowance for deferred tax assets on a jurisdictional basis. This evaluation utilizes the framework contained in ASC 740, Income Taxes, wherein management analyzes all positive and negative evidence available at the balance sheet date to determine whether all or some portion of our deferred tax assets will not be realized. Under this guidance, a valuation allowance must be established for deferred tax assets when it is more likely than not (a probability level of more than 50 percent) that they will not be realized. In assessing the realization of the Company's deferred tax assets, the Company considers all available evidence, both positive and negative.

In concluding on the evaluation, management placed significant emphasis on guidance in ASC 740, which states that “a cumulative loss in recent years is a significant piece of negative evidence that is difficult to overcome.” Based upon available evidence as of December 31, 2022, it was concluded on a more-likely-than-not basis that all deferred tax assets were not realizable. Accordingly, a valuation allowance of $705.0 million has been recorded to offset this deferred tax asset. During the years ended December 31, 2022 and 2021, the change in valuation allowance was $9.9 million and $19.6 million, respectively.

As of December 31, 2022, the Company had federal and state net operating loss carryforwards of approximately $2.2 billion and $1.7 billion available, respectively, to reduce future taxable income. $499.6 million of the federal losses do not expire and the remaining federal losses have started expiring, beginning in the current year through various future dates.

Pursuant to IRC Sections 382 and 383, annual use of the Company’s federal and California net operating loss and research and development credit carryforwards may be limited in the event a cumulative change in ownership of more than 50% occurs within a three-year period. As a result of the Company's initial public offering, an ownership change within the meaning of IRC Section 382 occurred in August 2004. As a result, federal net operating loss and credit carryforwards of approximately $105.8 million are subject to an annual use limitation of approximately $13.0 million. The annual limitation is cumulative and therefore, if not fully utilized in a year can be utilized in future years in addition to the Section 382 limitation for those years. We have completed a Section 382 analysis beginning from the date of our initial public offering through December 31, 2022, to determine whether additional limitations may be placed on the net operating loss carryforwards and other tax attributes, and no additional changes in ownership that met Section 382 study ownership change threshold has been identified through December 31, 2022. There is a risk that changes in ownership may occur in tax years after December 31, 2022. If a change in ownership were to occur, our net operating loss carryforwards and other tax attributes could be further limited or restricted. If limited, the related asset would be removed from the deferred tax asset schedule with a corresponding reduction in the valuation allowance. Due to the existence of the valuation allowance, limitations created by future ownership changes, if any, related to the Company’s operations in the U.S. will not impact the Company’s effective tax rate.

At December 31, 2022, the Company had $54.2 million of U.S. federal research and development credits which expire beginning in 2024, and $24.6 million of state research and development credits. The California credits are indefinite and do not expire and $0.2 million of the available New Jersey credits expire at the end of 2023. The Company also had two types of credits in Connecticut of which $19.8 million do not expire and the $1.1 million of the R&D credit expire at the end of 2023.

The Company files U.S. federal and state income tax returns in jurisdictions with varying statutes of limitations. In the normal course of business the Company is subject to examination by taxing authorities throughout the country. These audits could include examining the timing and amount of deductions, the allocation of income among various tax jurisdictions and compliance with federal, state, and local tax laws. The Company's tax years since 2018 remain subject to examination by federal, state and foreign tax authorities.

A reconciliation of beginning and ending amounts of unrecognized tax benefits in 2022, 2021 and 2020, respectively, was as follows (in thousands):

	Year Ended December 31,		
	2022	2021	2020
Unrecognized Tax Benefit			
Beginning of Year	$ 268,902	$ 268,902	$ —
Gross increases for tax positions of prior years	—	—	268,902
Gross decreases for tax positions of current year	—	—	—
Settlements	—	—	—
Lapse of statute of limitations	—	—	—
End of Year	$ 268,902	$ 268,902	$ 268,902

At December 31, 2022, 2021 and 2020, the Company has not recognized a liability for unrecognized tax benefits. If any were recognized, it would affect the Company's effective tax rate. The Company does not expect its unrecognized tax benefits to change significantly over the next 12 months. The Company recognizes interest and penalties accrued related to unrecognized tax benefits in income tax expense. During the years ended December 31, 2022, 2021 and 2020, the Company did not recognize any interest and/or penalties.

Exhibit 10.42

Execution Version

AMENDMENT NO. 8 TO CREDIT AND SECURITY AGREEMENT

This AMENDMENT NO. 8 TO CREDIT AND SECURITY AGREEMENT (this "**Agreement**") is made as of this 3rd day of November, 2021, by and among **MANNKIND CORPORATION**, a Delawarecorporation ("**MannKind**"), **MANNKIND LLC**, a Delaware limited liability company ("**MannKind LLC**"), **QRUMPHARMA, INC.**, a Delaware corporation ("**QP**"), **TECHNOSPHEREINTERNATIONAL, INC.**, a Delaware corporation ("Technosphere", and, Technosphere, together with MannKind, MannKind LLC and QP, each a "**Borrower**" and collectively, the "**Borrowers**"), **MIDCAP FINANCIAL TRUST**, as Agent (in such capacity, together with its successors and assigns, "**Agent**") andthe financial institutions or other entities from time to time parties to the Credit Agreement referenced below, each as a Lender.

RECITALS

A. Agent, Lenders and Borrowers have entered into that certain Credit and Security Agreement, dated as of August 6, 2019 (as amended by that certain Amendment No. 1 to Credit and SecurityAgreement, dated as of December 18, 2019, that certain Amendment No. 2 to Credit and Security Agreement, dated as of August 21, 2020, that certain Amendment No. 3 to Credit and Security Agreement, dated as of November 30, 2020, that certain Amendment No. 4 to Credit and Security Agreement, dated as of December 7, 2020, that certain Omnibus Joinder and Amendment No. 5 to Credit and Security Agreement and Amendment No. 1 to Pledge Agreement, dated as of December 29, 2020, that certain Amendment No. 6 to Credit and Security Agreement dated as of March 1, 2021, and that certainAmendment No. 7 to Credit and Security Agreement, dated as of April 22, 2021, as supplemented by that certain Omnibus Joinder to Credit and Security Agreement and Amendment No. 2 to Pledge Agreement, dated as of August 6, 2021, and as further amended, supplemented or otherwise modified from time to time prior to the date hereof, the "**Existing Credit Agreement**" and, as the same is amended hereby and as it may be further amended, modified, supplemented and restated from time to time, the "**Credit Agreement**"), pursuant to which the Lenders have agreed to make certain advances of money and to extend certain financial accommodations to the Borrowers in the amounts and manner set forth in the Credit Agreement.

B. Borrowers have requested, and Agent and Lenders have agreed, on and subject to the terms and conditions set forth in this Agreement, the Credit Agreement and the other Financing Documents, to amend certain provisions of the Existing Credit Agreement.

AGREEMENT

NOW, THEREFORE, in consideration of the foregoing, the terms and conditions set forth in this Agreement, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Agent, Lenders and Borrower hereby agree as follows:

1. **Recitals**. This Agreement shall constitute a Financing Document and the Recitals and each reference to the Credit Agreement, unless otherwise expressly noted, will be deemed to reference the CreditAgreement as amended hereby. Capitalized terms used but not otherwise defined herein shall have the meanings ascribed to them in the Credit Agreement (including those capitalized terms used in the Recitalshereto).

2. **Amendments to Existing Credit Agreement**. Subject to the terms and conditions of thisAgreement, including, without limitation, the conditions to effectiveness set forth in Section 5 below, the Existing Credit Agreement is hereby amended by deleting the text of subclause (f) of Section 7.9 of the Existing Credit Agreement and replacing it with "[reserved]".

3. **Representations and Warranties; Reaffirmation of Security Interest.** Each Borrowerhereby (a) confirms that all of the representations and warranties set forth in the Credit Agreement are true and correct in all material respects (without duplication of any materiality qualifier in the text of such representation or warranty) with respect to such Borrower as of the date hereof except to the extent that anysuch representation or warranty relates to a specific date in which case such representation or warranty shallbe true and correct as of such earlier date, and (b) covenants to perform its respective obligations under theCredit Agreement. Each Borrower confirms and agrees that all security interests and Liens granted to Agentcontinue in full force and effect, and all Collateral remains free and clear of any Liens, other than PermittedLiens. Nothing herein is intended to impair or limit the validity, priority or extent of Agent's security interests in and Liens on the Collateral. Each Borrower acknowledges and agrees that the CreditAgreement, the other Financing Documents and this Agreement constitute the legal, valid and binding obligation of such Borrower, and are enforceable against such Borrower in accordance with its terms, exceptas the enforceability thereof may be limited by bankruptcy, insolvency or other similar laws relating to theenforcement of creditors' rights generally and by general equitable principles.

4. **Costs and Fees.** Borrowers shall be responsible for the payment of all reasonable and documented out-of-pocket costs and fees of Agent's counsel incurred in connection with the preparation ofthis Agreement and any related documents.

5. **Conditions to Effectiveness.** This Agreement shall become effective as of the date on which each of the following conditions has been satisfied, as determined by Agent in its sole discretion:

(a) Agent shall have received (including by way of facsimile or other electronic transmission) a duly authorized, executed and delivered counterpart of the signature page to this Amendment from each Borrower, Agent and the Lenders;

(b) all representations and warranties of Borrower contained herein shall be true and correct in all material respects (without duplication of any materiality qualifier in the text of suchrepresentation or warranty) as of the date hereof except to the extent that any such representation or warranty relates to a specific date in which case such representation or warranty shall be true and correct as of such earlier date (and such parties' delivery of their respective signatures hereto shall be deemed to be its certification thereof);

(c) prior to and after giving effect to the agreements set forth herein, no Default or Event of Default shall exist under any of the Financing Documents; and

(d) Agent shall have received such other documents, information, certificates, and information as Agent may reasonably request in connection with this Agreement.

6. **Release**. In consideration of the agreements of Agent and Lenders contained herein and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Borrower, voluntarily, knowingly, unconditionally and irrevocably, with specific and express intent, for and on behalf of itself and all of its respective parents, subsidiaries, affiliates, members, managers, predecessors, successors, and assigns, and each of its respective current and former directors, officers, shareholders, agents, and employees, and each of its respective predecessors, successors, heirs, and assigns(individually and collectively, the "**Releasing Parties**") does hereby fully and completely release, acquit and forever discharge each of Agent, Lenders, and each their respective parents, subsidiaries, affiliates, members, managers, shareholders, directors, officers and employees, and each of their respective predecessors, successors, heirs, and assigns (individually and collectively, the "**Released Parties**"), of andfrom any and all actions, causes of action, suits, debts, disputes, damages, claims, obligations, liabilities, costs, expenses and demands of any kind whatsoever, at law or in equity, whether matured or unmatured, liquidated or unliquidated, vested or contingent, choate or inchoate, known or unknown that the ReleasingParties (or any of them) has against the Released Parties or any of them (whether directly or indirectly), based in whole or in part on facts, whether or not now known, existing on or before the date hereof, that relate to, arise out of or otherwise are in connection with: (i) any or all of the Financing Documents or transactions contemplated thereby or any actions or omissions in connection therewith or (ii) any aspect of the dealings or relationships between or among any Borrower, on the one hand, and any or all of the Released Parties, on the other hand, relating to any or all of the documents,

transactions, actions or omissions referenced in clause (i) hereof, in each case, based in whole or in part on facts, whether or not now known, existing before the date hereof. Borrower acknowledges that the foregoing release is a material inducement to Agent's and each Lender's decision to enter into this Agreement and agree to the modifications contemplated hereunder, and has been relied upon by Agent and Lenders in connection therewith.

7. **No Waiver or Novation.** The execution, delivery and effectiveness of this Agreement shall not, except as expressly provided in this Agreement, operate as a waiver of any right, power or remedy of Agent, nor constitute a waiver of any provision of the Credit Agreement, the Financing Documents or any other documents, instruments and agreements executed or delivered in connection with any of the foregoing. Nothing herein is intended or shall be construed as a waiver of any existing Defaults or Events of Default under the Credit Agreement or the other Financing Documents or any of Agent's rights and remedies in respect of such Defaults or Events of Default. Except as expressly provided herein, nothing in this Agreement shall be construed as an amendment to or waiver of any condition precedent to any funding of Credit Extensions by the Lenders under the Credit Agreement, including those conditions set forth in Section 3.2 of the Credit Agreement. This Agreement (together with any other document executed in connection herewith) is not intended to be, nor shall it be construed as, a novation of the Credit Agreement.

8. **Affirmation.** Except as specifically amended pursuant to the terms hereof, Borrower hereby acknowledges and agrees that the Credit Agreement and all other Financing Documents (and all covenants, terms, conditions and agreements therein) shall remain in full force and effect, and are hereby ratified and confirmed in all respects by Borrower. Borrower covenants and agrees to comply with all of the terms, covenants and conditions of the Credit Agreement and the Financing Documents, notwithstanding any prior course of conduct, waivers, releases or other actions or inactions on Agent's or any Lender's part which might otherwise constitute or be construed as a waiver of or amendment to such terms, covenants and conditions.

9. **Miscellaneous**.

(a) Reference to the Effect on the Credit Agreement. Upon the effectiveness of this Agreement, each reference in the Credit Agreement to "this Agreement," "hereunder," "hereof," "herein,"or words of similar import shall mean and be a reference to the Credit Agreement, as amended by this Agreement. Except as specifically amended above, the Credit Agreement, and all other Financing Documents (and all covenants, terms, conditions and agreements therein), shall remain in full force and effect, and are hereby ratified and confirmed in all respects by Borrower.

(b) GOVERNING LAW. THIS AGREEMENT AND ALL DISPUTES AND OTHER MATTERS RELATING HERETO OR THERETO OR ARISING THEREFROM (WHETHER SOUNDING IN CONTRACT LAW, TORT LAW OR OTHERWISE), SHALL BE GOVERNED BY,

AND SHALL BE CONSTRUED AND ENFORCED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF NEW YORK, WITHOUT REGARD TO CONFLICTS OF LAWS PRINCIPLES (OTHER THAN SECTION 5-1401 OF THE GENERAL OBLIGATIONS LAW).

(c) WAIVER OF JURY TRIAL. BORROWER, AGENT AND THE LENDERS PARTY HERETO HEREBY IRREVOCABLY WAIVES ANY AND ALL RIGHT TO TRIAL BY JURY IN ANY LEGAL ACTION OR PROCEEDING ARISING OUT OF OR RELATING TO THIS AGREEMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY AND AGREES THAT ANY SUCH ACTION OR PROCEEDING SHALL BE TRIED BEFORE A COURT AND NOT BEFORE A JURY. BORROWER, AGENT AND EACH LENDER ACKNOWLEDGES THAT THIS WAIVER IS A MATERIAL INDUCEMENT TO ENTER INTO A BUSINESS RELATIONSHIP, THAT EACH HAS RELIED ON THE WAIVER IN ENTERING INTO THIS AGREEMENT, AND THAT EACH WILL CONTINUE TO RELY ON THIS WAIVER IN THEIR RELATED FUTURE DEALINGS. BORROWER, AGENT AND EACH LENDER WARRANTS AND REPRESENTS THAT IT HAS HAD THE OPPORTUNITY OF REVIEWING THIS JURY WAIVER WITH LEGAL COUNSEL, AND THAT IT KNOWINGLY AND VOLUNTARILY WAIVES ITS JURY TRIAL RIGHTS.

(d) Incorporation of Credit Agreement Provisions. The provisions contained in Article 12 (Choice of law; venue and jury trial waiver; California waivers) and Section 13.2 (Indemnification) of the Credit Agreement are incorporated herein by reference to the same extent as if reproduced herein in their entirety.

(e) Headings. Section headings in this Agreement are included for convenience of reference only and shall not constitute a part of this Agreement for any other purpose.

(f) Counterparts. This Agreement may be signed in any number of counterparts, each of which shall be deemed an original and all of which when taken together shall constitute one and the same instrument. The words "execution," "signed," "signature," and words of like import in this Amendment shall be deemed to include electronic signatures or electronic records, each of which shall be of the same legal effect, validity or enforceability as a manually executed signature or the use of a paper-based recordkeeping system, as the case may be, to the extent and as provided for in any applicable law, including the Federal Electronic Signatures in Global and National Commerce Act, the New York State Electronic Signatures and Records Act, or any other similar state laws based on the Uniform Electronic Transactions Act.

(g) Entire Agreement. This Agreement constitutes the entire agreement and understanding among the parties hereto and supersedes any and all prior agreements and understandings, oral or written, relating to the subject matter hereof.

(h) Severability. In case any provision of or obligation under this Agreement shall be invalid, illegal or unenforceable in any applicable jurisdiction, the validity, legality and enforceability of the remaining provisions or obligations, or of such provision or obligation in any other jurisdiction, shall not in any way be affected or impaired thereby.

(i) Successors/Assigns. This Agreement shall bind, and the rights hereunder shall inure to, the respective successors and assigns of the parties hereto, subject to the provisions of the Credit Agreement and the other Financing Documents.

[SIGNATURES APPEAR ON FOLLOWING PAGES]

IN WITNESS WHEREOF, intending to be legally bound, the undersigned have executed thisAgreement as of the day and year first hereinabove set forth.

AGENT:

MIDCAP FINANCIAL TRUST,

By: Apollo Capital Management, L.P.,
its investment manager

By: Apollo Capital Management GP, LLC,
its general partner

By: /s/ Maurice Amsellem
Name: Maurice Amsellem
Title: Authorized Signatory

LENDERS:

MIDCAP FUNDING XIII TRUST

By: Apollo Capital Management, L.P.,
its investment manager

By: Apollo Capital Management GP, LLC,
its general partner

By: /s/ Maurice Amsellem
Name: Maurice Amsellem
Title: Authorized Signatory

LENDERS:

MIDCAP FINANCIAL TRUST,

By: Apollo Capital Management, L.P.,
its investment manager

By: Apollo Capital Management GP, LLC,
its general partner

By: /s/ Maurice Amsellem
Name: Maurice Amsellem
Title: Authorized Signatory

LENDERS: **ELM 2020-3 TRUST**

By: MidCap Financial Services Capital Management, LLC, as Servicer

By: /s/ John O'Dea
Name: John O'Dea
Title: Authorized Signatory

LENDERS: **ELM 2020-4 TRUST**

By: MidCap Financial Services Capital Management, LLC, as Servicer

By: /s/ John O'Dea
Name: John O'Dea
Title: Authorized Signatory

LENDERS:

APOLLO INVESTMENT CORPORATION

By: Apollo Investment Management, L.P., as Advisor
By: ACC Management, LLC, as its General Partner

By: /s/ Joseph D Glatt
Name: Joseph D Glatt
Title: Vice President

BORROWERS:

MANNKIND CORPORATION

By: /s/ David Thomson
Name: David Thomson
Title: General Counsel

MANNKIND LLC

By: /s/ David Thomson
Name: David Thomson
Title: Vice President

QRUMPHARMA, INC.

By: /s/ David Thomson
Name: David Thomson
Title: Vice President

TECHNOSPHERE INTERNATIONAL, INC.

By: /s/ David Thomson
Name: David Thomson
Title: Vice President

Exhibit 10.43

Execution Version

AMENDMENT NO. 9 AND LIMITED CONSENT TO CREDIT AND SECURITY AGREEMENT

This AMENDMENT NO. 9 AND LIMITED CONSENT TO CREDIT AND SECURITY AGREEMENT (this "**Agreement**") is made as of this 8th day of November, 2021, by and among **MANNKIND CORPORATION**, a Delaware corporation ("**MannKind**"), **MANNKIND LLC**, a Delaware limited liability company ("**MannKind LLC**"), **QRUMPHARMA, INC.**, a Delaware corporation ("**QP**"), **TECHNOSPHERE INTERNATIONAL, INC.**, a Delaware corporation ("**Technosphere**", Technosphere, together with MannKind, MannKind LLC and QP, each a "**Borrower**" and collectively, the "**Borrowers**"), **MIDCAP FINANCIAL TRUST**, as Agent (in such capacity, togetherwith its successors and assigns, "**Agent**") and the financial institutions or other entities from time to time parties to the Credit Agreement referenced below, each as a Lender.

RECITALS

A. Agent, Lenders and Borrowers have entered into that certain Credit and Security Agreement, dated as of August 6, 2019 (as amended by that certain Amendment No. 1 to Credit and SecurityAgreement, dated as of December 18, 2019, that certain Amendment No. 2 to Credit and Security Agreement, dated as of August 21, 2020, that certain Amendment No. 3 to Credit and Security Agreement, dated as of November 30, 2020, that certain Amendment No. 4 to Credit and Security Agreement, dated as of December 7, 2020, that certain Omnibus Joinder and Amendment No. 5 to Credit and Security Agreement and Amendment No. 1 to Pledge Agreement, dated as of December 29, 2020, that certain Amendment No. 6 to Credit and Security Agreement, dated as of March 1, 2021, that certain Amendment No. 7 to Credit and Security Agreement, dated as of April 22, 2021, as supplemented by that certain Omnibus Joinder to Credit and Security Agreement and Amendment No. 2 to Pledge Agreement, dated asof August 6, 2021, and that certain Amendment No. 8 to Credit and Security Agreement, dated as of November 3, 2021, and as further amended, supplemented or otherwise modified from time to time prior to the date hereof, the "**Existing Credit Agreement**" and, as the same is amended hereby and as it may be further amended, modified, supplemented and restated from time to time, the "**Credit Agreement**"), pursuant to which the Lenders have agreed to make certain advances of money and to extend certain financial accommodations to the Borrowers in the amounts and manner set forth in the Credit Agreement.

B. Borrowers have notified Agent and Lenders that the Borrowers wish to sell, transfer and assign to 1 Casper, LLC, a Delaware limited liability company ("**Casper**") a portion of the Owned Real Property (the "**Owned Real Property Sale**") pursuant to that certain Purchase and Sale Agreement, datedas of September 23, 2021 (the "**Casper Purchase Agreement**") by and between MannKind, as seller, andCasper, as buyer.

C. Pursuant to Section 7.1 of the Credit Agreement, Borrowers shall not, nor shall Borrowers permit any Credit Party to, Transfer all or any part of its business or property, subject to certain exceptions.

D. Borrowers have requested, and Agent and Lenders have agreed, on and subject to the termsand conditions set forth in this Agreement, the Credit Agreement and the other Financing Documents, to

(i) consent to the Owned Real Property Sale and (ii) amend certain provisions of the Existing CreditAgreement in connection with the Owned Real Property Sale.

AGREEMENT

NOW, THEREFORE, in consideration of the foregoing, the terms and conditions set forth in this Agreement, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Agent, Lenders and Borrower hereby agree as follows:

1. **Recitals**. This Agreement shall constitute a Financing Document and the Recitals and each reference to the Credit Agreement, unless otherwise expressly noted, will be deemed to reference the CreditAgreement as amended hereby. Capitalized terms used but not otherwise defined herein shall have the meanings ascribed to them in the Credit Agreement (including those capitalized terms used in the Recitalshereto).

2. Limited Consent.

(a) Subject to the terms and conditions set forth herein, including without limitation the conditions set forth in Section 6 hereof, notwithstanding Section 7.1 of the Credit Agreement, Agent and the Lenders party hereto (which Lenders constitute at least the Required Lenders) hereby consent to the consummation of the Owned Real Property Sale; *provided* that (i) the Owned Real Property Sale shallbe consummated in all material respects in accordance with the terms of the Casper Purchase Agreement, without giving effect to any amendments, consents, waivers or other modifications thereto that are materially adverse to the Lenders, (ii) no Default or Event of Default exists or would (after giving effect to this Agreement) result therefrom, and (iii) the Owned Real Property Sale and the transaction contemplatedby the Casper Purchase Agreement shall be consummated no later than November 9, 2021.

(b) The limited consent set forth in this Section 2 is effective solely for the purposes set forth herein and shall be limited precisely as written and shall not be deemed to (i) be a consent to any amendment, waiver or modification of any other term or condition of the Credit Agreement or of any otherFinancing Document; (ii) prejudice any right that Agent or Lenders have or may have in the future under or in connection with the Credit Agreement or any other Financing Document; (iii) constitute a consent toor waiver of any past, present or future Default or Event of Default or other violation of any provisions of the Credit Agreement or any other Financing Documents, (iv) create any obligation to forbear from takingany enforcement action, or to make any further extensions of credit or (v) establish a custom or course of dealing among any of the Credit Parties, on the one hand, or Agent or any Lender, on the other hand.

3. **Amendments to Existing Credit Agreement**. Subject to the terms and conditions of thisAgreement, including, without limitation, the conditions to effectiveness set forth in Section 6 below, the Existing Credit Agreement is hereby amended as follows:

(a) The definition of "**Material Agreement**" in Section 15 of the Existing Credit Agreement is hereby amended and restated as follows:

"**Material Agreement**" means (a) the agreements listed in the **Disclosure Schedule** to the **Disclosure Letter**, (b) the United Therapeutics License, (c) the Casper Lease Agreement, (d) eachother agreement or contract that is filed with the SEC as a material agreement, including pursuantto Item 601(b)(10) of Regulation S-K, and (e) each agreement or contract to which such Credit Party or its Subsidiaries is a party the termination of which could reasonably be expected to resultin a Material Adverse Change.

(b) Section 15 of the Existing Credit Agreement is hereby amended by adding the following new defined terms in the appropriate alphabetical order:

"**Casper Lease Agreement**" means that certain Lease Agreement, dated as of November8, 2021, by and between MannKind and 1 Casper, LLC, a Delaware limited liability company ("**Casper**"), pursuant to which MannKind leases from Casper certain real property, as set forth therein.

4. **Representations and Warranties; Reaffirmation of Security Interest.** Each Borrowerhereby (a) confirms that all of the representations and warranties set forth in the Credit Agreement are true and correct in all material respects (without duplication of any materiality qualifier in the text of such representation or warranty) with respect to such Borrower as of the date hereof except to the extent that anysuch representation or warranty relates to a specific date in which case such representation or warranty shallbe true and correct as of such earlier date, and (b) covenants to perform its respective obligations under theCredit Agreement. Each Borrower confirms and agrees that all security interests and Liens granted to Agentcontinue in full force and effect, and all Collateral remains free and clear of any Liens, other than PermittedLiens. Nothing herein is intended to impair or limit the validity, priority or extent of Agent's security interests in and Liens on the Collateral. Each Borrower acknowledges and agrees that the CreditAgreement, the other Financing Documents and this Agreement constitute the legal, valid and binding obligation of such Borrower, and are enforceable against such Borrower in accordance with its terms, exceptas the enforceability thereof may be limited by bankruptcy, insolvency or other similar laws relating to theenforcement of creditors' rights generally and by general equitable principles.

5. **Costs and Fees.** Borrowers shall be responsible for the payment of all reasonable and documented out-of-pocket costs and fees of Agent's counsel incurred in connection with the preparation ofthis Agreement and any related documents.

6. **Conditions to Effectiveness.** This Agreement shall become effective as of the date on which each of the following conditions has been satisfied, as determined by Agent in its sole discretion:

(a) Agent shall have received (including by way of facsimile or other electronic transmission) a duly authorized, executed and delivered counterpart of the signature page to this Amendment from each Borrower, Agent and the Lenders;

(b) Agent shall have received a fully-executed copy of the Deed of Partial Release;

(c) all representations and warranties of Borrower contained herein shall be true and correct in all material respects (without duplication of any materiality qualifier in the text of suchrepresentation or warranty) as of the date hereof except to the extent that any such representation or warranty relates to a specific date in which case such representation or warranty shall be true and correct as of such earlier date (and such parties' delivery of their respective signatures hereto shall be deemed to be its certification thereof);

(d) prior to and after giving effect to the agreements set forth herein, no Default or Event of Default shall exist under any of the Financing Documents or shall exist after giving effect to the transactions contemplated by the Casper Purchase Agreement;

(e) Agent shall have received such other documents, information, certificates, and information as Agent may reasonably request in connection with this Agreement.

7. **Post-Closing Requirements.** Borrowers hereby covenant and agree that by the date that is thirty (30) days following the date hereof (or such later date as Agent may agree in its sole discretion), Borrower shall deliver to Agent a fully-execute copy of an Access Agreement with respect to the premises leased by Borrowers pursuant to the Casper Lease Agreement in form and substance reasonably acceptableto Agent. Each Borrower hereby agrees that failure to comply with the requirements set forth in Section 7 of this Agreement shall constitute an immediate and automatic Event of Default.

8. **Release**. In consideration of the agreements of Agent and Lenders contained herein and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Borrower, voluntarily, knowingly, unconditionally and irrevocably, with specific and express intent, for and on behalf of itself and all of its respective parents, subsidiaries, affiliates, members, managers, predecessors, successors, and assigns, and each of its respective current and former directors, officers, shareholders, agents, and employees, and each of its respective predecessors, successors, heirs, and assigns(individually and collectively, the "**Releasing Parties**") does hereby fully and completely release, acquit and forever discharge each of Agent, Lenders, and each their respective parents, subsidiaries, affiliates, members, managers, shareholders, directors, officers and employees, and each of their respective predecessors, successors, heirs, and assigns (individually and collectively, the "**Released Parties**"), of andfrom any and all actions, causes of action, suits, debts, disputes, damages, claims, obligations, liabilities, costs, expenses and demands of any kind whatsoever, at law or in equity, whether matured or unmatured, liquidated or unliquidated, vested or contingent, choate or inchoate, known or unknown that the ReleasingParties (or any of them) has against the Released Parties or any of them (whether directly or indirectly), based in whole or in part on facts, whether or not now known, existing on or before the date hereof, that relate to, arise out of or otherwise are in connection with: (i) any or all of the Financing Documents or transactions contemplated thereby or any actions or omissions in connection therewith or (ii) any aspect of the dealings or relationships between or among any Borrower, on the one hand, and any or all of the Released Parties, on the other hand, relating to any or all of the documents, transactions, actions or omissions referenced in clause (i) hereof, in each case, based in whole or in part on facts, whether or not now known, existing before the date hereof. Borrower acknowledges that the foregoing release is a materialinducement to Agent's and each Lender's decision to enter into this Agreement and agree to the modifications contemplated hereunder, and has been relied upon by Agent and Lenders in connection therewith.

9. **No Waiver or Novation.** The execution, delivery and effectiveness of this Agreement shall not, except as expressly provided in this Agreement, operate as a waiver of any right, power or remedyof Agent, nor constitute a waiver of any provision of the Credit Agreement, the Financing Documents or any other documents, instruments and agreements executed or delivered in connection with any of the foregoing. Nothing herein is intended or shall be construed as a waiver of any existing Defaults or Eventsof Default under the Credit Agreement or the other Financing Documents or any of Agent's rights and remedies in respect of such Defaults or Events of Default. Except as expressly provided herein, nothing inthis Agreement shall be construed as an amendment to or waiver of any condition precedent to any fundingof Credit Extensions by the Lenders under the Credit Agreement, including those conditions set forth in Section 3.2 of the Credit Agreement. This Agreement (together with any other document executed in connection herewith) is not intended to be, nor shall it be construed as, a novation of the Credit Agreement.

10. **Affirmation.** Except as specifically amended pursuant to the terms hereof, Borrower hereby acknowledges and agrees that the Credit Agreement and all other Financing Documents (and all covenants, terms, conditions and agreements therein) shall remain in full force and effect, and are hereby ratified and confirmed in all respects by Borrower. Borrower covenants and agrees to comply with all of the terms, covenants and conditions of the Credit Agreement and the Financing Documents, notwithstanding any prior course of conduct, waivers, releases or other actions or inactions on Agent's or any Lender's part which might otherwise constitute or be construed as a waiver of or amendment to such terms, covenants and conditions.

11. **Miscellaneous**.

(a) Reference to the Effect on the Credit Agreement. Upon the effectiveness of this Agreement, each reference in the Credit Agreement to "this Agreement," "hereunder," "hereof," "herein,"or words of similar import shall mean and be a reference to the Credit Agreement, as amended by this Agreement. Except as specifically amended above, the Credit Agreement, and all other Financing

Documents (and all covenants, terms, conditions and agreements therein), shall remain in full force andeffect, and are hereby ratified and confirmed in all respects by Borrower.

(b) GOVERNING LAW. THIS AGREEMENT AND ALL DISPUTES AND OTHER MATTERS RELATING HERETO OR THERETO OR ARISING THEREFROM (WHETHER SOUNDING IN CONTRACT LAW, TORT LAW OR OTHERWISE), SHALL BE GOVERNED BY, AND SHALL BE CONSTRUED AND ENFORCED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF NEW YORK, WITHOUT REGARD TO CONFLICTS OF LAWS PRINCIPLES (OTHER THAN SECTION 5-1401 OF THE GENERAL OBLIGATIONS LAW).

(c) WAIVER OF JURY TRIAL. BORROWER, AGENT AND THE LENDERS PARTY HERETO HEREBY IRREVOCABLY WAIVES ANY AND ALL RIGHT TO TRIAL BY JURYIN ANY LEGAL ACTION OR PROCEEDING ARISING OUT OF OR RELATING TO THIS AGREEMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY AND AGREES THAT ANY SUCH ACTION OR PROCEEDING SHALL BE TRIED BEFORE A COURT AND NOT BEFORE A JURY. BORROWER, AGENT AND EACH LENDER ACKNOWLEDGES THAT THIS WAIVER IS A MATERIAL INDUCEMENT TO ENTER INTO A BUSINESS RELATIONSHIP, THAT EACH HAS RELIED ON THE WAIVER IN ENTERING INTO THIS AGREEMENT, AND THAT EACH WILL CONTINUE TO RELY ON THIS WAIVER IN THEIR RELATED FUTURE DEALINGS. BORROWER, AGENT AND EACH LENDER WARRANTS AND REPRESENTS THAT IT HAS HADTHE OPPORTUNITY OF REVIEWING THIS JURY WAIVER WITH LEGAL COUNSEL, AND THATIT KNOWINGLY AND VOLUNTARILY WAIVES ITS JURY TRIAL RIGHTS.

(d) Incorporation of Credit Agreement Provisions. The provisions contained in Article 12 (*Choice of law; venue and jury trial waiver; California waivers*) and Section 13.2 (*Indemnification*) of the Credit Agreement are incorporated herein by reference to the same extent as if reproduced herein in their entirety.

(e) Headings. Section headings in this Agreement are included for convenience of reference only and shall not constitute a part of this Agreement for any other purpose.

(f) Counterparts. This Agreement may be signed in any number of counterparts, eachof which shall be deemed an original and all of which when taken together shall constitute one and the sameinstrument. The words "execution," "signed," "signature," and words of like import in this Amendment shall be deemed to include electronic signatures or electronic records, each of which shall be of the same legal effect, validity or enforceability as a manually executed signature or the use of a paper-based recordkeeping system, as the case may be, to the extent and as provided for in any applicable law, includingthe Federal Electronic Signatures in Global and National Commerce Act, the New York State Electronic Signatures and Records Act, or any other similar state laws based on the Uniform Electronic Transactions Act.

(g) Entire Agreement. This Agreement constitutes the entire agreement and understanding among the parties hereto and supersedes any and all prior agreements and understandings, oral or written, relating to the subject matter hereof.

(h) Severability. In case any provision of or obligation under this Agreement shall be invalid, illegal or unenforceable in any applicable jurisdiction, the validity, legality and enforceability of the remaining provisions or obligations, or of such provision or obligation in any other jurisdiction, shall not in any way be affected or impaired thereby.

(h) Severability. In case any provision of or obligation under this Agreement shall be invalid, illegal or unenforceable in any applicable jurisdiction, the validity, legality and enforceability of the remaining provisions or obligations, or of such provision or obligation in any other jurisdiction, shall not in any way be affected or impaired thereby.

(i) Successors/Assigns. This Agreement shall bind, and the rights hereunder shall inure to, the respective successors and assigns of the parties hereto, subject to the provisions of the Credit Agreement and the other Financing Documents.

[SIGNATURES APPEAR ON FOLLOWING PAGES]

IN WITNESS WHEREOF, intending to be legally bound, the undersigned have executed this Agreement as of the day and year first hereinabove set forth.

AGENT:

MIDCAP FINANCIAL TRUST,

By: Apollo Capital Management, L.P.,
its investment manager

By: Apollo Capital Management GP, LLC,
its general partner

By: /s/ Maurice Amsellem
Name: Maurice Amsellem
Title: Authorized Signatory

LENDERS:

MIDCAP FUNDING XIII TRUST

By: Apollo Capital Management, L.P.,
its investment manager

By: Apollo Capital Management GP, LLC,
its general partner

By: /s/ Maurice Amsellem
Name: Maurice Amsellem
Title: Authorized Signatory

LENDERS:

MIDCAP FINANCIAL TRUST,

By: Apollo Capital Management, L.P.,
its investment manager

By: Apollo Capital Management GP, LLC,
its general partner

By: /s/ Maurice Amsellem
Name: Maurice Amsellem
Title: Authorized Signatory

LENDERS:

ELM 2020-3 TRUST

By: MidCap Financial Services Capital Management, LLC, as Servicer

By: /s/ John O'Dea
Name: John O'Dea
Title: Authorized Signatory

LENDERS:

ELM 2020-4 TRUST

By: MidCap Financial Services Capital Management, LLC, as Servicer

By: /s/ John O'Dea
Name: John O'Dea
Title: Authorized Signatory

LENDERS:

APOLLO INVESTMENT CORPORATION

By: Apollo Investment Management, L.P., as Investment Adviser

By: ACC Management, LLC, as its General Partner

By: /s/ Joseph D Glatt
Name: Joseph D Glatt
Title: Vice President

BORROWERS:

MANNKIND CORPORATION

By: /s/ David Thomson
Name: David Thomson
Title: General Counsel

MANNKIND LLC

By: /s/ David Thomson
Name: David Thomson
Title: Vice President

QRUMPHARMA, INC.

By: /s/ David Thomson
Name: David Thomson
Title: Vice President

TECHNOSPHERE INTERNATIONAL, INC.

By: /s/ David Thomson
Name: David Thomson
Title: Vice President

CERTAIN CONFIDENTIAL INFORMATION CONTAINED IN THIS DOCUMENT, MARKED BY [***], HAS BEEN OMITTED BECAUSE IT IS BOTH (I) NOT MATERIAL AND (II) IS THE TYPE THAT MANNKIND CORPORATION TREATS AS PRIVATE OR CONFIDENTIAL.

SECOND AMENDMENT
TO
COMMERCIAL SUPPLY AGREEMENT

This amendment is effective the last date signed by a party, between **MannKind Corporation**, a Delaware corporation ("**MannKind**"), having a principal place of business at One Casper Street, Danbury, Connecticut 06810, and **United Therapeutics Corporation**, a Delaware public benefit corporation ("**United Therapeutics**"), having a principal place of business at 1040 Spring Street, Silver Spring, Maryland 20910.

WHEREAS, the parties to this amendment entered into a Commercial Supply Agreement effective as of August 12, 2021 (as amended on October 16, 2021, the "**Agreement**"), and the parties now wish to amend the Agreement as set forth below.

NOW, THEREFORE, in consideration of the terms and conditions specified herein and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereby agree as follows:

1. **AMENDMENT**.

   a. Section 1.2 (*Annual Budget*) is deleted and replaced with the following:

      1.2 **"Annual Budget"** means an annual budget for all amounts to be invoiced to United Therapeutics pursuant to this Agreement in respect of a calendar year, in a format reasonably agreed to by United Therapeutics and MannKind, and at a minimum providing a breakdown of costs by Price, Staffing Payments, Facility Utilization Fees, and Packaging Services, and other discrete categories and subcategories as reasonably requested by United Therapeutics.

   b. The second sentence of Section 1.11 (*Cost of Goods*), set forth below as follows, is deleted:

      ~~In addition, COGs will include an annual facility utilization expense (or rent) of $**[***]** (increasing to $**[***]** on December 1, 2021 and thereafter) per square foot for the portion of the Facility allocated to activities under this Agreement; provided, however, that such facility utilization expense shall not be subject to the Margin.~~

c. The following defined term is added to the Agreement as new Section 1.14A:

1.14A "**Facility Utilization Fee**" means an amount equal to $**[***]**per month during the Term to compensate MannKind for the portion of the Facility used for Manufacturing and other activities covered by this Agreement, as has been reasonably determined by United Therapeutics and MannKind as of June 15, 2022, with the understanding that such amount will be reasonably adjusted by mutual agreement memorialized in an amendment to this Agreement or a letter agreement referencing this Agreement if and when there is a significant change to the amount of Facility space dedicated to Manufacturing and other activities covered by this Agreement.

d. Section 2.4.1 of the Agreement ("Rolling Forecast") is deleted in its entirety and replaced with the following:

2.4.1 The "**Rolling Forecast**" is defined as the 18-month Manufacturing forecast for Product and Semi-finished Product submitted by United Therapeutics, as updated monthly within the first 10 business days of each month by United Therapeutics during the Term in accordance with Section 2.4.2, 2.4.3, and 2.4.4. The first six months of the Rolling Forecast shall be considered binding upon the parties (i.e., United Therapeutics shall place Purchase Orders for, and MannKind shall Supply, not less than the minimum quantity of Product and Semi-Finished Product specified in such Rolling Forecast during such period), and the remaining 12 months will be considered good faith estimates, but may be adjusted as necessary to meet United Therapeutics' requirements, provided that notwithstanding the limited six-month binding portion of the Rolling Forecast, the Rolling Forecast in effect as of June 2, 2022 shall be considered binding through March 31, 2023.

e. Section 3.2 of the Agreement ("Staffing Payments") is deleted in its entirety and replaced with the following:

3.2. Staffing Payments and Facility Utilization Fee.

3.2.1. Staffing Payments. United Therapeutics shall reimburse MannKind monthly for the Staffing Payment, subject to the limits set forth in Appendix E in 2022, and subject to the limits set forth in the Annual Budget in subsequent years during the effective Term, in each case upon receipt of an invoice in accordance with Section 3.3. United Therapeutics and MannKind agree to reasonably account for Staffing Payments in calendar year 2023 and beyond through the Annual Budget process, and further agree that the per-item Prices shall exclude the components of COGs that are being invoiced in such Staffing Payments.

3.2.2 Facility Utilization Fee. Effective as of May 1, 2022, United Therapeutics shall be responsible for the monthly Facility Utilization Fee upon receipt of an invoice in accordance with Section 3.3, such invoice specifying the fee owed as specified in section 1.14A. MannKind shall ensure that no depreciation for the building, United Therapeutics funded capital, or other overhead is separately charged to United Therapeutics, or forms the basis of any Product or Semi-Finished Product Price, by virtue of the definitions of “COGs” or “Fixed Overhead”, for the portion of the Facility that gives rise to the Facility Utilization Fee.

f. Section 3.3.1 of the Agreement is deleted and replaced with the following:

On the fifth business day of each month, MannKind shall invoice United Therapeutics for any Staffing Payment owed pursuant to section 3.2.1 and any Facility Utilization Fee owed pursuant to section 3.2.2, in each case in respect of the immediately preceding calendar month.

g. Appendices B and E of the Agreement are deleted in their entirety and replaced with the updated versions of Appendices B and E attached hereto, and all references to Appendices B and E in the Agreement shall be construed as references to the updated versions attached hereto.

2. GENERAL. All terms of the Agreement that are not specifically modified by this amendment remain in full force and effect. The parties may execute this amendment in counterparts, each of which is deemed an original for all purposes, and which together will constitute the same instrument. The parties may execute this amendment by electronic means (electronic signature through generally recognized e-signature vendors), by scanned pdfs of wet-ink signed documents, or by return of originals.

* * *

Signature page follows

IN WITNESS WHEREOF, the parties have caused this amendment to be signed by their duly authorized representatives as of the date indicated below.

UNITED THERAPEUTICS CORPORATION	**MANNKIND CORPORATION**
By: /s/ Patrick Poisson	By: /s/ Joe Kocinsky
Name: Patrick Poisson	Name: Joe Kocinsky
Title: EVP, Technical Operations	Title: Chief Technology Officer
Date: 15-June-2022	Date: 15-June-2022

APPENDIX B
PRICE AND PRICE ADJUSTMENTS

[***]

APPENDIX E
STAFFING PAYMENTS

[***]

CERTAIN CONFIDENTIAL INFORMATION CONTAINED IN THIS DOCUMENT, MARKED BY [***], HAS BEEN OMITTED BECAUSE IT IS BOTH (I) NOT MATERIAL AND (II) IS THE TYPE THAT MANNKIND CORPORATION TREATS AS PRIVATE OR CONFIDENTIAL.

THIRD AMENDMENT
TO
COMMERCIAL SUPPLY AGREEMENT

This amendment is effective the last date signed by a party, between **MannKind Corporation**, a Delaware corporation ("**MannKind**"), having a principal place of business at One Casper Street, Danbury, Connecticut 06810, and **United Therapeutics Corporation**, a Delaware public benefit corporation ("**United Therapeutics**"), having a principal place of business at 1040 Spring Street, Silver Spring, Maryland 20910.

WHEREAS, the parties to this amendment entered into a Commercial Supply Agreement effective as of August 12, 2021 (such agreement, as amended in a First Amendment effective October 16, 2021, and in a Second Amendment effective June 15, 2022, the "**Agreement**"), and the parties now wish to amend the Agreement as set forth below.

NOW, THEREFORE, in consideration of the terms and conditions specified herein and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereby agree as follows:

1. **AMENDMENTS**.

    a. Appendices A and B are deleted in their entirety and replaced with the revised versions of Appendices A and B attached hereto, and all references to Appendices A and B in the Agreement shall be construed as references the updated versions attached hereto.

2. **GENERAL.** All terms of the Agreement that are not specifically modified by this amendment remain in full force and effect. The parties may execute this amendment in counterparts, each of which is deemed an original for all purposes, and which together will constitute the same instrument. The parties may execute this amendment by electronic means (electronic signature through generally recognized e-signature vendors), by scanned pdfs of wet-ink signed documents, or by return of originals.

* * *

Signature page follows

IN WITNESS WHEREOF, the parties have caused this amendment to be signed by their duly authorized representatives as of the date indicated below.

UNITED THERAPEUTICS CORPORATION	**MANNKIND CORPORATION**
By: /s/ Patrick Poisson	By: /s/ Joe Kocinsky
Name: Patrick Poisson	Name: Joe Kocinsky
Title: EVP, Technical Operations	Title: Chief Technology Officer
Date: 31-Aug-2022	Date: 31-Aug-2022

APPENDIX A
PRODUCT AND SEMI-FINISHED PRODUCT DESCRIPTIONS AND SPECIFICATIONS

[***]

APPENDIX B
PRICE AND PRICE ADJUSTMENTS

[***]

CERTAIN CONFIDENTIAL INFORMATION CONTAINED IN THIS DOCUMENT, MARKED BY [***], HAS BEEN OMITTED BECAUSE IT IS BOTH (I) NOT MATERIAL AND (II) IS THE TYPE THAT MANNKIND CORPORATION TREATS AS PRIVATE OR CONFIDENTIAL.

FOURTH AMENDMENT
TO
COMMERCIAL SUPPLY AGREEMENT

This amendment is effective the last date signed by a party, between **MannKind Corporation**, a Delaware corporation ("**MannKind**"), having a principal place of business at One Casper Street, Danbury, Connecticut 06810, and **United Therapeutics Corporation**, a Delaware public benefit corporation ("**United Therapeutics**"), having a principal place of business at 1040 Spring Street, Silver Spring, Maryland 20910.

WHEREAS, the parties to this amendment entered into a Commercial Supply Agreement effective as of August 12, 2021 (such agreement, as amended in a First Amendment effective October 16, 2021, a Second Amendment effective June 15, 2022, and a Third Amendment effective August 31, 2022, the "**Agreement**"), and the parties now wish to amend the Agreement as set forth below.

NOW, THEREFORE, in consideration of the terms and conditions specified herein and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereby agree as follows:

1. **AMENDMENTS**.

   a. The following section is added as section 2.2.7 to the Agreement:

      2.2.7 By October 15 of each year during the Term, MannKind shall provide United Therapeutics with a complete written listing of all equipment maintained by MannKind at the Facility that is titled to United Therapeutics as of October 1 of the same year, including, without limitation, Expansion Equipment, as evidenced by a bill of sale executed by the parties on or prior to October 1.

   b. The following phrase in the first sentence of Section 3.3 of the Agreement is deleted in its entirety: "[***]@unither.com, and/or". MannKind shall continue to send all invoices to United Therapeutics by email to AP@unither.com, and United Therapeutics will instruct MannKind as to any additional email addresses that should be cc'ed on such emails. All other invoicing procedures shall remain unchanged.

   c. Appendices A and B of the Agreement are deleted in their entirety and replaced with the revised versions of Appendices A and B attached hereto, and all references to Appendices A and B in the Agreement shall be construed as references the updated versions attached hereto.

2. GENERAL. All terms of the Agreement that are not specifically modified by this amendment remain in full force and effect. The parties may execute this amendment in counterparts, each of which is deemed an original for all purposes, and which together will constitute the same instrument. The parties may execute this amendment by electronic means (electronic signature through generally recognized e-signature vendors), by scanned pdfs of wet-ink signed documents, or by return of originals.

* * *

Signature page follows

IN WITNESS WHEREOF, the parties have caused this amendment to be signed by their duly authorized representatives as of the date indicated below.

UNITED THERAPEUTICS CORPORATION	**MANNKIND CORPORATION**
By: /s/ Patrick Poisson	By: /s/ Sanjay Singh
Name: Patrick Poisson	Name: Sanjay Singh
Title: EVP, Technical Operations	Title: EVP, Technical Operations
Date: 22-Dec-2022	Date: 22-Dec-2022

APPENDIX A
PRODUCT AND SEMI-FINISHED PRODUCT DESCRIPTIONS AND SPECIFICATIONS

[***]

APPENDIX B
PRICE AND PRICE ADJUSTMENTS

[***]

Exhibit 10.52

OFFICE LEASE AGREEMENT

BY AND BETWEEN

RFP LINCOLN 293, LLC

AND

VALERITAS, INC.

DATED : **May 10, 2017**

TABLE OF CONTENTS **PAGE**

TABLE OF CONTENTS **PAGE**

LEASE

This Lease, by and between Landlord and Tenant (as defined below), relates to the space in the building (the " Building ") located at 293 Boston Post Road, Marlborough, Massachusetts and known as Boston Post Road Corporate Center. The term " Lot " shall mean the parcel of land on which the Building is located, known as Block 77, Lot 11on the Marlborough Tax Map; and the term " Property " shall mean the Lot and all improvements thereon from time to time, including the Building.

The parties to this instrument hereby agree with each other as follows:

ARTICLE I
SUMMARY OF BASIC LEASE PROVISIONS

1.1 INTRODUCTION

As further supplemented in the balance of this instrument and its Exhibits, the following sets forth the basic terms of this Lease, and, where appropriate, constitutes definitions of certain terms used in this Lease.

1.2 BASIC DATA

Date:	May 10, 2017.
Landlord:	RFP LINCOLN 293, LLC, a Massachusetts limited liability company
Present Mailing Address of Landlord:	RFP LINCOLN 293, LLC 225 Franklin Street Boston, Massachusetts 02110 Attention: Sean V. Chrisom, Senior Vice President
Payment Address:	LPC Commercial Services, Inc. 225 Franklin Street Boston, Massachusetts 02110 Attention: Sean V. Chrisom, Senior Vice President
Managing Agent:	LPC Commercial Services, Inc. 225 Franklin Street Boston, Massachusetts 02110 Attention: Scott A. Brown, Senior Vice President
Tenant:	Valeritas, Inc., a Delaware corporation
Present Mailing Address of Tenant:	Valeritas, Inc. 800 Boston Turnpike Shrewsbury, Massachusetts 01545 Attention: Scott Huie, VP, RA/QA & Compliance
Mailing Address of Tenant after Tenant takes occupancy of the Premises:	Valeritas, Inc. 293 Boston Post Road Marlborough, Massachusetts 01752 Attention: Scott Huie, VP, RA/QA & Compliance
Premises:	An area containing approximately 10,203 rentable square feet of space Premises (based upon actual square footage Premises plus an "add-on" factor of 1.175%), located on the third floor of the Building (the " Third Floor Space "), as shown on Exhibit A-1 attached hereto. Also included within the Premises is an area containing approximately 4,968 rentable square feet (based upon actual square footage Premises plus an "add-on" factor of 1.175%) on the lower level of the Building (the " Lower Level Space " and when referenced herein together with the Third Floor Space, the " Premises "), as shown on Exhibit A-2 attached hereto.

Lease Term:	Seventy-six (76) months commencing on the Term Commencement Date.
Term Commencement Date:	Substantial completion of Landlord's Work, and Landlord has given Tenant at least five (5) business days prior notice thereof. The anticipated Term Commencement Date is October 15, 2017 (see Section 3.7 as to this " Outside Date ")

Base Rent:

1. Third Floor Space

Lease Year* or Monthly Period	Annual Base Rent	Per Square Foot	Monthly Rent
Months 1-4:	$***	N/A	N/A
Months 5-12:	$148,000.00*	$18.50*	$12,333.33*
Months 13-24	$196,407.75	$19.25	$16,367.31
Months 25-36	$204,060.00	$20.00	$17,005.00
Months 37-48	$211,712.25	$20.75	$17,642.69
Months 49-60	$219,364.50	$21.50	$18,280.38
Months 61-76	$227,016.75	$22.25	$18,918.06

2. Lower Level Space

Lease Year** or Monthly Period	Annual Base Rent	Per Square Foot	Monthly Rent
Months 1-4:	$***	N/A	N/A
Months 5-12:	$34,776.00	$7.00	$2,898.00
Months 13-24	$36,018.00	$7.25	$3,001.50
Months 25-36	$37,260.00	$7.50	$3,105.00
Months 37-48	$38,502.00	$7.75	$3,208.50
Months 49-60	$39,744.00	$8.00	$3,312.00
Months 61-76	$40,986.00	$8.25	$3,415.50

*For months 5-12 of the initial Lease Year, the monthly Base Rent on a one-time basis shall be hypothetically based upon 8,000.00 rentable square feet and applying the applicable per square foot pricing.

**For the purposes of this Lease, " Lease Year " shall be defined as each successive 12-month period included in whole or in part in the Lease Term; the first Lease Year beginning on the Term Commencement Date and ending at midnight on the day before the first anniversary of the Term Commencement Date. Base Rent for any partial calendar month at the beginning or the end of the Term shall be appropriately prorated.

******* Free Rent : Notwithstanding the stated Base Rent set forth above or any other term or provision contained in this Lease to the contrary, so long as Tenant is not in default under this Lease beyond any applicable notice, if any, and the expiration of any applicable cure period during the Free Rent Period (as defined below), Tenant shall be entitled to an abatement of the monthly installment of Base Rent (but remain liable for any other applicable charges due hereunder, if any, including Additional Rent and electricity costs), or so-called "free rent" period, equal to the first full four (4) calendar months of the Lease Term (" Free Rent Period ").

Security Deposit Amount:	The Security Deposit shall initially be $94,138.13 as subject to the following reductions: (i) so long as no Default of Tenant is then occurring on the three (3) year anniversary of the last day of the Free Rent Period, the Security Deposit on the third anniversary of the calendar month following Tenant's commencement of paying Rent hereunder shall be reduced to $18,627.63, with such amount being returned to Tenant, with such balance remaining as the Security Deposit for the balance of the following twelve (12) month period of the Lease Term; (ii) so long as no Default of Tenant is then occurring on the four (4) year anniversary of the last day of the Free Rent Period, the Security Deposit on the fourth anniversary of the calendar month following Tenant's commencement of paying Rent hereunder shall be reduced by an additional $18,627.63, with such amount being returned to Tenant, with such balance remaining as the Security Deposit for the balance of the next twelve (12) month period of the Lease Term; and (iii) so long as no Default of Tenant is then occurring on the five (5) year anniversary of the last day of the Free Rent Period, the Security Deposit on the fifth anniversary of the calendar month following Tenant's commencement of paying Rent hereunder shall be reduced by an additional $18,627.63, with such amount being returned to Tenant, with such balance remaining as the Security Deposit for the balance of the Lease Term. (iv) The Security Deposit shall otherwise be governed by Section 17.15 of this Lease. Such amounts shall be defined herein as the " Security Deposit Amount ."
Guarantor:	N/A
Permitted Use:	General office, research and development, manufacturing, laboratory and/or any lawful use incidental thereto, and any other use with the consent of the Landlord, which consent shall not be unreasonably withheld so long as such other use is (i) legal as a matter of right based upon applicable zoning and other governmental regulations, and (ii) consistent with and complimentary to the then-current use(s) of the remaining leased space in the Building.
Tenant's Proportionate Share:	8.49% based upon the rentable square feet of the Premises (including both the Third Floor Space and the Lower Level Space) based upon actual square footage Premises plus an "add-on" factor of 1.175% with respect to the Premises) and total rentable Building square footage of approximately 178,697 square feet. Tenant's Proportionate Share may be adjusted by Landlord from time to time in the event of any increase or decrease in the total square footage of rentable floor area contained within the Premises and/or the Building, based upon the square footage of rentable floor area contained within the Premises as compared to the square footage of rentable floor area contained within the Building, as it may be physically increased or decreased from time to time.

Base Tax Amount:	The Taxes (as defined in Section 4.2(a)) assessed for fiscal tax year 2018 (i.e., July 1, 2017 – June 30, 2018), i.e., the " Base Tax Year ."
Base Operating Costs:	The Operating Costs (as defined in Section 4.3) for calendar year 2017, i.e., the " Base Operating Year ."
Parking and Loading Dock:	Consistent with Section 2.2 of this Lease, Tenant shall be granted the right to use 42 parking spaces in the parking areas serving the Building, on a non-exclusive, "as available" basis.
Broker(s):	LPC Commercial Services, Inc. 225 Franklin Street Boston, MA 02110 Attn: Tim Latham Cushman & Wakefield U.S., Inc. 225 Franklin Street Boston, MA 02110 Attn: Paul Leone
Landlord's Construction Representative:	LPC Commercial Services, Inc. 225 Franklin Street Boston, MA 02110
Tenant's Construction Representative:	Valeritas, Inc. 800 Boston Turnpike Shrewsbury, Massachusetts 01545 Attention: Scott Huie, VP, RA/QA & Compliance

1.3 ENUMERATION OF EXHIBITS

Exhibit A-1: Plan showing the Third Floor Space

Exhibit A-2: Plan showing Lower Level Space

Exhibit B: Intentionally Deleted

Exhibit C: Rules and Regulations

Exhibit D: Legal Holidays Observed by Building

Exhibit E: Cleaning Specifications

ARTICLE II
DESCRIPTION OF PREMISES AND APPURTENANT RIGHTS

2.1 LOCATION OF PREMISES

The Landlord hereby leases to Tenant, and Tenant hereby accepts from Landlord, the Premises identified on Exhibits A-1 and A-2 in the Building, subject to the terms and conditions of this Lease. Nothing in Exhibit A shall be treated as a representation that the Premises or the Building shall be precisely of the area, dimensions, or shapes as shown, it being the intention of the parties only to show diagrammatically, rather than precisely, on Exhibits A-1 and A-2 the layout of the Premises and the Building. However, for the purposes of this Lease the rentable square footage of (i) the Third Floor Space will be 10,203, (ii) the Lower Level Space will be 4,968, and (iii) the Building will be 178,697 and not subject to re-measurement during the initial or any renewal term of this Lease.

2.2 APPURTENANT RIGHTS AND RESERVATIONS

Tenant shall have, as appurtenant to the Premises, rights to use in common with others entitled thereto the common facilities included in the Building or the Lot, including common walkways, driveways, lobbies, hallways, ramps, elevators and stairways and the cafeteria and exercise room in the Building. Such rights shall always be subject to reasonable rules and regulations from time to time established by Landlord by suitable notice, and to the right of Landlord to designate and to change from time to time the areas and facilities so to be used, provided that any such change shall not materially adversely affect Tenant's access to and use of the Premises. Tenant shall be afforded the non-exclusive right to use up to 52 parking spaces within the parking areas based on a parking ratio of 3.4 spaces per 1,000 rentable square feet of the Premises. Nothing contained in the Lease shall prohibit or otherwise restrict Landlord from changing, from time to time, without notice to Tenant, the layout or type of such parking areas, provided that Landlord shall not reduce the number of parking spaces available for Tenants' use and provided that such changed layout or type of spaces shall be at least as convenient to the Building as currently configured. Subject to reasonable rules from time to time made by Landlord of which Tenant is given notice, Tenant shall have the right, in common with all other tenants of the Building, to use such parking areas, without charge through the Lease Term, on a first-come, first-served basis up to the number of Tenant's parking spaces set forth in Section 1.2. Landlord shall uniformly and diligently enforce the parking requirements of each tenant's lease.

Not included in the Premises are the roof or ceiling, the floor and all perimeter walls of the space identified in Exhibit A, except the inner surfaces thereof and the perimeter doors and windows (excluding exterior windows). The Landlord reserves the right to install, use, maintain, repair and replace in the Premises (but in such manner as not unreasonably to interfere with Tenant's use of the Premises) utility lines, shafts, pipes, and the like, in, over and upon the Premises, provided that the same are located above the dropped ceiling (or, if there is no dropped ceiling, then within three (3) feet of the roof and/or floor deck), below the floor surfaces or tight against demising walls or columns.

Landlord agrees to repair any damage to the Premises caused by the installation of any such items. Such utility lines, shafts, pipes and the like shall not be deemed part of the Premises under this Lease. The Landlord also reserves the right to alter or relocate any common facility, so long as the cafeteria and fitness center remain in the Building, and to change the lines of the Building parking lot.

2.3 RIGHT OF FIRST OFFER

Provided no Default of Tenant (as defined in Article XIV) has occurred and is continuing beyond any applicable notice and cure period at the time Tenant elects to exercise its rights hereunder, Tenant shall have the one-time right from and after the date of this Lease through the entire Lease Term (as may be extended hereunder) of first offer to lease any space contiguous to the Premises on the third floor of the Building that becomes available for occupancy (the " Available Space "), subject to and in accordance with the terms and conditions set forth in this Section 2.3 and any rights of then-existing tenants of such Available Space. If at any time from and after the date of this Lease through the remaining Term of this Lease (as may be extended hereunder) there shall be any Available Space, Landlord shall notify Tenant thereof in writing (" Landlord's Available Space Notice "), which notice shall include the anticipated date upon which such Available Space shall be available for occupancy by Tenant along with a floor plan

showing the approximate rentable square footage thereof as reasonably determined by Landlord. Tenant shall have the right to lease all or a portion of such Available Space only by giving written notice to Landlord within thirty (30) days after Tenant receives Landlord's Available Space Notice, time being of the essence. If Tenant so elects to lease all or a portion of the Available Space, such Available Space shall be leased upon the same terms and conditions contained in this Lease, and the term shall expire on the same date as the existing Lease, except that: the Base Rent for such space shall be equal to then-current Base Rent (on a per rentable square foot basis) payable under this Lease for the Premises; provided, however, with respect to the applicable Available Space, the base year for operating expense escalation shall be the first full calendar year following Tenant's occupancy of the applicable Available Space and for real estate tax escalation shall be the first full fiscal year following Tenant's occupancy of the applicable Available Space, and, subject to the foregoing, the applicable Available Space shall be and become part of the Premises hereunder upon the delivery of such Available Space to Tenant. Landlord shall deliver exclusive, broom clean possession of such Available Space to Tenant with the heating, ventilating and air conditioning (HVAC), electrical, plumbing, mechanical and fire/life safety systems serving the Available Space in good working order. It is understood and agreed that the applicable Available Space shall otherwise be leased by Tenant in its then "as is", "where-is" condition, without warranty or representation by Landlord and Landlord shall have no obligation to complete any work to prepare the Available Space for Tenant's use and occupancy. Following such election by Tenant, and effective as of the delivery of the applicable Available Space and for the balance of the Term and any extension thereof: (a) the "Premises", as used in this Lease, shall include the applicable Available Space; (b) the rentable square feet of the Premises shall be increased to include the rentable square footage of the applicable Available

Space; (c) the annual Base Rent shall equal the sum of the Base Rent provided for in this Lease plus the Base Rent for the applicable Available Space as determined as set forth herein; (d) Tenant shall have the right to use up to an additional 3.4 parking spaces per 1,000 rentable square feet of the Available Space, without charge; and (e) "Tenant's Proportionate Share", solely for the applicable Available Space, shall be a percentage computed in the manner set forth in Section 1.2 of this Lease with the rentable square footage of the applicable Available Space. To confirm the inclusion of the Available Space as set forth above, Landlord shall prepare, and Landlord and Tenant shall promptly execute and deliver, an Amendment to Lease reflecting the foregoing terms and incorporation of any Available Space. Landlord agrees to use reasonable efforts to remove any hold over occupant of the Available Space and to otherwise obtain possession of the Available Space, including, without limitation, the institution and diligent prosecution of hold-over proceedings. Notwithstanding anything to the contrary set forth in this Section 2.3, if for any reason Landlord fails to deliver the Available Space to Tenant within ninety (90) days after the date stated in Landlord's Available Space Notice upon which the Available Space will be available for occupancy by Tenant, Tenant shall have the right to terminate its acceptance of Landlord's offer of the Available Space and shall be relieved of any obligation to lease the Available Space pursuant to this Section 2.3. For the purposes hereof, space shall be deemed " available for occupancy " when any lease or occupancy agreement (including extension periods) has expired or is due to expire within six (6) months, or Landlord has elected not to renew the lease of the present tenant, and any prior options, rights or rights to lease with respect to such Available Space in effect as of the date of this Lease have expired or been waived and Landlord is free to lease such space to third parties without restriction.

If Tenant fails to timely exercise any of its rights hereunder, the right(s) granted hereunder as to the applicable Available Space shall be deemed waived for all purposes, and Landlord may lease the applicable Available Space to any party and upon any terms free of any rights of Tenant.

Tenant understands that its rights under this Section are and shall be subject and subordinate to the following rights of first offer granted to other tenants of the Building having space on the third floor of the Building prior to the date of execution and delivery of this Lease:

Vasco Data Security – currently tenant in Suite 340

FC USA, Inc. – currently tenant in Suite 301

ARTICLE III
TERM OF LEASE: CONDITION OF PREMISES

3.1 TERM OF LEASE

The term of this Lease shall be the period specified in Section 1.2 hereof as the "Lease Term" commencing on the Term Commencement Date and terminating the last day of the seventy-sixth (76th) calendar month thereafter (the "Lease Term") (plus any partial calendar month if the Term Commencement Date occurs on any other day other than the first day of a calendar month), unless the Lease Term is extended under Section 3.2 below or terminated early pursuant to the terms hereof, including such rights afforded Landlord under Article XIV.

3.2 EXTENSION OPTION

Tenant may elect to extend the term of this Lease for one (1) sixty (60) month period with respect to the entire Premises or the Third Floor Space only (the "Extension Term"), by giving Landlord notice of such election no later than nine (9) months before the expiration of the Lease Term, provided Tenant is not in default hereunder beyond applicable notice and cure periods, both on the date such notice is given and on the commencement date of the Extension Term. Such extension shall be upon the same terms, covenants, and conditions contained in this Lease except that (a) Tenant shall have no further right to extend the Lease Term past this 60 month Extension Term, (b) there shall be no free rent period with respect to the Extension Term (except as otherwise provided in the determination of the Fair Market Rental Value), and (c) the Base Rent for the Extension Term shall be at a rate equal to the Fair Market Rental Value therefore determined as set forth in Section 4.5 below (including the application of updated Base Years for Operating Costs and Taxes).

3.3 CONDITION OF PREMISES

Except as otherwise expressly provided in this Lease, Tenant is leasing the Premises in "as is, where is" condition with all faults and without representation or warranty by Landlord of any kind or nature, express or implied in fact or in law by Landlord and without recourse to Landlord as to the nature, condition or usability thereof. With the exception of the Landlord's Work, Tenant, at its sole cost, expense and risk, shall perform and make any alterations, improvements or installations in the Premises which are necessary for Tenant's use and/or occupancy of the Premises. Notwithstanding the above, in addition to Landlord's Work, Landlord, at its expense, shall deliver the Premises on the Term Commencement Date (i) free from asbestos-containing materials and any other materials recognized by law to be "hazardous" or "toxic," and (ii) otherwise in compliance with all applicable laws and codes, (iii) with the heating, ventilating and air conditioning (HVAC), electrical, plumbing, mechanical and fire/life safety systems serving the Premises in good working order, and (iv) vacant, free from personal property and with all wire fencing in the Lower Level Premises removed. Notwithstanding the foregoing, nothing under this Section 3.3 shall obligate Landlord to install prior to delivery of the Premises any heating, ventilating, air conditioning, electrical, plumbing, mechanical and fire/life safety systems in the Lower Level Premises to the extent not installed as of such delivery date but rather are within the scope of Landlord's Work.

3.4 EARLY POSSESSION

Provided that (a) Tenant does not interfere with or delay the completion by Landlord or its agents or contractors of the Landlord's Work, and (b) Tenant has timely paid all amounts due as the Tenant's Share of the Landlord's Work Costs, Tenant shall have the right to enter the Premises up to thirty (30) days prior to the Term Commencement Date for the purpose of installing equipment, furniture, wiring and establishing general operations. Tenant shall be liable for any damages or delays caused by Tenant's activities at the Premises. Provided that Tenant has not begun operating its business from the Premises, and subject to all of the terms and conditions of the Lease (other than the obligation to pay Rent), the foregoing activity shall not constitute the delivery of possession of the Premises to Tenant and the Lease term shall not commence as a result of said activities. Prior to entering the Premises, Tenant shall obtain all insurance it is required to obtain by the Lease and shall provide certificates of said insurance to Landlord. Tenant shall coordinate such entry with Landlord's Building manager, and such entry shall be made in compliance with all terms and conditions of this Lease and the Rules and Regulations attached hereto as Exhibit C.

3.5 LANDLORD'S WORK.

(a) No later than the Effective Date, Landlord shall cause to be delivered to Tenant for Tenant's review (or otherwise make available to Tenant in the plan room located in the lower level of the Building) all construction and mechanical engineering plans and documents (both those in hard copy and CAD) in Landlord's possession in order for Tenant's architect to review and complete the Tenant fitout planning for Landlord's Work for the Premises containing sufficient detail in order for Landlord (or the Approved Contractor) to obtain all applicable permits and governmental approvals and otherwise consistent with the Landlord's Work (the " Construction Drawings") . Landlord represents to Tenant it has provided to Tenant a full set of CAD drawings for the third floor of the Building and hard copy plans for the remainder of the Building, but otherwise cannot assure Tenant or its architect that it can provide further existing architectural or mechanic plans for the Building that Tenant or its architect may require. Tenant shall cause to be delivered to Landlord on or before **June 15, 2017** the Construction Drawings for Landlord's approval, which approval of Landlord shall not be unreasonably withheld, conditioned or delayed and will be granted or withheld within five (5) days after Tenant's delivery of same to Landlord. If Landlord disapproves the proposed Construction Drawings, Landlord shall specify the basis for such disapproval in reasonable detail, and Tenant will cause its architect to revise the Construction Drawings to address such deficiencies and promptly submit the same to Landlord. The scope of Landlord's review of any such revised Construction Drawings will be limited to Tenant's architect's correction of the items specified by Landlord in Landlord's notice of disapproval. Landlord will notify Tenant of Landlord's approval or disapproval of such revised Construction Drawings within five (5) days following receipt of same, and this process shall continue until Landlord has approved the Construction Drawings (with such approved Construction Drawings constituting the " Approved Construction Drawings "). Landlord and Tenant confirm and agree that the Approved Constructing Drawings shall be fully approved by **July 1, 2017** in order to allow the parties sufficient time to timely
approve the Landlord's Approved Contractor and complete Landlord's Work in accordance with this Lease.

(b) As set forth in the prior paragraph (a), Landlord and Tenant shall on or before **July 1, 2017** agree upon the work to be done within the Premises as shown on the Approved Construction Drawings by the Landlord (by and through the Approved Contractor) prior to the Term Commencement Date (the " Landlord's Work ") pursuant to the Approved Construction Drawings. Tenant shall have the right, as part of Landlord's Work, to install in the Premises and thereafter maintain and operate its own heating, ventilating, and/or air-conditioning units to provide heating, ventilating and cooling to the Premises, including without limitation, equipment and support structures in a portion of the Building or Land outside the Premises as requested by Tenant and reasonably approved by Landlord (collectively, the " Supplemental HVAC "), which Supplemental HVAC shall be subject to Landlord's reasonable approval, as more particularly described in Section 3.5(a) hereof. Landlord and Tenant agree to mutually cooperate with one another in finalizing the Landlord's Work schedule. The portion of the cost of Landlord's Work in the amount of the Tenant's Share of the Landlord's Work Costs shall be borne by Tenant, with the balance borne and paid for entirely by Landlord, as more fully set forth below in Section 3.6. The Landlord's Work shall be performed by Landlord's Approved Contractor to be selected in accordance with this Lease and the cost of Landlord's Work shall include, without limiting the generality of the foregoing, (a) the entire cost of demolishing the existing improvements and building out the Premises in accordance with the Approved Construction Drawings, (b) the cost of all materials and labor related to the Landlord's Work and all permit fees, (c) the cost of full scale architectural and engineering costs in connection therewith (including the cost of Tenant's architect), (d) a construction management fee payable to Lincoln Property Company (or any affiliated entity) equal to three percent (3%) of the so-called "hard costs" of the Landlord's Work, and (e) the "Cost of the Work", as defined in AIA Document A111 (1987 Edition) (and also specifically including the cost of the general conditions of the Approved Contractor). Landlord's Work shall otherwise be performed in a good and workmanlike manner.

Notwithstanding anything to the contrary contained in this Lease, Landlord and Tenant hereby agree that Landlord, unless included in Landlord's Work, shall not be responsible for the construction, relocation or installation of security card readers, office furniture, security systems, internal/external telecommunications, voice and data cabling or other telephone, data and communications equipment (collectively the " Tenant's Initial Work ") nor shall Landlord have any obligation to pay therefore. Tenant shall have the right to install as part of Tenant's Initial Work its own security system at the entry to and within the Premises.

3.6 TENANT ALLOWANCE; TENANT OBLIGATION TO FUND TENANT'S SHARE OF EXCESS LANDLORD'S WORK COSTS

(a) Landlord agrees to fund the cost of the Landlord's Work in an amount not to exceed $357,105.00 (the " TI Allowance "), and Tenant (at Landlord's sole election) shall be liable to pay to the Approved Contractor or Landlord (as first dollars paid under the Approved Contractor's General Contract (" General Contract ") until the balance due under the General Contract equals the TI Allowance) any and all costs of the Landlord's Work in excess of the TI Allowance (the " Tenant's Share of the Landlord's Work Costs "). If the total cost of Landlord's Work is less than the TI Allowance, Tenant shall have the right to allocate such unused portion of the TI Allowance as a monthly credit against Base Rent until fully applied. The Tenant's Share of the Landlord's Work Costs, at the Landlord's sole election and direction, shall either (i) be paid by Tenant directly to the Approved Contractor (who shall be engaged by Landlord), or (ii) be paid to Landlord prior to Landlord having to fund any TI Allowance funds towards the General Contract until such time as the remaining cost of Landlord's Work is equal to the TI Allowance (taking into account all amounts paid on prior requisitions and upon payment of any pending requisition by the Approved Contractor). Landlord upon request by Tenant shall provide to Tenant sufficient backup and detail (including all executed lien waivers delivered to Landlord and/or Approved Contractor to date for work and materials in place and evidence that Landlord shall fund in full the TI Allowance) to evidence (i) the total cost of the Landlord's Work to date as requisitioned by and paid by Tenant as provided hereunder, as set forth on standard AIA forms, and (ii) the total remaining costs to complete the Landlord's Work and the amounts previously funded by Tenant as the Tenant's Share of the Landlord's Work Costs. Tenant shall pay the Tenant's Share of the Landlord's Work Costs (to either the Approved Contractor or Landlord) within ten (10) business days of written direction by Landlord absent any good faith dispute to be delivered by Tenant to Landlord during such ten (10) business day period (and shall include a detailed basis for such dispute), if at all. If Tenant does have a good faith dispute as to any amounts alleged owed, it shall timely pay all amounts not in dispute to the Landlord or Approved Contractor, as the case may be. The determination as to the payment of any disputed amounts shall be determined by the Landlord's architect within ten (10) business days of receipt of a copy of such Tenant dispute notice, whose decision in such matters shall be final and binding on the parties. If Tenant fails to timely pay any Tenant's Share of the Landlord's Work Costs following such ten (10) business day period absent any good faith dispute, or fails to timely pay such amounts within ten (10) business days of the final determination of Landlord's architect as to any dispute this failure shall constitute a monetary default under this Lease, and thereafter Landlord may elect to exercise any of it remedies set forth herein relative thereto. In the event that the cost of Landlord's Work is less than the TI Allowance, Landlord will be reimburse any overpayment made by Tenant of Tenant's Share of the Landlord's Work Costs within ten (10) business days of Tenant's receipt of the confirmation from Landlord, as provided in (i) and (ii) above in this paragraph evidencing Landlord's Work Costs. If Tenant fails to timely pay the Tenant's Share of Landlord's Work Costs, all such amounts due and owing shall accrue at the Lease Interest Rate which interest amounts shall accrue and be paid in addition to the unpaid Tenant's Share of Landlord Work Costs. Once Landlord is obligated to fund the TI Allowance hereunder, it shall timely pay the Approved Contractor directly all such amounts required in order to pay for completion of Landlord's Work (subject to any agreed-upon change orders and any associated costs but otherwise on a timely basis in accordance with Landlord's General Contract with Approved Contractor to complete such work) subject to procurement from the Approved Contractor of all backup and detail (including all executed lien waivers) as required of Approved Contractor under its General Contract with Landlord.

Under no circumstances shall the Landlord have a right to agree to any change order proposed by the Approved Contractor or otherwise agree to increase the cost of the Landlord's Work resulting in any increase in the Tenant's Share of Landlord's Work Costs absent the prior written consent of the Tenant. In the event Landlord and Tenant agree to a change order which increases the cost of the Landlord's Work, such shall be evidenced by the appropriate AIA form and Tenant shall expressly agree with Landlord to increase the Tenant's Share of the Landlord's Work Costs attributable to such General Contract cost increase prior to Landlord being obligated to execute and deliver same or direct the Approved Contractor to modify the scope of the Landlord's Work accordingly.

3.7 LANDLORD'S AND TENANT INITIAL WORK; DELAYS.

(a) Subject to any Tenant Delays, Landlord agrees to use due diligence to cause to be completed the Landlord's Work on or before October 15, 2017 (" Outside Date "). Landlord shall not be required to install any

improvements which are not in conformity with the Approved Construction Drawings or which do not comply with applicable law, ordinances or codes. In case of delays due to governmental regulation, unusual scarcity or inability to obtain labor or materials, labor difficulties, casualty or other causes reasonably beyond Landlord's control (other than lack of funds), the Outside Date shall be extended for the period of such delays.

(b) If the Landlord is unable to give possession of the Premises on the Outside Date because the Premises are not substantially complete due to Tenant Delays (as said term is hereinafter defined), the Term Commencement Date (and Outside Date) shall be extended for each day following the date that Landlord could have delivered the Premises (after having substantially completed the Landlord's Work) but for the Tenant Delay, and Landlord shall otherwise be obligated thereafter to timely deliver the Premises in accordance with this Lease as soon as practicable once Tenant cures such Tenant Delay. In such an event of Tenant Delay, for each day the Outside Date is extended the Free Rent Period shall be shortened. The term " Tenant Delay " shall mean any of the following, if applicable: (i) Tenant's failure to timely pay to the Landlord or Approved Contractor any amount due as the Tenant's Share of the Landlord's Work Costs, (ii) Tenant's failure to deliver the plans and specifications to Landlord, in accordance with any time frames provided by Landlord herein, for the completion of or in performing the Landlord's Work, including, without limitation, Tenant's failure to cause the Construction Drawings to be delivered to Landlord by June 15, 2017; or (iii) any delay in achieving substantial completion of Landlord's Work caused by or related to Tenant's change orders, requests for change orders or the time involved in processing, authorizing and/or withdrawing requests for change orders or selection of materials or in considering whether to proceed with a change order; (iv) any delay by Tenant in providing its approval of any items, materials or other Landlord's Work related work or materials; (v) Tenant errors in or incompletion respecting the plans or specifications related thereto; (vi) delays caused by Tenant's architect (if one is so engaged), or (vii) any other delay in achieving substantial completion caused by Tenant or its employees, agents or contractors(notice of which will be provided by Landlord to Tenant); provided however, there shall be no postponement of the Outside Date or reduction of the Free Rent Period until the date that is two (2) business days after the delivery of such notice by Landlord, unless Tenant cures such Tenant Delay within such two (2) business day period. In determining the length of any delay related to a Tenant Delay, the cumulative effect of such delay shall apply.

(c) Subject to Tenant Delays and Force Majeure Events (as defined below) or any other delays beyond Landlord's reasonable control (other than lack of funds), if Landlord shall be unable to give possession of the Premises on the Outside Date (as same may have been extended as provided herein) because the Landlord's Work is not substantially completed or because the Premises are not completed and ready for occupancy, and such delay continues past the Outside Date, Tenant have the elective right to do as follows: (i) if the delay continues past December 15, 2017, it may, but is not obligated, to complete the Landlord's Work, at its sole cost and expense, and following taking possession have the right to credit such amounts against future Base Rent (following any Free Rent Period) due and owing hereunder from the Term Commencement Date, as defined herein, (and shall provide Landlord with written backup documentation as to Tenant's payment of such costs prior to applying any such Base Rent credit), (ii) if the delay continues past December 15, 2017, it may terminate this Lease effective as of December 15, 2017, by providing written notice to Landlord by December 24, 2017 following which this Lease shall terminate and the Parties shall have no further obligations hereunder, other than to return to Tenant the security deposit and prepaid rent, and except pursuant to those provisions of this Lease which expressly survive the expiration or sooner termination thereof, or (iii) if the delay continues past the Outside Date, it may elect by providing notice to Landlord within five (5) days after the Outside Date to extend the time for completion of Landlord's Work in which case it shall receive a per diem Base Rent credit for each day substantial completion of Landlord's Work occurs after the Outside Date, which Base Rent credit shall be in addition to the Free Rent Period but shall not exceed as a cap a Base Rent credit equivalent to a sixty (60) day delay even if such delay is longer than sixty (60) days. Notwithstanding the foregoing, Tenant shall have no rights under this Section 3.7(c) in the event it has failed to timely pay any Tenant's Share of the Landlord's Work Costs unless such failure involves only those unpaid amounts subject to a good faith dispute as contemplated under Section 3.5.

(d) Following the Tenant's delivery of the Construction Drawings to Landlord, the Landlord shall competitively bid out the Landlord's Work to at least three (3) mutually acceptable qualified general contractors (if there are changes to the Construction Drawings before same become the Approved Construction Drawings, such changes shall be addressed as addendum or change order during the bidding process). Tenant shall have the right to

include one additional prospective general contractor from whom Landlord shall procure a bid for Landlord's Work. Following this competitive bidding process, Landlord and Tenant shall work cooperatively with each other in selecting a mutually acceptable and duly qualified general contractor (including without limitation, Tenant's right to interview the proposed general contractors and determine if the bids are responsive). In the event Landlord and Tenant are unable to agree on a mutually acceptable general contractor despite such efforts, Tenant shall have the final right to select the general contractor (the general contractor finally selected, the " Approved Contractor ") with Landlord's approval, not to be unreasonably, withheld, conditioned or delayed so long as such contractor shall be fully qualified to timely undertake and complete the Landlord's Work, and be fully and lawfully insured and licensed. Tenant shall, within one (1) week after its receipt of the final bid estimate from the Approved Contractor or the final bid and a detailed statement of the cost of Landlord's Work, be entitled to approve or disapprove such cost for Landlord's Work in writing. If Tenant disapproves such cost, Tenant shall meet with Landlord and the Approved Contractor within five (5) days after Landlord's receipt of Tenant's disapproval notice to (a) agree upon revisions to the Construction Drawings or Approved Construction Drawings so that the cost of Landlord's Work shall be reduced to an amount that is either (i) equal to or less than the TI Allowance or (ii) acceptable to Tenant or (b) negotiate with the Approved Contractor for a reduction in the cost of Landlord's Work. In all cases the Approved Contractor shall be selected and engaged on or before **July 15, 2017** in order to afford sufficient time for the timely completion of Landlord's Work.

(e) All of the Tenant's Initial Work shall be coordinated with Landlord's Work, and any other work being performed by Landlord and in such manner as to maintain harmonious labor relations and not damage the Building or interfere with Building operation and, except for installation of furnishings, shall be performed by contractors or workmen first approved by Landlord, which approval will not be unreasonably withheld. Except for work by the Approved Contractor, Tenant before Tenant's Initial Work and/or any Tenant alteration work is started, Tenant shall: secure all licenses and permits necessary therefore; deliver to Landlord a statement of the names of all its contractors and subcontractors; and cause each contractor to carry workmen's compensation insurance in statutory amounts covering all the contractor's and subcontractor's employees and commercial general liability insurance and property damage insurance in limits with respect to commercial general insurance, $1,000,000/$2,000,000 and with respect to property damage insurance, $500,000 (all such insurance to be written in companies reasonably approved by Landlord and naming Tenant as insured and naming Landlord, and Landlord's mortgagee as additional insureds), and to deliver to Landlord certificates of all such insurance. Tenant agrees to pay promptly when due the entire cost of any work done on the Premises for the Tenant's Initial Work, and not to cause or permit any liens for labor or materials performed or furnished in connection therewith to attach to the Premises or the Property and immediately to discharge any such liens (or bond the same off within thirty (30) days after notice of the filing thereof) which may so attach. Upon completion of Tenant's Initial Work, Tenant shall promptly deliver to Landlord original lien releases and waivers executed by each contractor, subcontractor, supplier materialmen, architect, engineer or other party which furnished labor, materials or other services in connection with such work and pursuant to which all liens, claims and other rights of such party with respect to labor, material or services furnished in connection with such work are unconditionally released and waived.

(f) The Landlord's Work and any other work required of Landlord pursuant to this Section 3 shall be deemed approved by Tenant when Tenant commences occupancy of the Premises for the Permitted Uses, except for any "punch list items" and any latent defects. Promptly upon the receipt of a list of such punch list items, Landlord shall commence and diligently pursue completion of such items and complete same within thirty (30) days of receipt of such punch list items.

(g) Tenant assumes full and complete responsibility to ensure that Landlord's Work is adequate to fully meet the needs and requirements of Tenant's business operations within the Premises and Tenant's use of the Premises. Neither the approval by Landlord of the Approved Construction Drawings or any plans, specifications, drawings or other items associated with Landlord's Work nor Landlord's performance, supervision or monitoring of the Landlord's Work shall constitute any warranty or covenant by Landlord to Tenant as to the adequacy of the design for Tenant's intended use of the Premises.

3.8 GENERAL PROVISIONS APPLICABLE TO CONSTRUCTION.

All construction work required or permitted by this Lease by Tenant and Landlord (including the Approved Contractor) shall be done in a good and workmanlike manner and in compliance with all applicable laws and all ordinances, regulations and orders of governmental authority. Landlord and Tenant may each inspect the work of the other at reasonable times and shall give notice of observed defects.

3.9 CONSTRUCTION REPRESENTATIVES.

Each party authorizes the other to rely in connection with plans and construction upon approval and other actions on the party's behalf by any Construction Representative of the party named in Section 1.2 or any person hereafter designated in substitution or addition by notice to the party relying thereon.

ARTICLE IV
RENT

4.1 RENT PAYMENTS

The Base Rent (at the rates specified in Section 1.2 hereof) and the additional rent or other charges payable pursuant to this Lease shall be payable by Tenant to Landlord at the Payment Address or such other place as Landlord may from time to time designate by notice to Tenant without any demand, counterclaim offset, or deduction whatsoever unless and except as otherwise specifically provided in this Lease.

(a) Subject to the Free Rent Period during which period Base Rent shall be abated, commencing on the Term Commencement Date, Base Rent and the monthly installments of Tenant's Proportionate Share of the Tax Excess and Tenant's Proportionate Share of Operating Costs Excess shall be payable in advance on the first day of each and every calendar month during the term of this Lease. As used in this Lease, the term " lease year " shall mean any calendar year or part thereof falling within the Lease Term.

(b) Base Rent and the monthly installments of Tenant's Proportionate Share of the Tax Excess and Tenant's Proportionate Share of Operating Costs Excess for any partial month shall be paid by Tenant to Landlord at such rate on a pro rata basis based on the number of days in such month and the number of days in such year. Any other charges payable by Tenant on a monthly basis, as hereinafter provided, shall likewise be prorated.

(c) For purposes herein, Base Rent and the monthly installments of Tenant's Proportionate Share of the Tax Excess and Tenant's Proportionate Share of Operating Costs Excess for any partial month, as well as any other charges due by Tenant hereunder, shall be deemed " Rent ." " Additional Rent " or " additional rent " consists of all such other sums of money as shall become due from and payable by Tenant to Landlord hereunder other than Base Rent, and, unless another due date is provided for in this Lease with respect thereto, additional rent shall be paid within thirty (30) days after written demand by Landlord, accompanied by invoices substantiating same.

(d) Rent not paid within ten (10) days of the date due shall bear interest at a rate (the " Lease Interest Rate ") equal to the lesser of (i) the so-called prime rate of interest charged from time to time by Bank of America, or its successor, plus two percent (2%) per annum or (ii) the maximum legally permissible rate, from the due date until paid.

(e) If any Rent or any other payments due hereunder from Tenant are not paid within ten (10) days of the due date thereof, Tenant shall be charged a late fee of $250.00 for each late payment for each month or portion thereof that said payment remains outstanding. Said late fee shall be payable in addition to and not in exclusion of any other remedies of Landlord on account of such late payments, including without limitation the obligation to pay interest on late payments, as provided above.

4.2 REAL ESTATE TAX

(a) The term " Taxes " shall mean all taxes and assessments (including without limitation, assessments for public improvements or benefits) and other charges or fees in the nature of taxes for municipal services which at any time during or in respect of the Lease Term may be assessed, levied, confirmed or imposed on or in respect of, or be a

lien upon, the Building and the Lot, or any part thereof, or any rent therefrom or any estate, right, or interest therein, or any occupancy, use, or possession of such property or any part thereof, and ad valorem taxes for any personal property used in connection with the Building or Lot. Taxes shall not include any penalties incurred as a result of Landlord's non-payment of Taxes or to file any tax or information returns when due. Landlord represents that the Building and the Lot are fully-assessed, and are not subject to any Tax abatements or exemptions or special assessments.

Should the Commonwealth of Massachusetts, or any political subdivision thereof, or any other governmental authority having jurisdiction over the Building, (1) impose a tax, assessment, charge or fee, which Landlord shall be required to pay, by way of substitution for or as a supplement to such Taxes, or (2) impose a tax on rents in substitution for or as a supplement to a tax levied against the Building or the Lot or any part thereof and/or the personal property used in connection with the Building or the Lot or any part thereof, all such taxes, assessments, fees or charges (" Substitute Taxes ") shall be deemed to constitute Taxes hereunder, but any such Substitute Taxes shall be computed as if the Building and Land were the only property of Landlord and the rents received by Landlord were the only income of Landlord. Taxes shall also include, in the year paid, all reasonable fees and costs incurred by Landlord in seeking to obtain a reduction of, or a limit on the increase in, any Taxes, regardless of whether any reduction or limitation is obtained. Tenant shall receive a proportionate credit for any such net tax abatements that Landlord receives during the Term, based on Tenant's Base Tax Year and previous payments. Except as hereinabove provided with regard to Substitute Taxes, Taxes shall not include any inheritance, excise, estate, succession, transfer, gift, franchise, net income or capital stock tax.

The term " Tax Period " shall mean the period during the Term during which Taxes are required to be paid under applicable law. Thus, under the law presently in effect in the Commonwealth of Massachusetts, Tax Period means the period from July 1 of a calendar year to June 30 of the subsequent calendar year.

(b) Commencing on the Tax Period beginning July 1, 2018, in the event that the Taxes during any Tax Period exceed the Base Tax Amount, Tenant shall pay to Landlord, as additional rent, Tenant's Proportionate Share of such excess (the " Tax Excess "). Tenant shall pay to Landlord, together with monthly payments of Base Rent, pro rata monthly installments on account of the projected Tax Excess for each Tax Period reasonably calculated by Landlord from time to time by Landlord with an adjustment made after the close of the Tax Period, to account for actual Tax Excess for such Tax Period. Landlord shall provide Tenant with copies of all tax bills for a Tax Period with any notice or payment requested made under this subsection. If the total of such monthly installments in any Tax Period is greater than Tenant's Proportionate Share of actual Tax Excess for such Tax Period, Tenant shall be entitled to a credit against Tenant's rental obligations hereunder in the amount of such difference or, if the Lease Term has expired and Tenant has no outstanding monetary obligations to Landlord, Landlord shall promptly pay such amount to Tenant. If the total of such monthly installments is less than such liability for such Tax Period, Tenant shall pay to Landlord the amount of such difference within thirty (30) days after Tenant receives Landlord's invoice therefore, together with all supporting and backup documentation relevant thereto.

(c) If any Taxes, with respect to which Tenant shall have paid Tenant's Proportionate Share of Tax Excess, shall be adjusted to take into account any abatement or refund, Tenant shall be entitled to a credit against rental obligations hereunder, in the amount of Tenant's Proportionate Share of such abatement or refund less Landlord's costs or expenses, including without limitation appraiser's and attorneys' fees, of securing such abatement or refund (to the extent such costs were not originally included in Taxes) or, if the Lease Term has expired and Tenant has no outstanding monetary obligations to Landlord, Landlord shall promptly pay such amount to Tenant. Tenant shall not apply for any real estate tax abatement without the prior written consent of Landlord.

(d) Tenant shall pay prior to delinquency all taxes assessed against and levied upon trade fixtures, furnishings, inventory, equipment and all other personal property of Tenant contained in, on, upon or around the Premises or related to Tenant's use of the Premises. If any of Tenant's personal property shall be assessed with Landlord's real or personal property, Tenant shall pay to Landlord the taxes attributable to Tenant within twenty (20) days after receipt of a written statement from Landlord setting forth the taxes applicable to Tenant's property.

4.3 TENANT'S SHARE OF OPERATING COSTS

Commencing on January 1, 2018, in the event that the Operating Costs (defined below) during any calendar year during the Lease Term exceed Operating Costs for the Base Operating Year (i.e., the Base Operating Costs), Tenant shall pay to Landlord, as additional rent, Tenant's Proportionate Share of such excess (the " Operating Costs Excess "). Tenant shall pay to Landlord pro rata monthly installments on account of the projected Operating Costs Excess for each Lease calendar year during the Lease Term in amounts reasonably calculated from time to time, but not more than once during the Lease calendar year, by Landlord with an adjustment made after the close of the Lease calendar year, to account for actual Operating Costs Excess for such Lease calendar year. Landlord shall deliver a statement of actual expenses in line-item detail, consistently applied throughout the Lease Term, within ninety (90) days after the close of each Lease calendar Year. If the total of such monthly installments in any Lease calendar year is greater than Tenant's Proportionate Share of actual Operating Costs Excess for such Lease calendar year, Tenant shall be entitled to a credit against Tenant's monthly installments on account of projected Operating Costs Excess hereunder in the amount of such difference or, if the Lease Term has expired and Tenant has no outstanding monetary obligations to Landlord, Landlord shall promptly pay such amount to Tenant. If the total of such monthly installments is less than such liability for such Lease calendar year, Tenant shall pay to Landlord the amount of such difference, as additional rent, within thirty (30) days after Tenant receives Landlord's invoice therefore, together with all supporting and backup documentation relevant thereto.

As used in this Lease, the term " Operating Costs " shall mean all costs and expenses incurred by Landlord in connection with the operation, insuring, repair, equipping, maintenance, replacement, management, cleaning and protection (collectively, "the Operation ") of the Building, the Building heating, ventilating, electrical, plumbing, and other systems and the Lot (collectively, " the Property "), including, without limitation, the following:

(1) All expenses incurred by Landlord or its agents which shall be related to employment of day and night supervisors, janitors, handymen, carpenters, engineers, firemen, mechanics, electricians, plumbers, guards, cleaners and other personnel (including amounts incurred for wages, salaries and other compensation for services, payroll, social security, unemployment and similar taxes, workmen's compensation insurance, disability benefits, pensions, hospitalization, retirement plans and group insurance, uniforms and working clothes and the cleaning thereof, and expenses imposed on Landlord or its agents pursuant to any collective bargaining agreement), for services in connection with the Operation of the Property, and personnel engaged in supervision of any of the persons mentioned above; provided, however, that the costs of employing personnel who work less than full-time in connection with the Operation of the Property shall be equitably adjusted; (2) The cost of services, materials and supplies furnished or used in the Operation of the Property, including, without limitation, the cost to perform Landlord's obligations under Sections 8.2 and 9.1 of this Lease; (3) The amounts paid for legal and other professional fees relating to the Operation of the Property, but excluding such fees paid in connection with (x) negotiations for or the enforcement of leases; and (y) seeking abatements of Taxes; (4) Insurance premiums and commercially reasonable deductibles, in Landlord's good faith determination, to the extent required, including without limitation rental abatement insurance pursuant to Section 11.5 of this Lease and casualty insurance required of Landlord under Section 11.7 of this Lease; (5) Costs for electricity, oil, natural gas, steam, water and other utilities required in the Operation of the Property; (6) Water and sewer use charges within the Building (as limited to domestic use and including other costs and expenses relating to the Building's sewer or septic system components but excluding all water and sewer use charges resulting from the use of any tenant in any demised premises within the Building); (7) The costs of snow-plowing and removal, landscaping and maintaining and operating irrigation systems; (8) Amounts paid to independent contractors for services, materials and supplies furnished for the Operation of the Property; (9) the cost of operating, replacing, modifying and/or adding improvements or equipment (i) mandated by any law, statute, regulation or directive of any governmental agency first in effect after the date of this Lease and any repairs or removals necessitated thereby, (ii) necessitated by the failure of Building machinery or equipment for which a prudent owner of comparable properties, in accordance with reasonable and customary building management practices, would elect to replace such machinery or equipment instead of repair or (iii) intended to improve the utility, efficiency or capacity of any Building System; (11) the cost of installing intrabuilding networking or related cabling (" INC ") and maintaining, repairing, securing and replacing existing INC for use by all tenants in the Building (and excluding such work by Landlord to the extent any INC is serving only a single tenant), (12) payments to independent contractors under service contracts for cleaning, operating, managing, maintaining and repairing the Building and said common areas (which payments may be to affiliates of Landlord); (13)

a Management fee based on a percentage of the gross rentals of the Building; provided, however, that management fees shall not exceed 3% of gross rental income; and (14) all other net expenses incurred in connection with the Operation of the health club, cafeteria facility, or other common amenity therein; provided that any associated revenues (by means of rental payments, membership fees or the like) shall have been first applied in determining any such net expenses. Operating Costs shall also include the Building's share (as reasonably determined and allocated by Landlord), if any, of: (i) the costs incurred by or attributable to Landlord in operating, maintaining, repairing, insuring and paying real estate taxes upon any common or shared facilities from time to time serving the Lot or Building in common with other buildings or parcels of land, such as any so-called "loop" access roads, retention ponds, sewer and other utility lines, amenities and the like; (ii) shuttle bus service (if and so long as Landlord shall provide the same); (iii) related personnel and the cost of administrative and or service personnel whose duties are not limited solely to the Building and/or the Lot, as allocated to the Building and/or Property by Landlord; and (iv) payments made by Landlord under any easement, license, operating agreement, declaration, restrictive covenant, or instrument pertaining to operating, maintaining, repairing, managing, insuring and paying real estate taxes among other buildings or parcels of land; provided, however, as of the date hereof, there are no such Operating Costs described in this sentence being passed along to Building tenants. Operating Costs may be incurred directly or by way of reimbursement, and shall include taxes applicable thereto.

Notwithstanding the foregoing, any costs not enumerated above or otherwise approved by Tenant in writing shall be excluded from Operating Costs, including the following: (i) costs of curing design or construction defects; (ii) depreciation; (iii) interest and principal payments on mortgages and other debt costs and ground lease payments, if any, and any penalties assessed as a result of Landlord's late payments of such amounts; (iv) real estate broker leasing commissions or compensation; (v) any cost or expenditure (or portion thereof) for which Landlord is reimbursed, whether by insurance proceeds or otherwise; (vi) attorneys' fees, costs, disbursements, advertising and marketing and other expenses incurred in connection with the negotiation and/or enforcement of leases with current and prospective tenants of the Building; (vii) rent for space which is not actually used by Landlord in connection with the management and operation of the Building; (viii) all costs or expense (including fines, penalties and legal fees) incurred due to the violation by Landlord, its employees, agents, contractors or assigns of the terms and conditions of the Lease, or any valid applicable building code, governmental rule, regulation or law, (ix) except for the above-referenced management fees, any overhead or profit increments to any subsidiary of affiliate of Landlord for services on or to the Building, to the extent that the costs of such services exceed competitive costs for such services; (x) the cost of constructing tenant improvements for Tenant or any other tenant of the Building; (xi) Operating Costs specially charged to and paid by any other tenant of the Building; (xii) the cost of special services, goods, or materials provided to any other tenant of the Building or Property; (xiii) capital improvements unless (X) required to comply with Laws and Restrictions first in effect after the Term Commencement Date of this Lease, (Y) necessary because of the failure of existing Building machinery or equipment for which a prudent owner of comparable properties, in accordance with reasonable and customary building management practices, would elect to replace such machinery or equipment instead of repair, or (Z) which are intended to improve the utility, efficiency or capacity of any Building system, in each case to be amortized over the useful life thereof together with interest on the unamortized balance thereof on any funds borrowed by Landlord to finance such capital improvements; or to extent such sums are not borrowed by Landlord to finance such capital improvements, with no additional interest costs included; (xiv) costs and expenses incurred in connection with disputes with individual tenants and/or the existence, maintenance or non-Property related operations of the legal entity or entities of which Landlord is comprised; (xv) costs of repairs necessitated by the negligence or willful misconduct of Landlord, its agents, contractors, employees, lenders or prospective purchasers; (xvi) subject to (xiii) above, the costs of developing and constructing the property or other improvements or additions at the Property, whether capital expenditures or otherwise; (xvii) Taxes and any other governmental payment incurred by Landlord in connection with the development or construction of the Property; (xviii) the cost of removing or remediating Hazardous Matters from the Property; (xix) any amounts paid to a person, firm, corporation or other entity under common ownership and control with Landlord that is in excess of the amount that would have been paid on an arms-length basis in the absence of such relationship; (xx) the cost of acquiring sculptures, paintings and other objects of art; (xxi) salaries and bonuses and benefits of officers, executives of Landlord and administrative employees above the grade of property manager or building supervisor, and if a property manager or building supervisor or any personnel below such grades are shared with other buildings or has other duties not related to the building containing the Premises, only the allocable portion of

such person or persons salary, bonuses, and benefits shall be included in Operating Costs; and (xxii) replacement and contingency reserves.

Notwithstanding anything contained herein to the contrary, Tenant's Proportionate Share of any Operating Costs Excess for each Lease year following the first Lease Year, exclusive of real estate taxes (the Building's proportionate share thereof), Landlord's Insurance, snow and ice removal, and utilities (the " Uncontrollable Cam Expenses "), shall not exceed 105% per year, on a non-cumulative basis, of the portion of Tenant's Proportionate Share of Operating Costs Excess attributable to these same Operating Costs (as subject to same exclusions) actually paid by Tenant for the prior Lease year.

If during all or part of any Lease calendar year (including, without limitation, the calendar year in which occurs any part of the term of this Lease and includes the Base Operating Year), Landlord is not performing or furnishing any item to any portion of the Building (the cost of which, if performed or furnished by Landlord to such portion of the Building would constitute a part of Operating Costs) on account of such portion of the Building not being occupied or leased, then Operating Costs shall be deemed to be increased by an amount equal to the additional costs and expenses which would reasonably have been incurred during such period by Landlord if it had performed or furnished such item to 95% of the Building.

4.4 INSPECTION RIGHT.

Landlord shall permit Tenant, at Tenant's expense and during normal business hours, but only one time with respect to any Lease calendar year, including the Base Operating Year, to review Landlord's invoices and statements relating to the Operating Costs for the applicable Lease calendar year for the purpose of verifying the Operating Costs and Tenant's share thereof, provided that notice of Tenant's desire to so review is given to Landlord not later than 120 days after Tenant receives an annual statement from Landlord, and provided that such review is thereafter commenced and prosecuted by Tenant with due diligence. Landlord shall make available to Tenant as part of any such review backup documentation relative to the Operating Costs for any such period. Any Operating Costs statement or accounting by Landlord shall be binding and conclusive upon Tenant unless (i) Tenant duly requests such review within such 120 day period, and (ii) within 120 days after such review request, Tenant shall notify Landlord in writing that Tenant disputes the correctness of such statement, specifying the particular respects in which the statement is claimed to be incorrect. The accountant or accounting firm conducting the review shall not be compensated based upon a percentage of alleged overcharges discovered. No subtenant shall have any right to conduct a review, and no assignee shall conduct a review for any period during which such assignee was not in possession of the Premises. Tenant agrees that the results of any Operating Costs review shall be kept strictly confidential by Tenant and shall not be disclosed to any other person or entity other than Tenant's officers, employees, accountants, attorneys, and lenders.

4.5 BASE RENT DURING ANY EXTENSION TERM.

During the Extension Term of this Lease (if Tenant exercises its option to extend the Term hereof in accordance with Section 3.2 above), the annual Base Rent to be paid by Tenant shall be the Fair Market Rental Value of the Premises determined as of the first day of the applicable Extension Term.

The " Fair Market Rental Value " shall mean the market rate for the rental of the Premises for the Extension Term, including updated base years for Operating Costs and Taxes, based upon rents then being paid for arm's length transactions for comparable space in the area in which the Property is located, including all relevant factors. The Fair Market Rental Value shall be determined as follows:

Within thirty (30) days after the exercise by Tenant of its option to extend the Term, Landlord shall advise Tenant in writing of Landlord's determination of the Fair Market Rental Value. Tenant shall be deemed to have accepted the rental amount contained in Landlord's said notice, and such rental rate shall be conclusively deemed to be the Fair Market Rental Value, unless Tenant notifies Landlord in writing, within seven (7) business days after Landlord's notice, that Tenant disputes the aforementioned determination by Landlord, in which event the parties shall proceed to the Fair Market Rental Value determination as set forth below.

In the event that Tenant so disputes the determination of the Fair Market Rental Value by Landlord, and Landlord and Tenant are unable to agree on the Fair Market Rental Value within 30 days, the same shall be determined as follows: Landlord and Tenant each shall, within ten days after the expiration of such thirty (30) day period, appoint an independent appraiser who shall be instructed to determine independently the Fair Market Rental Value. If the difference between the amounts so determined by such appraisers does not exceed ten percent (10%) of the lesser of such amounts, then the Fair Market Rental Value shall be an amount equal to fifty percent (50%) of the total of the amounts so determined. If the difference between the amounts so determined shall exceed ten percent (10%) of the lesser of such amounts, then such two (2) appraisers shall have ten (10) days thereafter to appoint a third appraiser, but if such appraisers fail to do so within such ten (10) day period, then either Landlord or Tenant may request the Greater Boston Real Estate Board or any successor organization thereto to appoint an appraiser within ten (10) days of such request, and both Landlord and Tenant shall be bound by any appointment so made within such ten (10) day period. If no such appraiser shall have been appointed within such ten (10) days either Landlord or Tenant may apply to any court having jurisdiction to have such appointment made by such court. Any appraiser appointed by the original appraisers, by the Greater Boston Real Estate Board or by such court shall be instructed to determine the Fair Market Rental Value in accordance with the definition of such term contained herein and within twenty (20) days after its appointment. If the third appraisal shall exceed the higher of the first two appraisals, the Fair Market Rental Value shall be the higher of the first two appraisals; if the third appraisal is less than the lower of the first two appraisals, the Fair Market Rental Value shall be the lower of the first two appraisals. In all other cases, the Fair Market Rental Value shall be equal to the third appraisal. Notwithstanding the foregoing, if either party shall fail to appoint its appraiser within the 10 day period specified above (such party being referred to herein as the " failing party "), the other party may serve notice on the failing party requiring the failing party to appoint its appraiser within ten (10) days of the giving of such notice. If the failing party shall not respond by appointment of its appraiser within said ten day period, then the appraiser appointed by the other party shall be the sole appraiser whose determination of the Fair Market Rental Value shall be binding and conclusive upon Tenant and Landlord. Each party shall pay for the fees and expenses of the appraiser appointed by it, but the fees and expenses of the third appraiser shall be shared equally by the parties. All appraisers appointed hereunder shall be real estate brokers or MAI appraisers having not less than ten (10) years' experience in leasing space or in appraising the value of leasehold interests in real estate similar to the Building located in the Boston Metro-West market. The foregoing determination shall be conclusive, final and binding on the parties and enforceable in any court having jurisdiction over the parties.

If the parties are unable to agree on the Fair Market Rental Value (or the arbitration procedure set forth above has not concluded) prior to the first day of the Extension Term, Tenant shall make monthly payments on account of Base Rent (in addition to all additional rent and other payments hereunder) in accordance with the increase in Base Rent established in the Lease for the last month of the initial term until the Fair Market Rental Value has been finally established as herein provided, at which time an appropriate retroactive Base Rent adjustment payment or refund shall be made, if necessary.

ARTICLE V
USE OF PREMISES

5.1 PERMITTED USE

Tenant agrees that the Premises shall be used and occupied by Tenant only for the purposes specified as the Permitted Use thereof in Section 1.2 of this Lease, and for no other purpose or purposes.

Tenant shall comply and shall cause its employees, agents, and invitees to comply with such reasonable rules and regulations as Landlord shall from time to time establish for the proper regulation of the Building and the Lot, provided that Landlord gives Tenant reasonable advance notice thereof and that such additional rules and regulations shall be of general application to all the tenants in the Building, except where different circumstances justify different treatment.

5.2 COMPLIANCE WITH LAWS

Tenant shall, at Tenant's sole expense, promptly comply with all applicable laws, ordinances, rules, regulations, orders, certificates of occupancy, conditional use or other permits, variances, covenants and restrictions of record, the

recommendations of Landlord's engineers or other consultants, and requirements of any fire insurance underwriters, rating bureaus or government agencies, now in effect or which may hereafter come into effect (collectively, " Laws and Restrictions "), whether or not they reflect a change in policy from that now existing, during the term or any part of the term hereof, relating in any manner to the occupation and use by Tenant of the Premises, completion of Tenant's Initial Work and any Alterations performed by Tenant except that the Tenant may defer compliance so long as the validity of any such Laws and Restrictions shall be contested by Tenant in good faith and by appropriate legal proceedings. Landlord shall, at its own cost and expense, comply with all Laws and Restrictions generally applicable to the Building as a whole, and notwithstanding anything to the contrary contained herein, Tenant shall not be required to make any structural change, alteration, addition or correction required by any Law and Restrictions which may be adopted or promulgated after the date of this Lease, unless necessitated by Tenant's acts, Tenant's Alterations or Tenant's particular use of the Premises for purposes other than the Permitted Uses. Landlord agrees to promptly remedy any violations noted or issued with respect to the Building which shall either prevent Tenant from making any Alterations in the Premises or from opening for or conducting business in the Premises. Tenant agrees that no trade or occupation shall be conducted in the Premises or use made thereof which will be unlawful, improper, or contrary to any Laws and Restrictions or which will disturb the quiet enjoyment of the other tenants of the Building. Other than the Certificate of Occupancy required for the Premises to be procured upon completion of Landlord's Work (which is Landlord's responsibility), Tenant shall obtain any and all approvals, permits, licenses, variances and the like from governmental or quasi-governmental authorities, including without limitation any Architectural Access Board and Board of Fire Underwriters (collectively, " Approvals ") which are required for Tenant's use of the Premises, including, without limitation, any which may be required for any construction work and installations in conjunction with the Tenant's Initial Work, alterations, or additions made by Tenant to, in, on, or about the Premises; provided, however, that Tenant shall not seek or apply for any Approvals without first having given Landlord a reasonable opportunity to review any applications for Approvals and all materials and plans to be submitted in connection therewith and obtaining Landlord's written consent, which consent shall not be unreasonably withheld, conditioned or delayed. Upon Tenant's request and at Tenant's expense, Landlord shall join in the application for any Approvals whenever such joining by Landlord shall be required by any governmental agency having jurisdiction, and Landlord shall otherwise reasonably cooperate with Tenant in connection therewith upon Tenant's request. In any event, Tenant shall be responsible for all costs, expenses, and fees in connection with obtaining all Approvals. Without limiting the general application of the foregoing, other than Landlord's Work, Tenant shall be responsible for compliance of the Premises, including, without limitation, any alterations it may make to the Premises, with the requirements of the Americans with Disabilities Act (42 U.S.C. Section 12101 et seq.) and the regulations and Accessibility Guidelines for Buildings and Facilities issued pursuant thereto, as the same may be amended from time to time (collectively, the " ADA "). Other than Landlord's Work, Tenant shall be responsible for compliance of the Premises with the ADA throughout the term of the Lease. Tenant's inability to obtain or delay in obtaining any such Approval shall in no event reduce, delay, or terminate Tenant's rental, payment, and performance obligations hereunder. Tenant shall, at its own cost and expense, (i) make all installations, repairs, alterations, additions, or improvements to the Premises required by any Laws and Restrictions as a result of Tenant's particular use of the Premises; (ii) keep the Premises equipped with all required safety equipment and appliances; and (iii) comply with all of Landlord's and Tenant's insurers reasonable requirements applicable to the Premises, Building and Lot. Tenant shall not place a load upon any floor in the Premises exceeding the lesser of (a) the floor load per square foot of area which such floor was designed to carry as certified by Landlord's architect and (b) the floor load per square foot of area which is allowed by law. Landlord reserves the right to prescribe the weight and position of all business machines and mechanical equipment, including safes, which shall be placed so as to distribute the weight.

5.3 INSURANCE RISKS

Tenant shall not permit any use of the Premises which will make voidable or, unless Tenant pays the extra insurance premium attributable thereto as provided below, increase the premiums for any insurance on the Building or on the contents of said property or which shall be contrary to any law or regulation from time to time established by the New England Fire Insurance Rating Association (or any successor organization) or which shall require any alteration or addition to the Building. Landlord shall notify Tenant of any such condition in writing and Tenant shall have thirty (30) days after such notice to cure. If Tenant does not cure within the prescribed timeframe, Tenant shall, within thirty (30) days after written demand therefore, reimburse Landlord for the costs of all extra insurance premiums caused by Tenant's use of the Premises. Any such amounts shall be deemed to be additional rent hereunder.

5.4 ELECTRICAL EQUIPMENT

Other than typical office equipment, light manufacturing, laboratory, research and development equipment, including, without limitation, computers, copiers, and printers, Tenant shall not, without Landlord's written consent in each instance, which consent shall not be unreasonably withheld, conditioned or delayed, connect to the electrical distribution system any fixtures, appliances, or equipment which will operate individually or collectively at a wattage in excess of the capacity of the electrical system serving the Premises as the same may be reasonably determined by Landlord who may audit Tenant's use of electric power to determine Tenant's compliance herewith. If Landlord, in its sole discretion, permits such excess usage, Tenant will pay for the cost of such excess power as additional rent, together with the cost of installing any additional risers, meters, or other facilities that may be required to furnish or measure such excess power to the Premises.

5.5 TENANT'S OPERATIONAL COVENANTS

(a) Affirmative Covenants

Subject to Landlord's obligations with respect to cleaning, repair and maintenance, in regard to the use and occupancy of the Premises, and in addition to those covenants set forth in other sections of this Lease, Tenant will, at its sole expense: (1) keep the inside of all glass in the doors and windows of the Premises reasonably clean (2) replace promptly any cracked or broken glass of the Premises that was broken by Tenant with glass of like kind and quality; (3) maintain the Premises in a clean, orderly and sanitary condition (provided, however, Landlord shall be responsible for the regular cleaning of the Premises unless Tenant upon written notice to Landlord elects to conduct this regular cleaning with its own agents in which case it shall do so at its own expense without any credit under this Lease); (4) keep any garbage, trash, rubbish or other refuse within the interior of the Premises until removed by Landlord or Landlord's agent; (5) keep all Tenant's mechanical apparatus free of vibration and loud noise which may be transmitted beyond the Premises; and (6) comply with and observe all rules and regulations reasonably established by Landlord from time to time and provided to the Tenant, including, without limitation, those rules and regulations set forth in Exhibit C attached hereto.

(b) Negative Covenants

In regard to the use and occupancy of the Premises and common areas, Tenant will not, in Landlord's reasonable judgment: (1) place or maintain any trash, refuse or other articles in any vestibule or entry of the Premises, on the sidewalks or corridors adjacent thereto or elsewhere on the exterior of the Premises so as to obstruct any corridor, stairway, sidewalk or common area; (2) cause or permit objectionable odors to emanate or to be dispelled from the Premises; or (3) commit, or suffer to be committed, any waste upon the Premises or any public or private nuisance or other act or thing which may disturb the quiet enjoyment of any other tenant or occupant of the Building, or use or permit the use of any portion of the Premises for any unlawful purpose.

5.6 SIGNS

Except as otherwise set forth herein, Tenant shall not place any signs, placards, or the like on the Building or in the Premises that will be visible from outside the Premises (including without limitation both interior and exterior surfaces of windows). Landlord shall provide, at Landlord's expense, building standard lettering on Tenant's Proportionate Share of the mahogany tenant roster kiosk in the Building lobby to identify Tenant's official name and Building address. Tenant at its own cost shall provide its own signage for the Premises, with the prior approval of Landlord, not to be unreasonably withheld, as to design and appearance to maintain consistency with other tenant signage in the Building. Following installation, Tenant shall maintain its existing signage at the entrance to the Premises and shall procure Landlord's consent, not to be unreasonably withheld, with respect to any modifications thereto. With respect to any monument signage located on the Lot at the entrance to the Boston Post Road Corporate Center, Tenant shall be provided, at Landlord's expense, an area of signage on this monument based upon its Tenant's Proportionate Share and the overall available signage area.

5.7 HAZARDOUS MATERIALS

Neither Tenant nor any of its employees, agents, invitees, licensees, contractors, representative or any other person or entity for whom Tenant is responsible (collectively, " Tenant's Agents ") shall use, maintain, generate, allow or bring on the Premises or the Property or transport or dispose of, on or from the Premises or the Property (whether into the ground, into any sewer or septic system, into the air, by removal off-site or otherwise) any Hazardous Matter (as hereinafter defined) without Landlord's consent. Tenant shall promptly deliver to Landlord copies of any notices, orders or other communications received from any governmental agency or official affecting the Premises and concerning alleged violations of the Environmental Requirements (hereinafter defined). Any Hazardous Matter in the Premises, and all containers therefore, shall be used, kept, stored and disposed of in conformity with all applicable Laws and Restrictions.

Tenant shall save Landlord (together with its officers, directors, stockholders, partners, beneficial owners, trustees, managers, members, employees, agents contractors, and mortgagees) harmless and indemnified from and against any and all Environmental Damages (hereinafter defined) which the indemnified parties may sustain or be put to on account of: (1) the presence or release of any Hazardous Matter upon, in or from the Premises during the Term and during any period when Tenant, or Tenant's Agents, are occupying the Premises or any part thereof, caused by Tenant or Tenant's Agents; (2) the presence or release of any Hazardous Matter upon, in or from the Property caused by the act, omission or default of Tenant or Tenant's Agents; (3) the activities or other action or inaction of Tenant or Tenant's Agents in violation of Environmental Requirements; and (4) the breach beyond any applicable notice and cure period of any of Tenant's obligations under this Section 5.7, except Tenant's indemnity shall not cover the willful misconduct or negligence of Landlord or Landlord's Agents. The provisions of this Section shall be in addition to any other obligations and liabilities Tenant may have to Landlord under this Lease or otherwise at law or in equity, and in the case of conflict between this Section 5.7 and any other provision of this Lease, the provision imposing the most stringent requirement on Tenant shall control. The obligations of Tenant under this Section 5.7 shall survive the expiration or termination of this Lease and the transfer of title to the Premises. The following terms as used herein shall have the meanings set forth below: " Hazardous Matter " shall mean any substance: (i) which is or becomes defined as Hazardous Substance, Hazardous Waste, Hazardous Material or Oil under The Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. Section 9601 et seq., M.G.L. Chapter 21C, M.G.L. Chapter 21D or M.G.L. Chapter 21E, and the regulations promulgated thereunder, as same may be amended from time to time; or (ii) which is toxic, explosive, corrosive, flammable, infectious, radioactive, carcinogenic, mutagenic or otherwise hazardous to health or the environment and which is or becomes regulated and the presence of which requires investigation or remediation pursuant to any applicable law. " Environmental Requirements " shall mean all applicable law, the provisions of any and all approvals, and the terms and conditions of this Lease insofar as same relate to the release, maintenance, use, keeping in place, transportation, disposal or generation of Hazardous Matter, including without limitation those pertaining to reporting, licensing, permitting, health and safety of persons, investigation, containment, remediation, and disposal. " Environmental Damages " shall mean all liabilities, injuries, losses, claims, damages (whether special, consequential or otherwise), settlements, attorneys' and consultants' fees, fines and penalties, interest and expenses, and costs of environmental site investigations, reports and cleanup, including without limitation costs incurred in connection with: any investigation or assessment of site conditions or of health of persons using the Building or the Lot; risk assessment and monitoring; any cleanup, remedial, removal or restoration work required by any governmental agency or reasonably recommended by Landlord's environmental consultant; any reasonable decrease in value of Landlord's Property; any reasonable damage caused by loss or restriction of rentable or usable space in Landlord's Property; or any reasonable damage caused by adverse impact on marketing or financing of Landlord's Property. No consent or approval of Landlord shall in any way be construed as imposing upon Landlord any liability for the means, methods, or manner of removal, containment or other compliance with applicable law for and with respect to the foregoing. The terms of this Section 5.7 shall apply to any transportation, storage, use or disposal of Hazardous Materials irrespective of whether Tenant has obtained Landlord's consent therefore but nothing in this Lease shall limit or otherwise modify the requirement of obtaining Landlord's prior consent as set forth in the first sentence of this Section 5.7. The consent requirement contained herein shall not apply to ordinary office products or products used in connection with the Permitted Uses that may contain de minimus quantities of hazardous materials and Hazardous Matters; however, Tenant indemnification obligations are not diminished with respect to the presence of such products.

Landlord shall save Tenant (together with its officers, directors, stockholders, partners, beneficial owners, trustees, managers, members, employees, agents and contractors) harmless and indemnified from and against any and all Environmental Damages (as defined above) which the indemnified parties may sustain or be put to on account of the presence or release of any Hazardous Matter upon, in or from the Property, ***except to the extent caused by*** (1) the presence or release of any Hazardous Matter upon, in or from the Premises during the Term and during any period when Tenant, or Tenant's Agents, are occupying the Premises or any part thereof, caused by Tenant or Tenant's Agents; (2) the presence or release of any Hazardous Matter upon, in or from the Property caused by the act, omission or default of Tenant or Tenant's Agents; (3) the activities or other action or inaction of Tenant or Tenant's Agents in violation of Environmental Requirements; and (4) the breach of any of Tenant's obligations under this Section 5.7, except Landlord's indemnity shall not cover the negligence or willful misconduct of Tenant or the Tenant's Agents. The provisions of this Section shall be in addition to any other obligations and liabilities Landlord may have to Tenant under this Lease or otherwise at law or in equity, and in the case of conflict between this Section 5.7 and any other provision of this Lease, the provision imposing the most stringent requirement on Landlord shall control.

Notwithstanding anything herein to the contrary, Tenant shall not be responsible for the costs and expenses incurred in connection with the removal or remediation of Hazardous Material that is not in compliance with applicable law on, the Term Commencement Date and which is located in, on or under the Building or the Property prior to the Term Commencement Date and was not brought on to the Property by Tenant or its agents. Landlord warrants and represents that there are currently no Hazardous Materials in the Premises.

ARTICLE VI
INSTALLATIONS, ALTERATIONS, AND ADDITIONS

Following completion of the Landlord's Work, Tenant after the Term Commencement Date shall not make any alterations, improvements, additions, utility installations or repairs (hereinafter collectively referred to as " Alterations ") to the Premises, except in accordance with this Article VI and with the prior written consent of Landlord, which Landlord agrees not unreasonably to withhold, condition or delay as to nonstructural Alterations (nonstructural Alterations being those that do not affect the Building's structure, roof, exterior or mechanical, electrical, plumbing, life safety or other Building systems of the Building or Premises) within the ten (10) day period below. Tenant shall submit, together with Tenant's request for approval to perform any such alterations, additions or improvements, a specific request for Landlord's decision as to whether or not such alterations, additions or improvements must be removed upon the expiration or earlier termination of the Lease, and Landlord shall inform Tenant of its decision as to Alterations, the removal thereof, and Tenant's contractors within ten (10) days of such request; provided, however, Tenant shall have no demolition obligation and shall not be required to remove any Alterations unless the same are not generally usable by other office tenants. Such decision shall be binding upon both Landlord and Tenant, their successors and assigns. In the event that Landlord fails to supply Tenant with an answer in writing, Tenant will not be required to remove said alterations, additions or improvements upon the expiration or earlier termination of the Lease, and such Alterations and contractors shall be approved. In no event shall Landlord's approval of any proposed Alterations to the Premises constitute a representation by Landlord that such work complies with the requirements of any applicable Laws and Restrictions, including without limitation the requirements of the ADA. Without limiting any of the terms hereof, Landlord will not approve any Alterations increasing the cost of construction, insurance or taxes on the Building or of Landlord's services to the Premises, unless Tenant first gives assurances acceptable to Landlord for payment of such increased cost. All Alterations made by Tenant shall be made in accordance with plans and specifications (to the extent plans and specifications are required by Laws and Requirements to be submitted to any governmental authority) which have been reasonably approved in writing by the Landlord, pursuant to a duly issued permit, and in accordance with all Laws and Restrictions, the provisions of this Lease and in a good and first-class workmanlike manner using new materials of same or better quality as base building standard materials, free of all liens and encumbrances and prior to Tenant's use of the Premises, after the performance of any such Alterations, Tenant shall procure (other than the Certificate of Occupancy) any required certificates. All Alterations shall be performed by a contractor or contractors selected by Tenant and reasonably approved in writing by Landlord. Tenant shall reimburse Landlord for any reasonable out-of-pocket costs it incurs in reviewing the plans therefore. If, as a result of any Alterations made by Tenant, Landlord is obligated to comply with ADA or any other Laws or Restrictions and such compliance requires Landlord to make any improvement or Alteration to any portion of the Building, as a condition to Landlord's consent, Landlord shall have the right to require Tenant to pay to Landlord prior to the construction of any

Alteration by Tenant, the entire reasonable cost of any improvement or Alteration Landlord is obligated to complete by such Law and Restriction. After the expiration of any applicable notice and cure period, Landlord shall have the right to stop any work not being performed in conformance with this Lease, and, at its option, may repair or remove non-conforming work at the expense of Tenant. Tenant hereby indemnifies and holds Landlord harmless from and against any liens, encumbrances and violations of Laws and Restrictions caused by Tenant's Alterations. The filing of any lien or encumbrance, or the violation of Laws or Restrictions caused by Tenant's Alterations, beyond any applicable notice and cure period, shall constitute a default hereunder, and Tenant, at its expense, shall satisfy, cancel or discharge all such liens relating to any Alterations, and remove same from the record (or may bond such liens) within thirty (30) days after Landlord makes written demand therefor as set forth in Section 17.21 hereof. The repair and indemnity obligations of Tenant hereunder, including Tenant's obligations to repay Landlord the cost of repairing or removing Alterations, shall survive the termination of this Lease. All Alterations performed by Tenant in the Premises shall remain therein (unless Landlord directs Tenant to remove the same on termination or expiration of this Lease in accordance with the provisions set forth above) and, at termination or expiration, shall be surrendered as a part thereof, except for Tenant's usual trade furniture and equipment, if movable, installed prior to or during the Lease term at Tenant's cost, which trade furniture and equipment Tenant shall remove in their entirety prior to the termination or expiration of this Lease. Tenant agrees to repair any and all damage to the Premises resulting from such removal (including removal of Tenant's Alterations directed by Landlord in accordance with the provisions set forth above) or, if Landlord so elects, to pay Landlord for the reasonable cost of any such repairs forthwith after billing therefore. At all times when any Alterations by Tenant are in progress, there shall be maintained, at Tenant's cost and expense, insurance meeting the requirements under Article 11 of this Lease and certificates of insurance evidencing such coverage shall be furnished to Landlord prior to the commencement of any such work. Notwithstanding the above, Tenant may make cosmetic alterations without Landlord's approval, provided Tenant complies with the requirements for performing work in the Premises and for removal thereof upon expiration or termination of Lease Term in accordance with this Lease.

ARTICLE VII
ASSIGNMENT AND SUBLETTING

7.1 PROHIBITION

Notwithstanding any other provision of this Lease, and other than in the case of a Permitted Transfer, Tenant shall not, directly or indirectly, assign, mortgage, pledge or otherwise transfer, voluntarily or involuntarily, this Lease or any interest herein or sublet (which term without limitation, shall include granting of concessions, licenses, and the like) or allow any other person or entity to occupy the whole or any part of the Premises, without, in each instance, having first received the express written consent of Landlord, which consent shall not be unreasonably withheld, conditioned or delayed. Without limitation, it shall not be unreasonable for Landlord to withhold such approval from any assignment or subletting where, in Landlord's reasonable opinion: (i) the proposed sublessee or assignee is a current tenant or a prospective tenant (meaning such tenant has been shown space or has been presented with or has made an offer to lease space within the last three months) of the Building at any time that Landlord has space in the Building to offer such Tenant comparable to the Premises; (ii) the use of the Premises by any sublessee or assignee (even though a Permitted Use) violates any use restriction granted by Landlord in any other lease or would otherwise cause Landlord to be in violation of its obligations under another lease or agreement to which Landlord is a party of which Tenant has received prior notice; (iii) Landlord has sued or been sued by the proposed assignee or subtenant or has otherwise been involved in a legal dispute with the proposed assignee or subtenant; (iv) the proposed assignee's or subtenant's business will impose a burden on the Property's parking facilities, elevators, common areas, facilities, or utilities that is materially greater than the burden imposed by Tenant, in Landlord's reasonable judgment; (v) Tenant is in default of any of its obligations under the Lease beyond applicable notice and cure periods at the time of the request; (vi) the assignee or subtenant is involved in a business which conflicts with the Permitted Use hereunder; (vii) the assignee or subtenant intends to use the Premises as an executive suite; or (viii) the assignee or subtenant is a governmental or quasi-governmental entity or an agency, department or instrumentality of a governmental or quasi-governmental agency that does not presently occupy any space in the Building. In no event, however, shall Tenant assign this Lease or sublet the whole or any part of the Premises to a proposed assignee or sublessee which at the time of the request is judicially declared bankrupt or insolvent according to law, or with respect to which at the time of the request an assignment has been made of property for the benefit of creditors, or with respect to which at the time of the

request a receiver, guardian, conservator, trustee in involuntary bankruptcy or similar officer has been appointed to take charge of all or any substantial part of the proposed assignee's or sublessee's property by a court of competent jurisdiction, or with respect to which at the time of the request a petition has been filed for reorganization under any provisions of the Bankruptcy Code now or hereafter enacted, or if at the time of the request a proposed assignee or sublessee has filed a petition for such reorganization, or for arrangements under any provisions of the Bankruptcy Code now or hereafter enacted and providing a plan for a debtor to settle, satisfy or extend the time for the payment of debts. Any assignment of this Lease or subletting of the whole or any part of the Premises (other than Permitted Transfers as set forth below) by Tenant without Landlord's express consent shall be invalid, void and of no force or effect. This prohibition includes, without limitation, any assignment, subletting, or other transfer that would occur by operation of law, merger, consolidation, reorganization, acquisition, transfer, or other change of Tenant's corporate or proprietary structure, subject, however to the provisions set forth in the last paragraph of this Section 7.1. Any request for consent under this Section 7.1 shall set forth, in detail reasonably satisfactory to Landlord, the identification of the proposed assignee or sublessee, and the material terms on which the proposed assignment or subletting is to be made, including, without limitation, the rent to be paid in respect thereto and such request shall be treated as Tenant's representation in respect to the information submitted therewith (" Tenant's Offer Notice "), and Landlord shall, within twenty (20) days after receipt of the Tenant's Offer Notice, either (a) reasonably consent or deny its consent to such assignment or subletting, or (b) if Section 7.4 hereof is applicable, exercise its recapture right. In the event that Landlord fails to supply Tenant with an answer in writing within such twenty (20) day period, such proposed assignment or sublease shall be deemed approved by Landlord, and Landlord shall have waived its recapture right in Section 7.4.

In any case where Landlord shall consent to any assignment or subletting, Tenant originally named herein shall remain fully liable for Tenant obligations hereunder, including, without limitation, the obligation to pay the rent and other amounts provided under this Lease and such liability shall not be affected in any way by any future amendment, modification, or extension of this Lease or any further assignment, other transfer, or subleasing and Tenant hereby irrevocably consents to any and all such transactions; provided, however, if this Lease be modified after any such assignment so as to increase Tenant's obligations, then the originally named Tenant, unless it consented to such modification, shall be liable only for the obligations under this Lease as same existed prior to such modifications. Tenant agrees to pay to Landlord, within thirty (30) days of billing therefor, all reasonable legal and other out-of-pocket expenses incurred by Landlord in connection with any request to assign or sublet, excluding Permitted Transfers, not to exceed $2,000.00 in the aggregate per assignment or sublet. It shall be a condition of the validity of any permitted assignment that the assignee agree, in commercially reasonable form satisfactory to Landlord, to be bound by all Tenant obligations hereunder, including, without limitation, the obligation to pay all Rent and other amounts provided for under this Lease and the covenant against further assignment or other transfer or subletting.

Without limitation of the rights of Landlord hereunder in respect thereto, if there is any assignment of this Lease by Tenant for consideration or a subletting of the whole of the Premises by Tenant (except any Permitted Transfer set forth below) at a rent which exceeds the rent payable hereunder by Tenant, or if there is a subletting of a portion of the Premises by Tenant at a rent in excess of the subleased portion's pro rata share of the Rent payable hereunder by Tenant, then Tenant shall pay to Landlord, as additional rent, forthwith upon Tenant's receipt of the consideration (or the cash equivalent thereof) therefor, in the case of both an assignment and a subletting, fifty (50%) percent of the amount of any such excess rent after Tenant's recuperation of reasonable attorneys' fees, brokerage commissions, advertising expenses, cash allowance, tenant improvement costs and free rent pertaining to any sublease or assignment. The provisions of this paragraph 7.1 shall apply to each and every assignment of this Lease and each and every subletting of all or a portion of the Premises, except to a Permitted Transferee. For the purposes of this Section 7.1, the term " rent " shall mean all rent and additional rent, in each case after deducting therefrom Tenant's costs in connection with such transaction, including, without limitation, broker's fees and commissions, legal fees and improvement expenses, free rent and allowances and advertising expenses.

Notwithstanding any other provision of this Article VII, Tenant may assign this Lease or sublease the Premises or any part thereof without the consent of Landlord to (i) any wholly owned subsidiary or to any parent corporation of Tenant; (ii) any affiliate or entity under common control with Tenant or any affiliate or entity under common control with a parent or subsidiary of Tenant;' (iii) any entity of which Tenant, a Tenant affiliate, Tenant partners, Tenant subsidiary, Tenant parent, or entity under common control with Tenant is a shareholder or partner or other equity interest holder; or (iv) any entity which acquires all or substantially all of the assets or stock or equity interest of

Tenant, by merger, consolidation, acquisition or other business reorganization (each of (i), (ii), (iii) or (iv) a " Permitted Transfer " and each assignee or subtenant thereunder a " Permitted Transferee "), which Permitted Transfer shall not be deemed to be an assignment or subletting within the meaning of this Section 7.1 nor require Landlord's consent or approval or be subject to payment of any excess rent pursuant to the immediately preceding paragraph provided that in any of such events (1) Landlord receives prior written notice of any such transactions (unless such advanced notice is prohibited under applicable laws or by confidentiality), and (2) in no event shall Tenant be released from its obligations under this Lease. If requested by Landlord in connection with an assignment of the Lease, the Permitted Transferee shall sign and deliver to Landlord a commercially reasonable form of assumption agreement. It is further understood that (a) shares of ownership or similar interests in Tenant or an entity with which it may merge or consolidate may be periodically offered for sale on public or private basis, and (b) shares of stock or other equity interests of Tenant may be transferred through the "over the counter" market or through any recognized stock exchange or in connection with a public offering of shares or other equity interests of Tenant, and no prohibitions or conditions on assignment or subletting under this Article VII shall apply to any such activities.

Notwithstanding anything contained in this Lease to the contrary, Tenant may, without Landlord's consent and without being obligated to remit any profit or overage to Landlord, permit third parties (individually, a " Space Sharer ") to use and occupy portions of the Premises in common with Tenant not to exceed twenty (20%) of the total area of the Premises, provided that (i) such arrangement will terminate automatically upon a default occurring and continuing beyond any applicable notice and grace period under this Lease; (ii) any Space Sharer shall use the Premises in conformity with all applicable provisions of this Lease, including, without limitation, Article 2 hereof; (iii) in no event shall the use of any portion of the Premises by a Space Sharer create or be deemed to create any right, title or interest in or to the Premises for such Space Sharer; and (iv) the portion of the Premises occupied by any Space Sharer and the portion of the Premises occupied by Tenant shall not be, and shall not be required by law to be, separated by legal demising walls within the Premises or so as to create separate entrances from the elevator landing or public corridors. Any such use of all or any portion of the Premises by such Space Sharer shall not constitute or be deemed a sublease and shall not relieve Tenant of any of its obligations or liabilities under this Lease.

7.2 ACCEPTANCE OF RENT FROM TRANSFEREE

The acceptance by Landlord of the payment of Rent, additional rent, or other charges following assignment, subletting, or other transfer prohibited by this Article VII shall not be deemed to be a consent by Landlord to any such assignment, subletting, or other transfer, nor shall the same constitute a waiver of any right or remedy of Landlord.

7.3 SUBLEASE RENTALS

The following terms and conditions shall apply to any subletting by Tenant of all or any part of the Premises and shall be deemed included in all subleases under this Lease whether or not expressly incorporated therein:

Tenant hereby absolutely and unconditionally assigns and transfers to Landlord all of Tenant's interest in all rentals and income arising from any sublease entered into by Tenant, and Landlord may collect such rent and income and apply same toward Tenant's obligations under this Lease; provided, however, that until a default occurs in the performance of Tenant's obligations under this Lease beyond applicable notice and cure periods, Tenant may receive, collect and enjoy the rents accruing under such sublease. Landlord shall not, by reason of this or any other assignment of such rents to Landlord nor by reason of the collection of the rents from a subtenant, be deemed to have assumed or recognized any sublease or to be liable to the subtenant for any failure of Tenant to perform and comply with any of Tenant's obligations to such subtenant under such sublease, including, but not limited to, Tenant's obligation to return any security deposit. Tenant hereby irrevocably authorizes and directs any such subtenant, upon receipt of a written notice from Landlord stating that a monetary default exists in the performance of Tenant's obligations under this Lease beyond any applicable notice and cure period, to pay to Landlord the rents due as they become due under the sublease. In the event Landlord terminates this Lease by reason of a default of Tenant, Landlord at its option and without any obligation to do so, may require any subtenant to attorn to Landlord, in which event Landlord shall undertake the obligations of Tenant under such sublease from the time of the exercise of said option to the termination of such sublease; provided, however, Landlord shall not be liable for any prepaid rents or security deposit paid by such subtenant to Tenant or for any other prior defaults of Tenant under such sublease.

7.4 RIGHT OF RECAPTURE.

Except in connection with Permitted Transfers or Space Sharers, with respect to any assignment of this Lease or a sublease of the entire Premises for the entire remaining Term of this Lease requiring Landlord's consent, in lieu of consenting to any proposed assignment or sublease, Landlord shall have the right, but not the obligation, to terminate this Lease and recapture the Premises upon thirty (30) days' notice to Tenant unless, within five (5) business days after Landlord's notice to Tenant exercising its option to terminate this Lease, Tenant notifies Landlord in writing that Tenant is withdrawing its request for Landlord's consent to such assignment or sublease, in which event such exercise by Landlord of such option to terminate shall be void and of no further force and effect.

ARTICLE VIII
REPAIRS AND MAINTENANCE

8.1 TENANT OBLIGATIONS

Tenant covenants and agrees that Tenant will keep neat and clean and maintain in good order, condition and repair, the Premises and every part thereof (and any signs permitted hereunder) throughout the Lease Term, excepting only those repairs for which Landlord is responsible under the terms of this Lease (including without limitation, subject to the provisions of Section 11.6, Landlord shall reimburse Tenant for the costs of maintaining, repairing, or otherwise correcting any condition caused by an act, omission, neglect or default under this Lease of Landlord or any employee, agent, or contractor of Landlord or any other party for whose conduct Landlord is responsible), damage by fire or other casualty or as a consequence of the exercise of the power of eminent domain and reasonable wear and tear and Tenant shall surrender the Premises at the expiration or termination of the Lease Term in such condition. Reasonable wear and tear shall not include any damage or deterioration that would have been prevented by proper maintenance by Tenant or Tenant otherwise performing all of its obligations under this Lease. Tenant shall be responsible for the cost of repairs which may be made necessary by reason of damage to any areas in the Building, including the Premises, by Tenant, Tenant's contractors or Tenant's agents, employees, invitees, or anyone claiming by, through or under Tenant. If repairs are required to be made by Tenant pursuant to the terms hereof, Landlord may demand that Tenant make the same forthwith, and if Tenant fails, refuses or neglects to commence such repairs and complete the same with reasonable dispatch after such demand, Landlord may (but shall not be obligated to) make or cause such repairs to be made and shall not be responsible to Tenant for any loss or damage that may accrue to Tenant's stock or business by reason thereof. If Landlord makes or causes such repairs to be made, Tenant agrees that Tenant will forthwith, on demand, pay to Landlord the reasonable out-of-pocket cost thereof, and if Tenant shall fail to so reimburse Landlord upon demand, Landlord shall have the remedies provided for the nonpayment of rent or other charges payable hereunder.

8.2 LANDLORD OBLIGATIONS

Except as may be provided in Articles XII and XIII, Landlord agrees to keep in the same good order, condition, and repair as of the date of this Lease the structural components and the roof of the Building, the common utility and Building systems, the common hallways, entrances, restrooms, elevators, cafeteria and exercise room, the paved surface of the parking areas serving the Building and the sprinkler system and all other common facilities of the Property, except that, subject to the provisions of Section 11.6, Tenant shall reimburse Landlord, as additional rent hereunder, for the costs of maintaining, repairing, or otherwise correcting any condition caused by an act, omission, neglect or default under this Lease of Tenant or any employee, agent, or contractor of Tenant or any other party for whose conduct Tenant is responsible. Without limitation, Landlord shall not be responsible to make any improvements or repairs other than as expressly provided in this Section 8.2 and Landlord shall not be liable for any failure to make such repairs unless Tenant has given notice to Landlord of the need to make such repairs and Landlord has failed to commence to make such repairs within a reasonable time thereafter.

Landlord shall uniformly enforce the rules and regulations set forth in Exhibit C attached hereto, but Landlord shall not be liable to Tenant for violation of the same by any other tenant or occupant of the Building, or persons having business with them.

ARTICLE IX
SERVICES TO BE FURNISHED BY LANDLORD; UTILITIES

9.1 LANDLORD'S SERVICES

Landlord agrees, at its expense, during the Lease Term: (i) to provide, during the hours of 8:00 A.M. to 6:00 P.M., Monday through Friday and 8:00 A.M. to 1:00 P.M., Saturday, legal holidays excepted, a list of which can be found in Exhibit D, heating and air-conditioning in the Premises during the normal heating and air conditioning seasons, substantially equivalent to that being furnished in comparably aged, similarly equipped office buildings in the suburban Greater Boston area; (ii) to furnish hot and cold water for ordinary toilet, drinking, sprinkler, pantry, lavatory, cleaning and drinking purposes. If Tenant requires water for any other purpose, including without limitation, in connection with the business conducted in the Premises, Tenant shall pay the landlord an appropriate charge stipulated by Landlord to reimburse Landlord for the cost of such extraordinary water and related sewer use charge (including a charge to reimburse Landlord for the cost of metering Tenant's usage); (iii) to furnish non-exclusive passenger elevator service; (iv) to furnish, through Landlord's employees or independent contractors, general cleaning services in accordance with the specifications attached hereto as Exhibit E; and (v) to furnish, through Landlord's employees or independent contractors, additional Building operation services available from Landlord upon reasonable advance request of Tenant at rates from time to time established by Landlord to be paid by Tenant provided the same may be reasonably and conveniently provided by Landlord.

The Landlord further agrees to cause the parking areas, driveways, and walkways on the Lot to be kept reasonably clear of accumulations of dirt, litter, rubbish, ice and snow, cause the landscaping on the Lot to be kept in a neat and attractive condition, keep the parking areas on the lot lighted as reasonably necessary and perform its obligations with respect to maintenance and repair set forth in Section 8.2 above. Upon the request of Tenant from time to time, Landlord shall use reasonable efforts to provide services at hours other than the times set forth above and Tenant shall reimburse Landlord as Additional Rent for the reasonable cost of such services (as determined and/or allocated by Landlord in its good faith) within thirty (30) days after invoice therefore (provided, however, these overtime services shall not apply to submetered electric for the Third Floor Space). Landlord shall have no obligation to provide utilities or equipment other than the utilities and equipment within the Premises as of the Term Commencement Date of this Lease. Tenant shall not, without first having obtained Landlord's prior written consent (which consent Landlord shall not unreasonably withhold), install or use any additional air-conditioning or heating equipment in the Premises. In the event that Tenant should require additional utilities, appliances, machines or equipment, the installation, maintenance and costs thereof shall be Tenant's sole obligation, provided that any such installation shall require the written consent of Landlord, which consent Landlord shall not unreasonably withhold.

9.2 CAUSES BEYOND CONTROL OF THE PARTIES

To the maximum extent this Lease may be made effective according to law, the Landlord and Tenant shall in no event be liable for failure to perform any of their obligations under this Lease when prevented from doing so by virtue of a Force Majeure Event (as defined herein) or for any cause due to any act, neglect, or default of the other party or the parties' servants, contractors, agents, employees, licensees or any person claiming by, through or under Landlord or Tenant, and in no event shall either party ever be liable to the other for any indirect, special or consequential damages under the provisions of this Section 9.2 or any other provision of this Lease unless specifically allowed under the terms of this Lease; provided, however, in no event shall a Force Majeure Event excuse Tenant from paying Rent.

9.3 SEPARATELY METERED UTILITIES

Tenant shall pay directly to the utility, as they become due, all bills for electricity (whether used for furnishing heat or for other purposes) that are furnished to the Premises and now separately metered or billed by the utility to the Premises. Electricity for the Premises shall be separately metered and such meter shall be placed in Tenant's name and electric bills related thereto shall be paid directly to the electric company by Tenant. This electrical service for the Premises shall include all electric charges associated with Tenant's lights, plugs, and the electrical service necessary to operate the heating component of the Variable Air Volume forced air system. Notwithstanding the foregoing, Landlord and Tenant confirm and agree that the Lower Level Space is presently not separately metered with respect to electricity

usage. If Tenant elects to cause the Lower Level Space to be separately metered for electricity usage, such meters may be included in Landlord's Work. In the event that Tenant elects not to cause the Lower Level Space to be separately metered for electricity usage, Landlord shall have a right to invoice Tenant, and Tenant shall pay when Rent is due its equitable portion of electricity usage for the Lower Level Space as reasonably determined by Landlord. Landlord upon request of Tenant shall provide reasonable backup for such electricity usage charges invoiced to Tenant.

9.4 INTERRUPTION OF SERVICES

Notwithstanding anything to the contrary in this Lease, if all or a material portion of either floor of the Premises is rendered untenantable or services to such floor(s) of the Premises are interrupted such that Tenant cannot reasonably operate at such floor(s) of the Premises for a period of three (3) consecutive days or more by virtue of a condition resulting from a Force Majeure Event (as defined in this Lease) or for any other reason (other than as result of the acts, omissions or negligence of Tenant or its agents), Rent shall be abated with respect to such floor(s) of the Premises until such floor(s) of the Premises shall have been restored to the condition in which they were prior to such untenantability or interruption of services by Landlord.

ARTICLE X
INDEMNITY

10.1 INDEMNITY

To the maximum extent this agreement may be made effective according to law, Tenant shall indemnify, defend and save harmless Landlord (together with its officers, directors, stockholders, partners, beneficial owners, trustees, managers, members, employees, agents, contractors, and mortgagees), against and from claims, expenses, or liabilities (a) arising directly or indirectly from any default or breach by Tenant or Tenant's contractors, licensees, agents, servants, successors, assigns or employees under any of the terms or covenants of this Lease (including without limitation any violation of Landlord's Rules and Regulations, as set forth in Exhibit C, and any failure to maintain or repair equipment or installations to be maintained or repaired by Tenant hereunder) or the failure of Tenant or such persons to comply with any rule, order, regulation, or lawful direction now or hereafter in force of any public authority, in each case to the extent the same are related, directly or indirectly, to the Premises or the Building, or Tenant's use thereof; or (b) arising directly or indirectly from any accident, injury, or damage, to any person or property, on or about the Premises (except to the extent caused by Landlord or its employees, agents, contractors, including, without limitation, any such claims related to or arising out of Landlord's Work), for the Tenant's negligent acts or omissions occurring either prior to (which would be from the date Tenant is permitted early access pursuant to Section 3.4) or subsequent to the Term Commencement Date; or (c) arising directly or indirectly from any accident, injury, or damage to any person or property occurring outside the Premises but within the Building or on the Lot, where such accident, injury, or damage results, or is claimed to have resulted, from any negligence or willful misconduct on the part of Tenant, or Tenant's contractors, licensees, agents, servants, employees, or customers, or anyone claiming by or through Tenant; provided, that the foregoing indemnity shall not apply to the extent such claim results from the negligence or willful misconduct of Landlord, its agents, servants and employees.

This indemnity shall include, without limitation, indemnity against all expenses, reasonable attorney's fees and liabilities incurred in connection with any such claim or proceeding brought thereon and the defense thereof with counsel acceptable to Landlord, and counsel for Tenant's insurer is acceptable to Landlord. At the request of Landlord, Tenant shall defend any such claim or proceeding directly on behalf and for the benefit of Landlord.

To the maximum extent this agreement may be made effective according to law, Landlord shall indemnify, defend and save harmless Tenant (together with its officers, directors, stockholders, partners, beneficial owners, trustees, managers, members, employees, agents and contractors), against and from claims, expenses, or liabilities (a) arising directly or indirectly from any default or breach by Landlord or Landlord's contractors, licensees, agents, servants, successors, assigns or employees under any of the terms or covenants of this Lease or the failure of Landlord or such persons to comply with any rule, order, regulation, or lawful direction now or hereafter in force of any public authority; or (b) arising directly or indirectly from any accident, injury, or damage to any person or property within the Building or on the Lot, where such accident, injury, or damage results, or is claimed to have resulted, from any

negligence or willful misconduct on the part of Landlord, or Landlord's contractors, licensees, agents, servants, employees, or customers; provided, that the foregoing indemnity shall not apply to the extent such claim results from the negligence or willful misconduct of Tenant, its agents, servants and employees.. This indemnity and hold harmless agreement shall include, without limitation, indemnity against all expenses, reasonable attorney's fees and liabilities incurred in connection with any such claim or proceeding brought thereon and the defense thereof with counsel acceptable to Tenant, and counsel for Landlord's insurer is acceptable to Tenant. At the request of Tenant, Landlord shall defend any such claim or proceeding directly on behalf and for the benefit of Tenant.

10.2 TENANT'S RISK

To the maximum extent this agreement may be made effective according to law, Tenant agrees its use and occupancy of the Premises (and Building) shall be at Tenant's sole risk; and Landlord shall have no responsibility or liability for any loss of or damage to furniture, fixtures, equipment or other personal property of Tenant for any reason whatsoever; and Landlord shall not be responsible or liable for any loss or damage resulting to Tenant or those claiming by, through or under Tenant, or its or their property, from the breaking, bursting, stopping or leaking of electric cables and wires, water, gas, sewer or steam pipes, sprinklers, and from roof leaks and the like, except in connection with damage or injury resulting from the negligence or willful misconduct of Landlord or its authorized agents. The provisions of this Section 10.2 shall be applicable from and after the execution of this Lease, and until the end of the Lease Term, and during such further period as Tenant may use or be in occupancy of any part of the Premises or of the Building.

10.3 INJURY CAUSED BY THIRD PARTIES

Tenant agrees that Landlord shall not be responsible or liable to Tenant, or to those claiming by, through, or under Tenant, for any loss or damage resulting to Tenant or those claiming by, through, or under Tenant, or its or their property, that may be occasioned by or through the acts or omissions of persons occupying any part of the Building, or for any loss or damage from the breaking, bursting, crossing, stopping, or leaking of electric cables and wires, and water, gas, sewer, or steam pipes, or like matters, except in connection with damage or injury resulting from the negligence or willful misconduct of Landlord or its authorized agents.

10.4 SECURITY

Landlord shall continue to provide the card key access system to the Building and other security procedures currently in place as of the date of this Lease, and Landlord agrees that the Premises will be accessible 24 hours a day 7 days per week, subject to applicable Laws and Requirements and Landlord's reasonable security procedures. Notwithstanding the foregoing, Tenant assumes all responsibility for the protection of Tenant, its agents, employees, contractors and invitees and the property of Tenant and of Tenant's agents, employees, contractors and invitees from acts of third parties. Nothing herein contained shall prevent Landlord, at Landlord's sole option, from implementing security measures for the Building or any part thereof comparable to other security measures at other first class properties in the area in which the Building is located, in which event Tenant shall participate in such security measures and the reasonable cost thereof shall be included within the definition of Operating Costs. Landlord shall have the right, but not the obligation, to require all persons entering or leaving the Building to identify themselves to a security guard and to reasonably establish that such person should be permitted access to the Building.

ARTICLE XI
INSURANCE

11.1 PUBLIC LIABILITY INSURANCE

Tenant shall obtain and keep in force and effect from the date upon which Tenant first enters the Premises for any reason, throughout the Lease Term, and thereafter so long as Tenant is in occupancy of any part of the Premises, at its own cost and expense commercial general liability and property damage insurance, on an occurrence basis, such insurance to afford protection in an amount of not less than $1,000,000 per occurrence/ $2,000,000 in the aggregate for injury, death, property damage or other insured loss arising out of any one occurrence, protecting Tenant as insured,

and naming Landlord, Landlord's mortgagees, property managers and managing agents as additional insureds, against claims for bodily injury, personal injury, death, property damage or other general liability insured loss occurring in, upon, adjacent to or connected with the Premises or any part thereof. Each such policy shall be reasonably satisfactory to Landlord. Business Auto Liability insurance shall not be required so long as Tenant does not own or lease any company vehicles. In addition, commencing as of the Term Commencement Date, and thereafter throughout the Term, Tenant shall, at Tenant's sole cost and expense, provide and maintain or cause to be provided and maintained workers' compensation insurance (meeting the requirements of the state workers' compensation laws) and employer liability insurance covering all of Tenant's employees at the Premises. Tenant shall also use good faith efforts to ensure all contractors, sub-contractors, vendors, leased employees, and temporary employees are properly insured for workers' compensation.

11.2 HAZARD INSURANCE

Tenant agrees to maintain in full force from the date upon which Tenant first enters the Premises for any reason, throughout the Lease Term, and thereafter so long as Tenant is in occupancy of any part of the Premises insuring any leasehold improvements paid for by Tenant and all fixtures, equipment, and other personal property of Tenant against damage or destruction by fire or other casualty in an amount equal to the full replacement cost of such property. Any such coverages may be effected directly and/or through the use of blanket or umbrella insurance coverage covering more than one location. Tenant agrees to maintain in full force from the date upon which Tenant first enters the Premises for any reason, throughout the Lease Term, and thereafter so long as Tenant is in occupancy of any part of the Premises, workers' compensation and employers' liability insurance with a limit of liability as required by law to be maintained.

11.3 CONSTRUCTION PERIOD INSURANCE

At any time when non-cosmetic Alterations, demolition or construction work is being performed on or about the Premises or Building by or on behalf of Tenant, including at all times when Tenant's Initial Work is being undertaken, Tenant shall keep, and require its contractors to keep, in full force and effect the following insurance coverage in each instance with policies reasonably acceptable to Landlord:

(1) Builder's risk and property insurance on Tenant's improvements and betterments and personal property during the course of construction or alteration. Tenant may provide Builder's Risk coverage in lieu of Tenant's contractor; and

(2) workers' compensation or similar insurance in form and amounts required by law.

Tenant shall cause a certificate or certificates of such insurance to be delivered to Landlord prior to the commencement of any work in or about the Building or the Premises, in default of which Landlord shall have the right, but not the obligation, to obtain any or all such insurance at the expense of Tenant, in addition to any other right or remedy of Landlord. The provisions of this Section 11.3 shall survive the expiration or earlier termination of this Lease.

11.4 EVIDENCE OF INSURANCE; INSURANCE STANDARDS

Tenant's insurers shall endeavor to provide Landlord with thirty (30) days prior notice of a cancellation of the policy. Prior to Tenant's entry onto the Premises, appropriate certificates of such policies shall be deposited with the Landlord. Certificates of Insurance shall state that insurers shall endeavor to provide at least thirty (30) days notice of cancellation. Certificates of renewal policies shall be provided to Landlord upon expiration of prior policies. Any renewals, replacements and endorsements shall also be deposited with Landlord, in the case of renewals, same shall be so deposited within 10 days of the expiration of the prior policy. The insurance required hereunder shall be written in form and substance reasonably satisfactory to Landlord by a good and solvent insurance company of recognized standing, admitted to do business in Massachusetts, with a general policyholder's rating of not less than A- and financial rating of not less than Class VII (as rated in the most current Best's Insurance Reports), which company shall be reasonably satisfactory to Landlord. Tenant shall procure, maintain and place such insurance and pay all premiums and charges therefore, and upon failure of Tenant to maintain such insurance (and without limiting any other remedies

on account thereof), Landlord may, but shall not be obligated to, procure, maintain and place such insurance or make such payments, and in such event, Tenant agrees to pay the amount thereof to Landlord on demand, as additional rent hereunder.

11.5 RENTAL ABATEMENT INSURANCE

Landlord may elect to keep and maintain in full force and effect during the Lease Term, market rate rental abatement insurance against abatement or loss of Rent in case of fire or other casualty, in an amount at least equal to the amount of the Rent payable by Tenant during the then current lease year as reasonably determined by Landlord. All premiums for such insurance shall be included in Operating Costs for the purposes of this Lease; provided, however, to the extent market rate rental abatement insurance is not included in the Operating Costs for the Base Operating Year, for purposes of calculating Tenant's Proportionate Share of the Operating Costs Excess for any particular Lease Year, the cost attributable to the market rate rental abatement insurance shall be included in the Operating Costs for the Base Operating Year on a hypothetical basis in calculating the Tenant's Proportionate Share of the Operating Costs Excess for such Lease Year.

11.6 MUTUAL WAIVER OF SUBROGATION

The parties hereto shall each procure an appropriate clause in, or endorsement on, any property insurance policy maintained or required to be maintained by the parties hereunder on the Property, Premises or any personal property, fixtures or equipment located thereon or therein, pursuant to which the insurer waives subrogation or consents to a waiver of right of recovery in favor of either party, its respective agents or employees. Having obtained such clauses and/or endorsements, each party hereby agrees that it will not make any claim against or seek to recover from the other or its agents or employees for any loss or damage to its property or the property of others resulting from fire or other perils covered by such property insurance regardless of the cause or origin of such loss or damage, including, but not limited to, the negligence of such other party or its agents or employees.

11.7 LANDLORD'S INSURANCE

Landlord shall maintain and keep in effect throughout the Lease Term (a) insurance against loss or damage to the Building by fire or other casualty as may be included within either fire and extended coverage insurance or "special form " insurance in commercially reasonable amounts at least equal to the full replacement cost thereof, (b) commercial general liability insurance in amounts reasonably determined by Landlord to equal amounts carried by prudent owners of properties in the area in which the Property is located, and (c) such other insurance coverages and policies as Landlord determines. Any such coverages may be effected directly and/or through the use of blanket insurance coverage covering more than one location and may contain such commercially reasonable deductibles as Landlord may elect in its discretion. The cost of all such insurance shall be included as part of Operating Costs.

ARTICLE XII
CASUALTY

12.1 DEFINITION OF "SUBSTANTIAL DAMAGE" AND "PARTIAL DAMAGE"

The term " substantial damage ," as used herein, shall refer to damage which is of such a character that in Landlord's reasonable, good faith estimate the same cannot, in ordinary course, be expected to be repaired within ninety (90) calendar days from the time that such repair work would commence. Any damage which is not "substantial damage" is " partial damage ." Within thirty (30) days after the occurrence of any damage, Landlord shall notify Tenant (" Landlord's Casualty Notice ") of the reasonable determination of landlord's architect whether such damage is "substantial" or "partial."

12.2 PARTIAL DAMAGE TO THE BUILDING

If during the Lease Term there shall be partial damage to the Building by fire or other casualty and if such damage shall materially interfere with Tenant's use of the Premises as contemplated by this Lease, Landlord shall promptly proceed to restore the Building to substantially the condition in which it was immediately prior to the

occurrence of such damage, provided however, that in no event shall Landlord be obligated to expend more than the insurance proceeds actually received by Landlord, plus any deductible carried by Landlord.

12.3 SUBSTANTIAL DAMAGE TO THE BUILDING

If during the Lease Term there shall be substantial damage to the Building by fire or other casualty and if such damage shall materially interfere with Tenant's use of the Premises as contemplated by this Lease, Landlord shall promptly restore the Building to the extent reasonably necessary to enable Tenant's use of the Premises, unless Landlord, within ninety (90) days after the occurrence of such damage, shall give notice to Tenant of Landlord's election to terminate this Lease, provided however, that in no event shall Landlord be obligated to expend more than the insurance proceeds actually received by Landlord, plus any deductible carried by Landlord, and provided that Landlord may not terminate this Lease unless Landlord similarly terminates the leases of other tenants in the Building aggregating at least 80% of the portion of the Building immediately prior to such damage. The Landlord shall have the right to make such election in the event of substantial damage to the Building whether or not such damage materially interferes with Tenant's use of the Premises. If Landlord shall give such notice, then this Lease shall terminate as of the date of such notice with the same force and effect as if such date were the date originally established as the expiration date hereof. If Landlord has not restored the Premises to the extent required under this Section 12.3 within nine (9) months after the date of such damage or destruction, such nine-month period to be extended to the extent of any delays of the completion of such restoration due to matters beyond Landlord's reasonable control, or if the Premises shall be substantially damaged during the last twelve (12) months of the Lease Term then, Tenant may elect to terminate this Lease by giving written notice of such election to Landlord within thirty (30) days after the end of such nine-month period and before the substantial completion of such restoration or, if during the last twelve (12) months, at the time of such casualty, as the case may be. If Tenant so elects to terminate this Lease, then this Lease and the term hereof shall cease and come to an end on the date that is thirty (30) days after the date that Landlord receives Tenant's termination notice, unless on or before such date Landlord has substantially completed such restoration.

12.4 ABATEMENT OF RENT

If during the Lease Term the Building shall be damaged by fire or casualty and if such damage shall materially interfere with Tenant’s use of the Premises as contemplated by this Lease, a just proportion of the Rent payable by Tenant hereunder shall abate proportionately for the period in which, by reason of such damage, there is such interference with Tenant’s use of the Premises, having regard to the extent to which Tenant may be required to discontinue Tenant’s use of the Premises, but such abatement or reduction shall end twenty (20) days of when Landlord shall have substantially restored the Premises or so much thereof as shall have been originally constructed by Landlord (exclusive of any of Tenant’s fixtures, furnishings, equipment and the like or work performed therein by Tenant) to substantially the condition in which the Premises were prior to such damage.

12.5 MISCELLANEOUS

In no event shall Landlord have any obligation to make any repairs or perform any restoration work under this Article XII if prevented from doing so by reason of any cause beyond its reasonable control, including, without limitation, the requirements of any applicable laws, codes, ordinances, rules, or regulations, the refusal of the holder of a mortgage or ground lease affecting the Premises to make available to Landlord the net insurance proceeds attributable to such restoration, or the inadequacy of such proceeds to fund the full cost of such repairs or restoration, but reasonably promptly after Landlord ascertains the existence of any such cause, it shall either terminate this Lease or waive such condition to its restoration obligations and proceed to restore the Premises as otherwise provided herein. Further, Landlord shall not be obligated in any event to make any repairs or perform any restoration work to any alterations, additions, or improvements to the Premises performed by or for the benefit of Tenant (all of which Tenant shall repair and restore) or to any fixtures in or portions of the Premises or the Building which were constructed or installed by or for some party other than Landlord or which are not the property of Landlord.

ARTICLE XIII
EMINENT DOMAIN

13.1 RIGHTS OF TERMINATION FOR TAKING

If the Premises, or such portion thereof as to render the balance (if reconstructed to the maximum extent practicable in the circumstances) physically unsuitable for Tenant’s purposes, shall be taken (including a temporary taking in excess of 180 days) by condemnation or right of eminent domain or sold in lieu of condemnation, Landlord or Tenant may elect to terminate this Lease by giving notice to the other of such election not later than thirty (30) days after Tenant has been deprived of possession.

Further, if so much of the Building (which may include the Premises) or the Lot shall be so taken, condemned or sold or shall receive any direct or consequential damage by reason of anything done pursuant to public or quasi-public authority such that continued operation of the same would be uneconomical, Landlord or Tenant may elect to terminate this Lease by giving notice to the other party of such election not later than thirty (30) days after the effective date of such taking.

Should any part of the Premises be so taken or condemned or receive such damage and should this Lease be not terminated in accordance with the foregoing provisions, Landlord shall promptly after the determination of Landlord’s award on account thereof, expend so much as may be necessary of the net amount which may be awarded to Landlord in such condemnation proceedings in restoring the Premises to an architectural unit that is reasonably suitable to the uses of Tenant permitted hereunder. Should the net amount so awarded to Landlord be insufficient to cover the cost of so restoring the Premises, in the reasonable estimate of Landlord, Landlord may, but shall have no obligation to, supply the amount of such insufficiency and restore the Premises to such an architectural unit, with all reasonable diligence, or Landlord may terminate this Lease by giving notice to Tenant within a reasonable time after Landlord has determined the estimated cost of such restoration; provided that Landlord may not terminate this Lease unless Landlord similarly terminates the leases of other tenants in the Building aggregating at least 80% of the portion of the Building immediately prior to such taking or condemnation.

If Landlord has not restored the Premises to the extent required under this Section 13.1 within nine (9) months after the date of such taking, such nine-month period to be extended to the extent of any delays of the completion of such restoration due to matters beyond Landlord's reasonable control, or if the Premises or any portion thereof shall be taken during the last twelve (12) months of the Lease Term then, in either such case, Tenant may elect to terminate this Lease by giving written notice of such election to Landlord within thirty (30) days after the end of such nine-month period or, if during the last twelve (12) months, at the time of the taking and before the substantial completion of such restoration, as the case may be. If Tenant so elects to terminate this Lease, then this Lease and the term hereof shall cease and come to an end as if such expiration date were the original expiration date of this Lease on the date that is thirty (30) days after the date that Landlord receives Tenant's termination notice, unless on or before such date Landlord has substantially completed such restoration.

Landlord warrants and represents that it is unaware of any currently pending or potential governmental takings or planned takings of any of the Premises.

13.2 PAYMENT OF AWARD

The Landlord shall have and hereby reserves and accepts, and Tenant hereby grants and assigns to Landlord, all rights to recover for damages to the Building and the Lot and the leasehold interest hereby created, and to compensation accrued or hereafter to accrue by reason of such taking or damage, as aforesaid. Tenant covenants to deliver such further assignments and assurances thereof as Landlord may from time to time request. Nothing contained herein shall be construed to prevent Tenant from prosecuting in any condemnation proceedings a claim for the value of any of Tenant’s trade fixtures installed in the Premises by Tenant at Tenant’s expense, for relocation expenses, Tenant’s Alterations, and for Tenant’s leasehold interest hereby created, provided that such action shall not affect the amount of compensation otherwise recoverable hereunder by Landlord from the taking authority.

13.3 ABATEMENT OF RENT

In the event of any such taking of the Premises, the Rent or a fair and just proportion thereof, according to the nature and extent of the damage sustained, shall be suspended or abated, as appropriate and equitable in the circumstances, and based on the useable to non-useable square footage of the Premises.

13.4 MISCELLANEOUS

In no event shall Landlord have any obligation to make any repairs under this Article XIII if prevented from doing so by reason of any cause beyond its reasonable control, including, without limitation, requirements of any applicable laws, codes, ordinances, rules, or regulations or requirements of any mortgagee. Further, Landlord shall not be obligated to make any repairs to any portions of the Premises or the Building which were constructed or installed by some party other than Landlord or which are not the property of Landlord, and Tenant shall be obligated to perform any repairs on and restorations to any of Tenant's alterations, additions, or improvements to the Premises performed by or for the benefit of Tenant.

ARTICLE XIV
DEFAULT

14.1 TENANT'S DEFAULT

(a) If at any time any one or more of the following events (herein referred to as a " Default of Tenant ") shall occur:

(i) Tenant shall fail to make payment of Rent or any other monetary amount due under this Lease, including the Tenant's Share of the Landlord's Work Costs, within five (5) business days after Landlord has sent to Tenant written notice of such default;

(ii) Tenant shall fail to perform or observe any other covenant or provision herein contained on Tenant's part to be performed or observed and Tenant shall fail to remedy the same within thirty (30) days after notice to Tenant specifying such neglect or failure, or, if such failure is of such a nature that Tenant cannot reasonably remedy the same within such thirty (30) day period, Tenant shall fail to commence promptly to remedy the same and to prosecute such remedy to completion with diligence and continuity, except to the extent that Tenant is delayed by cause of Force Majeure as defined in Article 14.2 of this Lease (and this Lease and the obligations of Landlord hereunder shall not be affected or impaired because Tenant is unable to fulfill any of its obligations hereunder or is delayed in doing so, if such inability or delay is caused by reason of a Force Majeure Event, and the time for Tenant's performance shall be extended for the period of any such delay);

(iii) except as otherwise provided by applicable law, if the estate hereby created shall be taken on execution or by other process of law, or if Tenant shall be judicially declared bankrupt or insolvent according to law, or if any assignment shall be made of the property of Tenant for the benefit of creditors, or if a receiver, guardian, conservator, trustee in involuntary bankruptcy or other similar officer shall be appointed to take charge of all or any substantial part of Tenant's property by a court of competent jurisdiction, or if a petition shall be filed for the reorganization of Tenant under any provisions of law now or hereafter enacted, and such proceeding is not dismissed within sixty (60) days after it is begun, or if Tenant shall file a petition for such reorganization, or for arrangements under any provisions of such laws providing a plan for a debtor to settle, satisfy, or extend the time for the payment of debts;

then, in any such case, Landlord may, in addition to any remedies otherwise available to Landlord, immediately or at any time thereafter, in accordance with all applicable Laws, repossess the same as of Landlord's former estate, and expel Tenant and those claiming by, through or under it and remove its or their effects without being deemed guilty of any manner of trespass, and without prejudice to any remedies which might otherwise be used for arrears of rent or preceding breach of covenant and/or Landlord may terminate this Lease by notice to Tenant and this Lease shall come to an end on the 5th day after such notice as fully and completely as if such 5th day were on the date herein originally fixed for the expiration of the term of this Lease (Tenant hereby waiving any rights of redemption, if any, under M.G.L. c.186, §11 to extent that such rights may be lawfully waived), and Tenant will then quit and surrender the Premises to

Landlord, but Tenant shall remain liable as herein provided. To the extent permitted by law, Tenant hereby expressly waives any and all rights of redemption granted by or under any present or future laws in the event of Tenant being evicted or dispossessed, or in the event of Landlord obtaining possession of the Premises, by reason of the violation by Tenant of any of the covenants and conditions of this Lease. In the event of any such termination, entry or re-entry, Landlord shall have the right to the extent permitted under applicable law to remove and store Tenant's property and that of persons claiming by, through or under Tenant at the sole risk and expense of Tenant and, if the Tenant does not make arrangements to collect such property within thirty (30) days of termination, entry or re-entry and if Landlord so elects, (x) to sell such property at public auction or private sale and apply the net proceeds to the payment of all sums due to Landlord from Tenant and pay the balance, if any, to Tenant, or (y) to dispose of such property in any manner in which Landlord shall elect, Tenant hereby agreeing to the fullest extent permitted by law that it shall have no right, title or interest in any property remaining in the Premises thirty (30) days after such termination, entry or re-entry.

(b) Tenant covenants and agrees, notwithstanding any termination of this Lease as aforesaid or any entry or re-entry by Landlord, whether by summary proceedings, termination, or otherwise, to pay and be liable for on the days originally fixed herein for the payment thereof, amounts equal to the several installments of Rent and other charges reserved as they would become due under the terms of this Lease if this Lease had not been terminated or if Landlord had not entered or re-entered, as aforesaid, and whether the Premises be re-let or remain vacant, in whole or in part, or for a period less than the remainder of the Term, or for the whole thereof; but in the event the Premises be re-let by Landlord, Tenant shall be entitled to a credit in the net amount of rent received by Landlord in re-letting, after deduction of all expenses incurred in re-letting the Premises (including, without limitation, reasonable preparation of the space for reletting; brokerage fees, attorneys' fees and the like), and in collecting the rent in connection therewith. As an alternative, at the election of Landlord, Tenant will upon such termination pay to Landlord, as damages, such a sum as at the time of such termination represents the amount of the excess, if any, discounted to present value, of the then fair market value of the total Rent and other benefits which would have accrued to Landlord under this Lease for the remainder of the Lease Term if the lease terms had been fully complied with by Tenant over and above the then cash rental value (in advance) of the Premises for what would be the then unexpired Lease Term if the same remained in effect. For the purposes of this Section, the " remainder of the Lease Term " shall not include the Extension Term available to Tenant under Section 3.2 of this Lease except to the extent that the extension option for such Extension Term has already been exercised by Tenant in accordance with the provisions of Section 3.2. For purposes of this Article, if Landlord elects to require Tenant to pay damages in accordance with immediately preceding sentence, the total amount due shall be computed by assuming that Tenant's Proportionate Share of Taxes and Tenant's Proportionate Share of Operating Costs would be, for the balance of such unexpired term, the amount thereof respectively for the tax and lease years in which such termination, entry or re-entry shall occur.

(c) In case of any Default of Tenant, re-entry, entry, expiration and dispossession by summary proceedings or otherwise, Landlord may (i) re-let the Premises or any part or parts thereof, either in the name of Landlord or otherwise, for a term or terms which may at Landlord's option be equal to or less than or exceed the period which would otherwise have constituted the balance of the Lease Term and may grant reasonable concessions or free rent to the extent that Landlord considers advisable or necessary to re-let the Premises and (ii) make such alterations, repairs and decorations in the Premises as Landlord, in its sole judgment, considers advisable or necessary for the purpose of re-letting the Premises; and no action by Landlord in accordance with the foregoing shall operate or be construed to release Tenant from liability hereunder as aforesaid. It is specifically understood and agreed that Landlord shall be entitled to take into account in connection with any re-letting of the Premises all relevant factors which would be taken into account by a sophisticated developer in securing a replacement tenant for the Premises, such as, but not limited to, the first class quality of the Building and the financial responsibility of any such replacement tenant. Landlord shall in no event be liable in any way whatsoever for failure to re-let the Premises, or, in the event that the Premises are re-let, for failure to collect the rent under such re-letting, and Tenant hereby waives, to the extent permitted by applicable law, any obligation Landlord may have to mitigate Tenant's damages. The Landlord agrees to list the Premises with a broker in the event of a termination, entry or re-entry under this ARTICLE XIV, provided that Landlord's obligation to list the Premises as provided herein is independent of Tenant's obligations under this ARTICLE XIV and shall not be construed to entitle Tenant to set-off against any amounts payable by Tenant hereunder in the event of a breach or alleged breach by Landlord of such obligation. In no event shall Landlord be obligated to give priority to the re-letting of the Premises over any other Premises in the Building or any other building owned by Landlord. Notwithstanding anything to the contrary herein, Landlord agrees that it shall use reasonable efforts to mitigate its damages as a result of

Tenant's default. It is agreed and understood that Landlord's obligation to mitigate damages shall be deemed satisfied by its providing adequate information to a commercial broker as to the availability of such space (based on a customary brokerage fee being earned by such broker), having the Premises available for inspection by prospective tenants during reasonable business hours, and by acceptance of a commercially reasonable offer for the Premises (or reasonable portion thereof) from a creditworthy person or entity based on a form of lease agreement which is substantially the same as the form utilized for other space tenants in the Building, without material change therefrom (and Landlord shall be under no obligation to accept any offer other than a commercially reasonable offer from a creditworthy person or entity at then going rental rates for the Building).

(d) If there is at any time an assignee of this Lease or any interest of Tenant herein, the happening of any of the events described in paragraph (a)(iii) of this Section with respect to such assignee shall constitute a Default of Tenant hereunder.

(e) The specified remedies to which Landlord may resort hereunder are not intended to be exclusive of any remedies or means of redress to which Landlord may, at any time, be entitled lawfully and Landlord may invoke any remedy (including the remedy of specific performance) allowed at law or in equity as if specific remedies were not herein provided for.

(f) Subject to Section 17.16 hereunder which provisions shall control as to the allocation of such liabilities as between Landlord and Tenant, all costs and expenses incurred by or on behalf of Landlord (including, without limitation, reasonable attorneys' fees and expenses) in enforcing its rights hereunder or occasioned by any Default of Tenant shall be paid by Tenant provided Landlord is the prevailing party or a settlement is made in favor of Landlord in connection therewith.

(g) Upon any Default of Tenant or the expiration or termination of this Lease, Landlord shall have the right of summary process under Massachusetts General Laws Chapter 239, or other applicable statutes, and such other rights to recover possession as permitted by law.

Nothing contained in this Lease shall limit or prejudice the right of Landlord to prove for and obtain in proceedings for bankruptcy, insolvency, or like proceedings by reason of the termination of this Lease, an amount equal to the maximum allowed by any statute or rule of law in effect at the time when, and governing the proceedings in which, the damages are to be proved, whether or not the amount be greater than, equal to, or less than the amount of the loss or damages referred to above.

All references contained in this Lease to the terms " Default ", " default ," " breach ," " event of default " or words of similar import shall be construed to mean default beyond any applicable notice and grace period. All references to the terms " expenditures ", " fees ", " expenses " and words of similar import contained in the lease shall be construed to mean reasonable third party expenditures, fees and expenses actually incurred.

14.2 LANDLORD'S DEFAULT

Landlord shall in no event be in default in the performance of any of Landlord's obligations hereunder unless and until Landlord shall have failed to perform such obligations within 30 days, or such additional time as is reasonably required to correct any such default after notice by Tenant to Landlord properly specifying wherein Landlord has failed to perform any such obligation, provided that Landlord commences such cure within thirty (30) days of such notice, except in the event of an emergency situation, whereby Landlord should proceed to cure immediately upon Tenant's notice thereof. It is the express understanding and agreement of the parties and a condition of Landlord's agreement to execute this Lease that in no event shall Tenant have the right to terminate this Lease or seek an abatement to or offset from Base Rent or other Rent as a result of Landlord's default, but Tenant shall be entitled to seek all other remedies, at law or equity, as a result of such default. Tenant hereby waives its right to recover punitive or consequential damages arising out of any act, omission or default by Landlord. This Lease and the obligations of Tenant hereunder shall not be affected or impaired because Landlord is unable to fulfill any of its obligations hereunder or is delayed in doing so, if such inability or delay is caused by reason of a Force Majeure Event (as defined below), and the time for Landlord's performance shall be extended for the period of any such delay. As used herein, a " Force Majeure Event " shall be any

delay caused by or resulting from acts of God, war, civil commotion, fire, flood or other casualty, labor difficulties, shortages of or inability to obtain labor, materials or equipment, governmental regulations, unusually severe weather, or other causes beyond such party's reasonable control (other than lack of funds).

ARTICLE XV
THE LANDLORD'S ACCESS TO PREMISES

15.1 THE LANDLORD'S RIGHT OF ACCESS

The Landlord and its agents, contractors, and employees shall have the right to enter the Premises at all reasonable hours upon not less than twenty four (24) hours advance notice, except in exigent circumstances, or any time in case of emergency, while accompanied by a representative of Tenant (provided one is made reasonably available by Tenant), for the purpose of inspecting or of making repairs or alterations, to the Premises or the Building or additions to the Building, and Landlord shall also have the right to make access available at all reasonable hours upon not less than twenty four (24) hours' notice to prospective or existing mortgagees or purchasers of any part of the Building. To assure access by Landlord to the Premises, Tenant shall provide Landlord with duplicate copies of all keys used by Tenant in providing access to the Premises. Landlord will use commercially reasonable efforts to conduct any Landlord required repairs within the Premises without interference to the ability of Tenant to conduct its business at the Premises.

For a period commencing nine (9) months prior to the expiration of the Lease Term, Landlord may have reasonable access to the Premises at all reasonable hours upon not less than twenty four (24) hours advance notice for the purpose of exhibiting the same to prospective tenants.

ARTICLE XVI
RIGHTS OF MORTGAGEES

16.1 SUBORDINATION AND ATTORNMENT

(a) If any holder of a mortgage or holder of a ground lease of property which includes the Premises, executed and recorded subsequent to the date of this Lease, shall so elect, the interest of Tenant hereunder shall be subordinate to the rights of such holder, provided that such holder shall, by a commercially reasonable non-disturbance agreement, agree to recognize in writing the rights of Tenant under this Lease upon the terms and conditions set forth herein, and the performance by Tenant of Tenant's obligations hereunder; or

(b) If any holder of a mortgage or holder of a ground lease of property which includes the Premises executed and recorded prior to the date of this Lease shall so elect, this Lease, and the rights of Tenant hereunder, shall be superior in right to the rights of such holder, with the same force and effect as if this Lease had been executed and delivered, and recorded, or a statutory notice hereof recorded, prior to the execution, delivery and recording of any such mortgage.

The election of any such holder as to Subsection (a) above shall be exercised by notice to Tenant, in the same fashion as notices under this Lease are given by Landlord to Tenant, and, if such notice is given, such subordination shall be effective as to all advances then or thereafter made by such holder under such mortgage or in connection with such ground lease. Any election as to Subsection (b) above shall become effective upon either notice from such holder to Tenant in the same fashion as notices from Landlord to Tenant are to be given hereunder or by the recording in the appropriate registry or recorder's office of an instrument, in which such holder subordinates its rights under such mortgage or ground lease to this Lease.

(c) Forthwith upon the request of Landlord, the holder of any mortgage or deed of trust affecting the Premises, or the lessor under any ground lease affecting the Premises, Tenant shall execute and deliver to such party an attornment agreement providing that Tenant shall attorn to such holder or lessor in the event of a foreclosure of such mortgage or deed of trust or transfer in lieu thereof or a termination of such ground lease and incorporating such other terms and conditions as such party may reasonably require, provided that such agreement includes a commercially reasonable non-disturbance agreement by such other party to recognize the rights of Tenant under this Lease. Subject to

the such attornment agreement, Tenant shall, in the event any proceedings are brought for the foreclosure of, or in the event of exercise of the power of sale under, any mortgage or deed of trust made by Landlord, its successors or assigns, encumbering the Premises, or any part thereof, or in the event of termination of any ground lease, if so requested, attorn to the purchaser or ground lessor upon such foreclosure, sale or termination or upon any grant of a deed in lieu of foreclosure and recognize such purchaser or ground lessor as Landlord under this Lease.

(d) Tenant agrees on request of Landlord to execute and deliver from time to time any instrument that Landlord may reasonably deem necessary to implement the provisions of this Section 16.1, provided that such instrument does not increase the obligations or decrease the rights of Tenant hereunder or decrease Landlord's obligations hereunder or otherwise adversely affect the leasehold interest hereby created.

16.2 NOTICE TO MORTGAGEE AND GROUND LESSOR; OPPORTUNITY TO CURE

After receiving written notice from any person, firm, or other entity (or from Landlord on behalf of any such person, etc.) that it holds a mortgage which includes the Premises as part of the mortgaged premises, or that it is the ground lessor under a lease with Landlord as ground lessee, which includes the Premises as a part of the demised premises, Tenant will copy such mortgagor or ground lessor on any notice given to Landlord and the curing of any of Landlord's defaults by such holder or ground lessor shall be treated as performance by Landlord. Accordingly, no act or failure to act on the part of Landlord which would entitle Tenant under the terms of this Lease, or by law, to be relieved of Tenant's obligations hereunder shall have such an effect unless and until such holder or ground lessor, after receipt of a copy of such notice, has failed or refused to correct or cure the condition complained of within thirty (30) days after notice of such default by Landlord beyond the applicable notice and cure period, or if such default cannot be cured in that time, if within such thirty (30) days such holder or ground lessor has not commenced pursing the remedies necessary to cure such default and does not diligently pursue such remedies , but nothing contained in this Section 16 or elsewhere in this Lease shall be deemed to impose any obligation on any such holder or ground lessor to correct or cure any such condition

16.3 ASSIGNMENT OF RENTS

With reference to any assignment by Landlord of Landlord's interest in this Lease, or the rents payable hereunder, conditional in nature or otherwise, which assignment is made to the holder of a mortgage or ground lease on property which includes the Premises, Tenant agrees:

(a) that the execution thereof by Landlord, and the acceptance thereof by the holder of such mortgage, or the ground lessor, shall never be treated as an assumption by such holder or ground lessor of any of the obligations of Landlord hereunder, unless such holder or ground lessor shall, by notice sent to Tenant, specifically otherwise elect; and

(b) that, except as aforesaid, such holder or ground lessor shall be treated as having assumed Landlord's obligations hereunder only upon foreclosure of such holder's mortgage and the taking of possession of the Premises, or in the case of a ground lessor, the assumption of Landlord's position hereunder by such ground lessor.

Landlord hereby agrees that Tenant's compliance with the assignment of any rents payable hereunder, to any such holder or ground lessor under this Article 16.3 shall not be deemed a violation of the Lease.

16.4 NON-DISTURBANCE AGREEMENT

Landlord represents that as of the date of execution hereof, (i) there are no existing superior mortgages other than mortgage(s) held by Santander Bank, N.A. (" Existing Mortgagee ") and (ii) there are no existing superior leases. Within thirty (30) days after the Date of this Lease, Landlord will obtain for Tenant, at no cost to Tenant, a commercially reasonable non-disturbance agreement (" SNDA ") with respect to this Lease from the Existing Mortgagee. Landlord shall also obtain an SNDA for Tenant from any future lessor or holder of a superior mortgage as described herein.

ARTICLE XVII
MISCELLANEOUS PROVISIONS

17.1 CAPTIONS

The captions throughout this Lease are for convenience or reference only and shall in no way be held or deemed to define, limit, explain, describe, modify, or add to the interpretation, construction, or meaning of any provision of this Lease.

17.2 BIND AND INURE

Except as herein otherwise expressly provided, the obligations of this Lease shall run with the land, and this Lease shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns. The reference herein to successors and assigns of Tenant is not intended to constitute a consent to assignment by Tenant, but has reference only to those instances in which Landlord may later give consent to a particular assignment as required by the provisions of Article VII. Neither the assignment by Landlord of its interest in this Lease as security to a lender holding a mortgage on the Building, nor the acceptance thereof by such lender, nor the exercise by such lender of any of its rights pursuant to said assignment shall be deemed in any way an assumption by such lender of any of the obligations of Landlord hereunder unless such lender shall specifically otherwise elect in writing or unless such lender shall have completed foreclosure proceedings under said mortgage. Whenever the Premises are owned by a trustee or trustees, the obligations of Landlord shall be binding upon Landlord's trust estate, but not upon any trustee, beneficiary or shareholder of the trust individually.

17.3 NO WAIVER

The failure of Landlord or of Tenant to seek redress for violation of, or to insist upon the strict performance of any covenant or condition of this Lease shall not be deemed to be a waiver of such violation or to prevent a subsequent act, which would originally have constituted a violation, from having all the force and effect of an original violation. The receipt by Landlord of Rent or additional rent with knowledge of the breach of any covenant of this Lease shall not be deemed to be a waiver of such breach by Landlord unless such waiver is in writing signed by Landlord. No consent or waiver, express or implied, by Landlord or Tenant to or of any breach of any agreement or duty shall be construed as a waiver or consent to or of any other breach of the same or any other agreement or duty.

17.4 NO ACCORD AND SATISFACTION

No acceptance by Landlord of a lesser sum than the minimum and additional rent then due shall be deemed to be other than on account of the earliest installment of such rent due, nor shall any endorsement or statement on any check or any letter accompanying any check or payment as rent be deemed to be an accord and satisfaction, and Landlord may accept such check or payment without prejudice to Landlord's right to recover the balance of such installment or pursue any other remedy in this Lease or at law or in equity provided.

17.5 CUMULATIVE REMEDIES

The specific remedies to which Landlord may resort under the terms of this Lease are cumulative and not intended to be exclusive of any other remedies or means of redress to which it may be lawfully entitled in case of any breach by Tenant of any provisions of this Lease. In addition to the other remedies provided in this Lease, Landlord shall be entitled to the restraint by injunction of the violation or attempted of any of the covenants, conditions or provisions of this Lease or to a decree compelling specific performance of any such covenants, conditions or provisions. Except as otherwise set forth herein, any obligations of Tenant as set forth herein (including, without limitation, rental and other monetary obligations, repair obligations and obligations to indemnify Landlord) shall survive the expiration or earlier termination of this Lease, and after the expiration of any applicable notice and cure period, Tenant shall immediately reimburse Landlord for any expense incurred by Landlord in curing Tenant's failure to satisfy any such obligation (notwithstanding the fact that such cure might be effected by Landlord following the expiration or earlier termination of this Lease. Notwithstanding anything to the contrary contained in this Lease, in the event Landlord fails to bill Tenant for any Rent on or before the date which is two (2) years after the last day of the

year to which such bill applies, then Landlord shall be deemed to have waived the payment of any then unpaid Rent which would have been due pursuant to said bill relate (i.e., Landlord may not render bills or corrected, revised or updated bills in respect of any year more than two (2) years after the expiration of such year).

17.6 PARTIAL INVALIDITY

If any term or provision of this Lease or any portion thereof or the application thereof to any person or circumstances shall, to any extent, be invalid or unenforceable, then the remainder of this Lease and of such term or provision and the application of this Lease and of such term and provision to persons or circumstances other than those as to which it is invalid or unenforceable, shall not be affected thereby, and each term of this Lease shall be valid and enforceable to the fullest extent permitted by law.

17.7 LANDLORD'S RIGHT TO CURE; SURVIVAL

If Tenant shall at any time default in the performance of any obligation under this Lease beyond applicable notice and cure periods, Landlord shall have the right, but not the obligation, to enter upon the Premises and/or to perform such obligation, notwithstanding the fact that no specific provision for such substituted performance by Landlord is made in this Lease with respect to such default. In performing any such obligations, Landlord may make any payment of money or perform any other act. All reasonable sums so paid by Landlord (together with interest at the Lease Interest Rate) and all necessary incidental costs and expenses in connection with the performance of any such act by Landlord, shall be deemed to be additional rent under this Lease and shall be payable to Landlord immediately upon written demand; and if Tenant shall default in such payment, Landlord shall have the same rights and remedies as Landlord has hereunder for the failure of Tenant to pay Rent. Landlord may exercise the foregoing rights without waiving any other of its rights or releasing Tenant from any of its obligations under this Lease. Except as otherwise set forth herein, any obligations of Tenant as set forth herein (including, without limitation, rental and other monetary obligations, and obligations to indemnify Landlord), shall survive the expiration or earlier termination of this Lease, and Tenant shall immediately reimburse Landlord for any expense incurred by Landlord in curing Tenant's failure to satisfy any such obligation (notwithstanding the fact that such cure might be effected by Landlord following the expiration or earlier termination of this Lease).

17.8 ESTOPPEL CERTIFICATES

Tenant agrees on the Term Commencement Date and from time to time thereafter, upon not less than fifteen (15) days' prior written request by Landlord, to execute, acknowledge and deliver to Landlord a statement in writing, certifying that this Lease is unmodified and in full force and effect, that Tenant has no defenses, offsets or counterclaims against its obligations to pay rent and other charges required under this Lease and to perform its other covenants under this Lease and that there are no uncured defaults of Landlord or Tenant under this Lease (or, if there have been any modifications, that this Lease is in full force and effect, as modified, and stating the modifications, and, if there are any defenses, offsets, counterclaims or defaults, setting them forth in reasonable detail), and the dates to which the Rent and other charges have been paid. Any such statement delivered pursuant to this Section 17.8 may be relied upon by any prospective purchaser or mortgagee of the property which includes the Premises or any prospective assignee of any such mortgagee, however, Tenant shall incur no liability for its certifications reasonably made by Tenant in good faith.

Landlord agrees on the Term Commencement Date and from time to time thereafter, upon not less than fifteen (15) days' prior written request by Tenant, to execute, acknowledge and deliver to Tenant a statement in writing, certifying that this Lease is unmodified and in full force and effect, that Landlord has no defenses, offsets or counterclaims with respect to its obligations under this Lease and to perform its other covenants under this Lease and that there are no uncured defaults of Landlord or Tenant under this Lease (or, if there have been any modifications, that this Lease is in full force and effect, as modified, and stating the modifications, and, if there are any defenses, offsets, counterclaims or defaults, setting them forth in reasonable detail), and the dates to which the Rent and other charges have been paid. Any such statement delivered pursuant to this Section 17.8 may be relied upon by any prospective purchaser or mortgagee of the property which includes the Premises or any prospective assignee of any such mortgagee or any other party.

17.9 BROKERAGE

Each party hereto warrants and represents that it has dealt with no real estate broker or agent other than the Broker(s) named in Section 1.2 above in connection with this transaction and agrees to defend, indemnify and save the other party harmless from and against any and all claims for commissions or fees arising out of this Lease which, as to the respective parties, are inconsistent with such party's warranties and representations. Landlord shall be responsible for any commissions or fees owed to the Brokers in connection with this transaction in accordance with a separate agreement between the Brokers and Landlord. This Section shall survive the expiration or earlier termination of this Lease.

17.10 ENTIRE AGREEMENT

All negotiations, considerations, representations, and understandings between Landlord and Tenant are incorporated herein and this Lease expressly supersedes any proposals or other written documents relating hereto. No prior or contemporaneous agreement or understanding pertaining to any such matter shall be effective. Except as otherwise stated in this Lease, Tenant hereby acknowledges that no real estate broker nor Landlord or any employee or agents of any of said persons has made any oral or written warranties or representations to Tenant concerning the condition or use by Tenant of the Premises or the Property or concerning any other matter addressed by this Lease. This Lease may be modified or altered only by written agreement between Landlord and Tenant, and no act or omission of any employee or agent of Landlord shall alter, change, or modify any of the provisions hereof.

17.11 HOLDOVER

If for any reason Tenant holds over or occupies the Premises (or any portion thereof) beyond the Lease Term without the written consent of Landlord, Tenant shall have no more rights than a tenant by sufferance (or, at Landlord's sole option, such holding over shall constitute a tenancy from month to month, terminable by either party upon 30 days prior written notice to the other); and, in any case, Tenant shall be liable for payment of Rent during such period in an amount equal to one hundred fifty percent (150%) of the Base Rent payable immediately preceding the termination date of this Lease, with such tenancy otherwise on the same terms and conditions as set forth in the Lease, as far as applicable. In addition, if Tenant shall hold over for more than 30 days beyond such expiration or earlier termination without Landlord's written consent, Tenant shall be subject to costs, losses and damages related to such holding over (including reasonable attorneys' fees) Landlord may incur as a result of Tenant's failure to surrender possession of the Premises to Landlord upon the termination of this Lease. Nothing in this Section shall be construed to permit such holding over, or to limit Landlord's other rights and remedies on account thereof.

17.12 COUNTERPARTS

This Lease is executed in any number of counterparts, each copy of which is identical, and any one of which shall be deemed to be complete in itself and may be introduced in evidence or used for any purpose without the production of the other copies. Delivery of an executed counterpart of this Lease by facsimile or portable document format (PDF) shall be equally effective as delivery of an original executed counterpart.

17.13 CONSTRUCTION AND GRAMMATICAL USAGE

This Lease shall be governed, construed and interpreted in accordance with the laws of The Commonwealth of Massachusetts, and Tenant agrees to submit to the personal jurisdiction of any court (federal or state) in said Commonwealth for any dispute, claim or proceeding arising out of or relating to this Lease. In construing this Lease, feminine or neuter pronouns shall be substituted for those masculine in form and vice versa, and plural terms shall be substituted for singular and singular for plural in any place in which the context so admits or requires. If there be more than one party tenant, the covenants of Tenant shall be the joint and several obligations of each such party and, if Tenant is a partnership, the covenants of Tenant shall be the joint and several obligations of each of the partners and the obligations of the firm.

17.14 WHEN LEASE BECOMES BINDING

Employees or agents of Landlord have no authority to make or agree to make a lease or any other agreement or undertaking in connection herewith. The submission of this document for examination and negotiation does not constitute an offer to lease, or a reservation of, or option for, the Premises, and this document shall become effective and binding only upon the execution and delivery hereof by both Landlord and Tenant.

17.15 SECURITY DEPOSIT

Simultaneously with the execution and delivery of this Lease, Tenant shall deliver to Landlord a security deposit (the "Security Deposit"), which Security Deposit shall be in the Security Deposit Amount (as defined in Section 1.2) and shall consist of cash. During the Term hereof, and any extensions thereof, and for 60 days after the expiration of the Term, or for so long thereafter as Tenant is in possession of the Premises or has unsatisfied obligations hereunder to Landlord, the Security Deposit shall be security for the full and timely performance of Tenant's obligations under this Lease; which cash may be used and applied from time to time against outstanding obligations of Tenant hereunder without notice or demand, subject to applicable notice and cure periods. Tenant shall have no right to require Landlord to so apply the Security Deposit, nor shall Tenant be entitled to credit the same against Rent or other sums payable hereunder; no interest shall accrue thereon. No trust relationship is created herein between Landlord and Tenant with respect to said Security Deposit. Tenant acknowledges that the Security Deposit is not an advance payment of any kind or a measure of Landlord's damages in the event of Tenant's default; Landlord shall not be obliged to keep the Security Deposit as a separate fund or pay interest thereon but may commingle the Security Deposit with its own funds. Tenant hereby waives the provisions of any law which is inconsistent with this Section 17.15. The Security Deposit shall be reduced during the Lease Term commencing on the third anniversary of the month Tenant commences paying Rent in accordance with the provisions under Section 1.2 of this Lease.

17.16 LEGAL EXPENSES

If either party hereto be made or becomes a party to any litigation commenced by or against the other party involving the enforcement of any of the rights and remedies of such party, or arising on account of the default of the other party in the performance of such party's obligations hereunder, then the prevailing party in any such litigation, or the party becoming involved in such litigation because of a claim against such other party, as the case may be, shall receive from the other party all costs and reasonable attorneys' fees incurred by such party at trial and on appeal in connection with such litigation.

17.17 NO SURRENDER

The delivery of keys to any employee of Landlord or to Landlord's agents or employees shall not operate as a termination of this Lease or a surrender of the Premises.

17.18 COVENANT OF QUIET ENJOYMENT

Subject to the terms and provisions of this Lease and on payment of the Rent, additional rent, and other sums due hereunder and compliance with all of the terms and provisions of this Lease within any applicable notice and cure period, Tenant shall have the right to lawfully, peaceably, and quietly have, hold, occupy, and enjoy the Premises during the term hereof, without hindrance or ejection by Landlord or by any persons lawfully claiming under Landlord, or by any of Landlord's other tenants; the foregoing covenant of quiet enjoyment is in lieu of any other covenant, express or implied.

17.19 NO PERSONAL LIABILITY OF THE LANDLORD

Tenant agrees to look solely to Landlord's then equity interest in the Building and the Lot at the time owned or in which Landlord holds an interest as ground lessee, and the rents, income and other proceeds therefrom, for recovery of any judgment from Landlord; it being specifically agreed that neither any member of Landlord (whether Landlord be an individual, partnership, firm, corporation, trustee, or other fiduciary) nor any partner, policyholder, officer, manager, member, shareholder or director of Landlord, nor any trust of which any person holding Landlord's interest is trustee nor any successor in interest to any of the foregoing shall ever be personally liable for any such judgment, or for the payment of any monetary obligation to Tenant. The covenants of Landlord contained in this Lease shall be binding upon Landlord and Landlord's successors only with respect to breaches occurring during Landlord's and Landlord's successors' respective periods of ownership of Landlord's interest hereunder. Notwithstanding any other provision of this Lease to the contrary, in no event shall Landlord ever be liable for any indirect, special or consequential damages suffered by Tenant or Tenant's agents from any cause whatsoever. Notwithstanding any other provision of this Lease to the contrary, in no event shall Tenant ever be liable for any indirect, special or consequential damages suffered by Landlord or Landlord's agents from any cause whatsoever, except as provided in Sections 5.7 and 17.11.

17.20 NOTICES

Whenever, by the terms of this Lease, notice shall or may be given either to Landlord or to Tenant, such notice shall be in writing and shall be delivered by hand or sent by registered or certified mail, postage prepaid or by so-called "express" mail (such as Federal Express or U.S. Postal Service Express Mail):

If intended for Landlord, addressed to Managing Agent at the address set forth in Section 1.2 with a copy to Landlord at the address set forth in Section 1.2 and to (i) Thomas W. Tavenner, Jr. Esq., Dalton & Finegold LLP, 34 Essex Street, Andover, Massachusetts 01810, and (ii) Lincoln Property Company, 1000 McKinney Avenue, Suite 1000, Dallas, Texas 75201, or to such other addresses as may from time to time hereafter be designated by Landlord by like notice.

If intended for Tenant, addressed to Tenant at the address set forth on the first page of this Lease, with a copy of any default notice to Tenant's counsel, J. Goodwin Bland, Esq., Morgan Lewis & Bockius LLP, 101 Park Avenue, New York, New York 10178, or to such other address or addresses as may from time to time hereafter be designated by Tenant by like notice.

All such notices shall be effective upon delivery, attempted delivery, or refusal, whichever occurs first, at the address or addresses of the intended recipient, as set forth above.

17.21 MECHANIC'S LIENS

Tenant agrees immediately to discharge (either by payment or by the filing of the necessary bond, or otherwise) any mechanics', materialmen's or other lien or encumbrance against the Premises and/or Landlord's interest therein, which liens may arise out of any payment due, or purported to be due, for any labor, services, materials, supplies or equipment alleged to have been furnished to or for Tenant in, upon or about the Premises, excluding any for Landlord's Work as defined in this Lease. If Tenant shall fail to so discharge such lien or encumbrance within thirty (30) days of notice of filing then, in addition to any other right or remedy of Landlord, Landlord may, but shall not be obligated to, discharge same (either by payment or by filing of the necessary bond or otherwise) and any amount paid by Landlord for any of the aforesaid purposes, and all actual and legal and other expenses of Landlord, including actual counsel fees, in or about procuring the discharge of such lien, together with all necessary disbursements in connection therewith, and together with interest thereon at the rate set forth in Section 12.3 from the date of payment, shall be repaid by Tenant to Landlord, within ten (10) days of rendition of any bill or statement to Tenant therefore and if unpaid may be treated as additional rent. Nothing contained in this Lease shall prevent Tenant from granting a security interest or chattel mortgage in any of Tenant's property, and nothing herein shall prevent Tenant from contesting any such lien in good faith.

17.22 RECORDING

Tenant agrees not to record the within Lease, but, if required by applicable law in order to protect Tenant's interest in the Premises, each party hereto agrees, on the request of the other, to execute a so-called memorandum of lease or short form lease in recordable form and complying with applicable law and reasonably satisfactory to Landlord's attorneys. In no event shall such document set forth the rent or other charges payable by Tenant under this Lease; and any such document shall expressly state that it is executed pursuant to the provisions contained in this Lease and is not intended to vary the terms and conditions of this Lease.

17.23 TENANT'S FINANCIAL CONDITION

Tenant warrants and represents that all information furnished to Landlord or Landlord's representatives in connection with this Lease are true and correct and in respect of the financial condition of Tenant, properly reflect the same without material adverse change, as of the date hereof. Upon Landlord's request, which may be made no more often than annually, Tenant shall furnish to Landlord, at Tenant's sole cost and expense, then current financial statements of Tenant (if audited statements have been recently prepared on behalf of Tenant, or otherwise certified as being true and correct by the chief financial officer of Tenant). All information provided to Landlord shall be held strictly confidential. Notwithstanding the above, in the event the capital stock of Tenant is then traded on a National Exchange (as defined under Federal securities law) and Tenant's most recent 10-K (and, if more recent, 10-Q), or similar financial document provided for entities listed on the Australian national stock exchange, is readily available to the public for review (i.e., via the internet), Landlord shall obtain same from such sources and such document will satisfy the requirements of Section 17.23 of this Lease.

17.24 WAIVER OF COUNTERCLAIMS

If Landlord commences any summary proceeding for possession of the Premises based on an event of default by Tenant hereunder, Tenant hereby waives the right to interpose any non-compulsory counterclaim of whatever nature or description in any such proceeding; provided, however, that Tenant shall have the right to bring a separate action against Landlord to the extent otherwise allowed under this Lease as long as Tenant does not attempt to have such action joined or otherwise consolidated with Landlord's summary proceeding.

17.25 CONSENTS

Except as otherwise specifically provided in this Lease, any consent or approval to be given by Landlord under this Lease may be withheld or denied at Landlord's sole and absolute reasonable discretion. Whenever in this Lease the consent or approval of Landlord is required, and it is specifically provided that such consent or approval is not to be unreasonably withheld, delayed or conditioned, but nevertheless Landlord shall refuse or delay or condition such consent or approval, Tenant shall not be entitled to make any claim, and Tenant hereby waives any claim, for money damages (nor shall Tenant claim any money damages by any setoff, counterclaim or defense) based upon any claim or assertion by Tenant that Landlord unreasonably withheld or delayed or conditioned its consent or approval; and Tenant's sole remedy in such circumstances shall be an action or proceeding for specific performance, injunctive relief or declaratory judgment, plus reasonable attorney's fees.

17.26 EASEMENTS

Landlord reserves to itself the right, from time to time, to grant such easements, rights and dedications that Landlord deems necessary or desirable, and to cause the recordation of parcel maps and restrictions, so long as such easements, rights, dedications, maps and restrictions do not unreasonably materially interfere with the use of the Premises by Tenant. Tenant shall sign any of the aforementioned documents within ten (10) days after Landlord's request and Tenant's failure to do so shall constitute a default by Tenant. The obstruction of Tenant's view, air, or light by any structure erected in the vicinity of the Property, whether by Landlord or third parties, shall in no way affect this Lease or impose any liability upon Landlord.

17.27 CHANGES TO PROPERTY

Landlord shall have the right, from time to time, to make changes to the size, shape, location, number and extent of the improvements comprising the Property (hereinafter referred to collectively as " Changes ") including, but not limited to, the Building interior and exterior, the common areas and elements thereof, elevators, escalators, restrooms, HVAC, electrical systems, communication systems, fire protection and detection systems, plumbing systems, security systems, parking control systems, driveways, entrances, parking spaces, parking areas and landscaped areas; provided that such Change shall not (a) unreasonably diminish Tenant's ingress and egress to and from the Building and the Premises, (b) unreasonably diminish elevator or other services or facilities from the level required of Landlord in this Lease as a result thereof, or (c) adversely affect Tenant's use of the Premises for the Permitted Uses. In connection with the Changes, Landlord may, among other things, erect scaffolding or other necessary structures at the Property, limit or eliminate access to portions of the Property, including portions of the common areas, or perform work in the Building, which work may create noise, dust or leave debris in the Building. Tenant hereby agrees that such Changes and Landlord's actions in connection with such Changes shall in no way constitute a constructive eviction of Tenant or entitle Tenant to any abatement of rent. Notwithstanding anything to the contrary contained herein, although Landlord shall use commercially reasonable efforts to minimize any material interference of Tenant's use or occupancy of or access to the Premises, Landlord shall have no responsibility or for any reason be liable to Tenant for any direct or indirect injury to or interference with Tenant's business arising from the Changes unless caused by Landlord's gross negligence or willful misconduct, nor shall Tenant be entitled to any compensation or damages from Landlord for any inconvenience or annoyance occasioned by such Changes or Landlord's actions in connection with such Changes unless caused by Landlord's gross negligence or willful misconduct and causes Tenant to be unable to conduct its business at any portion of the Premises for more than three (3) consecutive days, then Tenant's Rent with respect to such portion of the Premises will abate from the fourth (4 th) day until the day that Tenant may reasonably resume its business in such portion of the Premises.

17.28 COVENANTS

This Lease shall be construed as though Landlord's covenants contained herein are independent and not dependent and Tenant hereby waives the benefit of any law to the contrary. All provisions of this Lease to be observed or performed by Tenant are both covenants and conditions.

17.29 AUCTIONS

Tenant shall not conduct, nor permit to be conducted, either voluntarily or involuntarily, any auction upon the Premises or the Property. The holding of any auction on the Premises or common areas in violation of this Section shall constitute a default hereunder.

17.30 AUTHORITY

If Tenant is a corporation, limited liability corporation, trust, or general or limited partnership, Tenant, and each individual executing this Lease on behalf of such entity, represents and warrants that such individual is duly authorized to execute and deliver this Lease on behalf of said entity, that said entity is duly authorized to enter into this Lease, and that this Lease is enforceable against said entity in accordance with its terms. If Tenant is a corporation, trust or partnership, Tenant shall deliver to Landlord upon request evidence of such authority satisfactory to Landlord.

17.31 RELATIONSHIP OF PARTIES

Nothing contained in this Lease shall be deemed or construed by the parties hereto or by any third party to create the relationship of principal and agent, partnership, joint venturer or any association between Landlord and Tenant.

17.32 RIGHT TO LEASE

Landlord reserves the absolute right to effect such other tenancies in the Property as Landlord in its sole discretion shall determine, and Tenant is not relying on any representation that any specific tenant or number of tenants will occupy the Property.

17.33 CONFIDENTIALITY

The parties acknowledge and agree that the terms of this Lease are confidential. Disclosure of the terms hereof could adversely affect the ability of Landlord to negotiate other leases with respect to the Building and may impair Landlord's relationship with other tenants of the Building. Tenant agrees that it and its partners, officers, directors, employees, brokers, and attorneys, if any, shall not disclose the terms and conditions of this Lease to any other person or entity without the prior written consent of Landlord which may be given or withheld by Landlord, in Landlord's sole discretion, except as required for financial disclosures or securities filings or in connection with proposed assignments or subleases, lenders, proposed joint venturers or investors, or in connection with Tenant's legitimate business reasons **.** It is understood and agreed that Landlord's sole remember for a breach of this provision shall be to seek specific performance of this provision and to seek injunctive relief to prevent its breach or continued breach.

17.34 USA PATRIOT ACT CERTIFICATION

(a) Certification . Pursuant to Executive Order 13224, signed by President George W. Bush on September 24, 2001, each of Lender and Tenant hereby certifies to the other that:

(1) It is not acting, directly or indirectly, for or on behalf of any person, group, entity, or nation named by any Executive Order or the United States Treasury Department as a terrorist, "Specially Designated National and Blocked Person," or other banned or blocked person, entity, nation, or transaction pursuant to any law, order, rule, or regulation that is enforced or administered by the Office of Foreign Assets Control; and

(2) It is not engaged in this transaction, directly or indirectly on behalf of, or instigating or facilitating this transaction directly or indirectly on behalf of, any such person, group, entity, or nation.

(b) Indemnification . Each of Landlord and Tenant hereby agrees to defend, indemnify and hold harmless the other from and against any and all claims, damages, losses, risks, liabilities and expenses (including reasonable attorneys' fees and costs) arising from or related to any breach of the foregoing certification.

17.35 WAIVER OF JURY TRIAL

LANDLORD AND TENANT HEREBY WAIVE THEIR RESPECTIVE RIGHT TO TRIAL BY JURY OF ANY CAUSE OF ACTION, CLAIM, COUNTERCLAIM OR CROSS-COMPLAINT IN ANY ACTION, PROCEEDING AND/OR HEARING BROUGHT BY EITHER LANDLORD AGAINST TENANT OR TENANT AGAINST LANDLORD ON ANY MATTER WHATSOEVER ARISING OUT OF, OR IN ANY WAY CONNECTED WITH, THIS LEASE, THE RELATIONSHIP OF LANDLORD AND TENANT, TENANT'S USE OR OCCUPANCY OF THE PREMISES, OR ANY CLAIM OF INJURY OR DAMAGE, OR THE ENFORCEMENT OF ANY REMEDY UNDER ANY LAW, STATUTE, OR REGULATION, EMERGENCY OR OTHERWISE, NOW OR HEREAFTER IN EFFECT.

THIS SPACE LEFT BLANK – SIGNATURE PAGE TO FOLLOW

IN WITNESS WHEREOF, the parties hereto have executed this instrument under seal as of the date set forth in Section 1.2, above.

LANDLORD

RFP LINCOLN 293, LLC
a Massachusetts limited liability company

By: Lincoln Route 20 (MA), a Delaware limited liability company, its Managing Member

By: Non-Member Manager, Inc., a Texas corporation, its Manager

/s/ Gregory S. Courtwright
Name: Gregory S. Courtwright
Title: Vice President

TENANT

VALERITAS, INC.
a Delaware corporation

/s/ Erick Lucera
Name: Erick Lucera
Title: CFO

EXHIBIT A-1

Plan showing the existing Third Floor Space

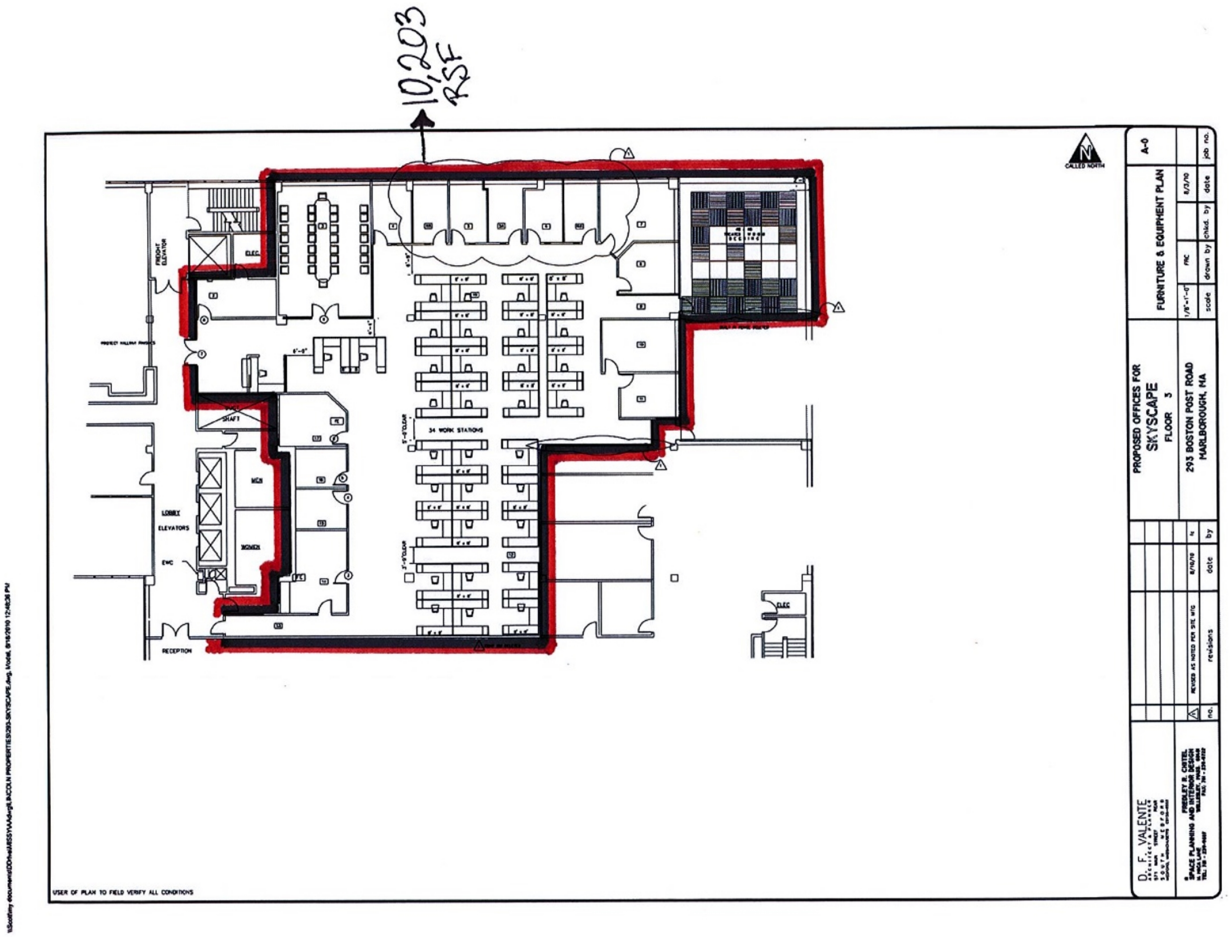
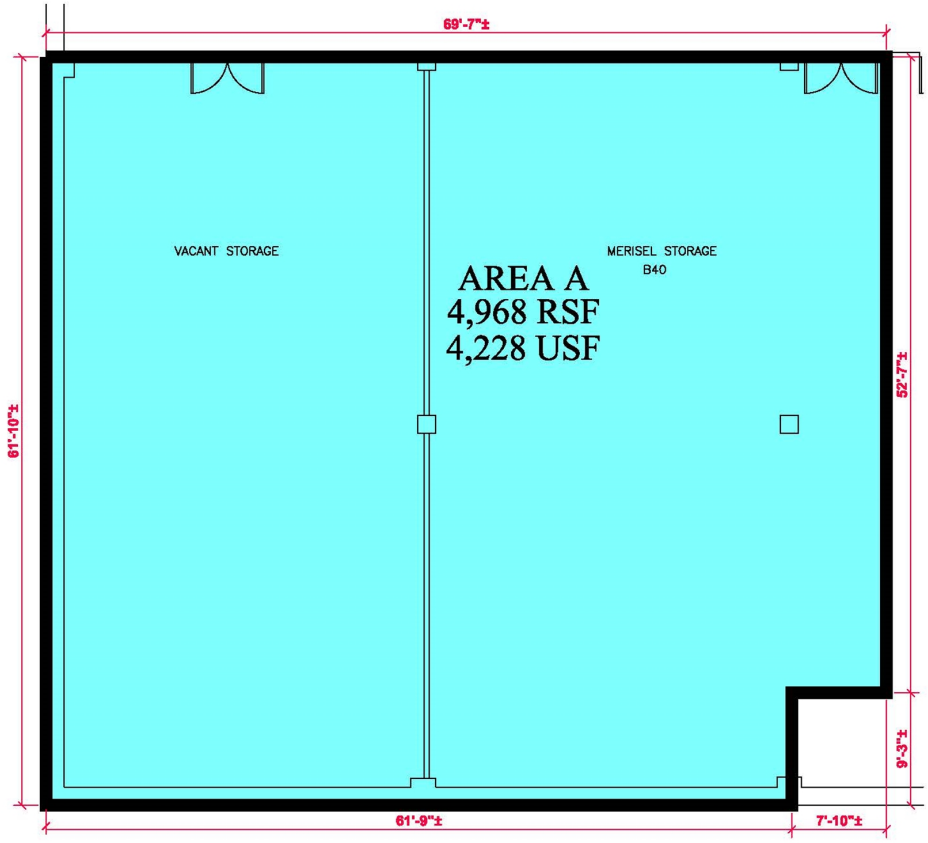


Exhibit A-2

Plan showing Lower Level Space



PROPOSED BASEMENT AREA FLOOR PLAN-OPTION C

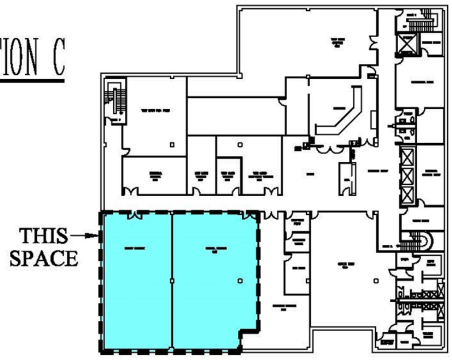
NOTE: ALL DIMENSIONS ARE APPROXIMATE

PROPOSED AREA PLAN FOR:

VALERITAS

293 BOSTON POST ROAD
MARLBOROUGH, MASSACHUESTTS
2017_0145SF1 4/28/2017

INFORMATION BY OTHERS
NO FIELD CONFIRMATIONS HAVE BEEN MADE



BASEMENT KEY PLAN

Exhibit B

Intentionally Deleted

EXHIBIT C

RULES AND REGULATIONS
293 Boston Post Road
Marlborough, Massachusetts

In the event of a conflict between the terms of the Lease and the Rules and Regulations, the terms of the Lease shall control.

1. Heating, lighting and plumbing: The Landlord should be notified at once of any trouble with heating, lighting or plumbing fixtures. Tenants must not leave the doors of the Premises unlocked at night.

2. The entrances, sidewalks, ways, vestibules, passages, corridors, halls, elevators and stairways shall not be encumbered nor obstructed by Tenant, Tenant's agents, servants, employees, licensees or visitors, or be used by them for any purpose other than ingress or egress to and from the Premises. Landlord reserves the right to reasonably restrict and regulate the use of aforementioned public areas of the Building by Tenant, Tenant's agents, employees, servants, licensees and visitors and by persons making deliveries to Tenant.

3. The water and wash closets and other plumbing fixtures shall not be used for any purposes other than those for which they were constructed, and no sweepings, rubbish, rags, or other substances shall be thrown or placed therein. Damages or maintenance expense resulting from any negligent misuse of fixtures or disposal of the above by Tenant, its servants, employees, agents, visitors, or licensees, shall be borne by Tenant.

4. The weight and position of all safes and heavy equipment or machines shall be subject to the approval of the Landlord.

5. Lettering on doors, tablets and building directory shall be subject to the approval of the Landlord; no lettering shall be allowed on outside windows.

6. No wires for telephone service, electric lights, messenger service or for any other purpose shall be put in the Premises without the consent of the Landlord.

7. No glass in doors or elsewhere through which light is admitted in to any part of the building shall be obstructed.

8. No bicycles, vehicles, or animals, except for the disabled, shall be brought into or kept in or about the Premises or Building, except bicycles may be stored at the designated bicycle rack.

9. After the conclusion of Tenant's initial move into the Premises, other movement in or out of the Building of furniture or office equipment which requires the use of elevators or stairways or the movement through the main Building entrance shall be restricted to the after business hours designated by Landlord. All such movement shall be under the supervision of Landlord and performed in the manner agreed upon between Tenant and Landlord by pre-arrangement before performance. Such pre-arrangement initiated by Tenant will include the determination by Landlord and subject to Landlord's reasonable discretion, relating to the time, method, and routing of the items' movement, as well as reasonable limitations imposed by safety, appearance or other reasonable concerns which may include the prohibition of equipment or any other item from being brought into the Building, as well as the method of the items' movement through the Building. Tenant shall assume with its contractors, all risk as to damage caused by any such movement or property being moved or injury to persons or public engaged or not engaged in such movement, including equipment, property, and personnel of Landlord if damaged or injured as a result of Tenant or its contractor's negligent or willful acts in connection with such Tenant arranged moving from the time of entering the property to the completion of work. Landlord shall not be liable for the acts of any person engaged in, or any damage or loss to any of said property or persons resulting from any act in connection with such moving performed by Tenant arrangement, except relating to Landlord's or its agent's or contractor's negligence or misconduct.

10. Nothing shall be thrown from or taken in through the windows, nor shall anything be left outside the Building on the window sills of the Premises.

11. No person shall loiter in the halls, corridors, or lavatories.

12. The Landlord, its agents and employees shall have access at reasonable times and upon reasonable notice to perform their duties in the maintenance and operation of the Premises.

13. No Tenant shall use any method of heating other than that provided for in the Tenant's Lease without the consent of the Landlord.

14. Any damage caused to the Building or the Premises or to any person or property herein as a result of any breach of any of the rules and regulations by the Tenant shall be borne by Tenant.

15. After the conclusion of Tenant move-in, all deliveries, inclusive of packages, office supplies, etc., must be made via the freight elevator during normal business hours. Landlord's written approval must be obtained for any delivery made after business hours and Tenant will be responsible for the expense of the security attendant who monitors access to the Building during the period of such delivery.

16. Tenant shall not permit the parking or standing of delivery vehicles to interfere with the use of any driveway, walk, parking area or other common areas.

17. No hand trucks or delivery dollies, except those equipped with rubber tires and padded side guards, shall be used in any space, or in public halls of the building, either by Tenant or by jobbers or others in the delivery or receipt of merchandise.

18. All deliveries to Tenant must be accepted by Tenant. The Landlord and its agents or employees will not accept, sign for, or hold Tenant mail, packages, or deliveries.

19. Tenant shall not make, or permit to be made, any unseemly or disturbing noises, odors, or vibrations to emanate from premises or otherwise unreasonably disturb or interfere with the occupancy of the Building whether by the use of any equipment, musical instrument, radio, television, talking machine, unmusical noise, whistling, singing, or in any other way.

20. No additional locks or security devices will be installed without prior notification and approval by Landlord. New locks or re-keying must be coordinated with Landlord and keyed on building master system.

21. Tenant shall be responsible for persons it authorizes to have access to the Building during non-business hours and shall be liable for and shall coordinate which persons should have access cards issued. Tenant shall keep access card records current and properly identified by employee name.

22. All service requests of Tenant required of Landlord shall be administered through Building management office. Tenants will not contract independently with employees and agents of Landlord without the coordination of the management office, nor shall Tenant request employees or agents of Landlord to receive or carry messages for or to any Tenant or other person.

23. None of the entries, passages, doors, elevators, elevator doors, hallways, or stairways shall be blocked or obstructed, nor shall any rubbish, litter, trash, or material of any nature be placed, emptied, or thrown into these areas, nor shall such areas be used at any time except for ingress and egress by Tenant, Tenant's agents, employees, or invitees.

24. No boxes, crates, pallets, or other such materials shall be stored in building hallways or other common areas. When Tenant must dispose of crates, boxes, etc., it will be the responsibility of Tenant to dispose of same prior to, or after the hours of 8:00 a.m. and 6:00 p.m., so as to avoid having such debris visible or being moved in the Common Areas during normal business hours. Such items will be removed as part of evening janitorial service at Landlord's expense.

25. Each Tenant shall cooperate with Landlord's employees in keeping leased premises neat and clean.

26. Unless otherwise provided for in this Lease, Tenant shall not mark, paint, drill into, or in any way deface any part of the Premises, the Building except for Tenant's interior design components and furnishings in the Premises or the approved signage. Other than for initial move-in, no boring, cutting, or stringing for wires shall be permitted without the prior written consent of Landlord and as Landlord may direct.

27. Unless otherwise provided in this Lease, neither Tenant, nor its servants, employees, agents, visitors, or licensees, shall at any time bring or keep upon the Premises any flammable, combustible, or explosive fluid, chemical or substance (including Christmas trees and ornaments) except such items as may be incidentally used, provided Tenant notifies Landlord of the location thereof and makes adequate provision for safe storage. No space heaters or fans shall be operated or located in the Premises, other than UL approved or Landlord installed appliances.

28. Tenant will not locate furnishings or cabinets adjacent to mechanical or electrical panels, HVAC equipment or other mechanical equipment so as to prevent personnel from servicing such units or equipment as routine or emergency access may require. Cost of moving such furnishings for Landlord's access will be borne by Tenant.

29. No space in the Premises or Building shall be used for manufacturing, for lodging, sleeping, storage of drugs or medicine not typically found of quality or quantity in First Aid supply kits or for legal purposes.

30. Tenant shall not place, install or operate on the demised premises or in any part of Building, any engine, stove, or machinery, or conduct mechanical operations or cook thereon or therein except Tenants microwave, refrigerator, additional cooling equipment for file server room (subject to Landlord's reasonable approval), office and communication equipment.

31. Tenant will coordinate with Landlord all Tenant arranged contractors, and installation technicians, rendering any construction or installation service to Tenant before performance of any such service. This provision shall apply to all work performed in the Building by Tenant arranged contractors including the installation of telephones, telegraph equipment, electrical devices and attachments, and the installation of any nature affecting the floors, walls, woodwork, trim, windows, ceiling, equipment (other than Tenant's office equipment), or any other physical portion of the Building.

32. Smoking is prohibited in common entrances, vestibules, passages, corridors, halls, elevators, stairways, and toilet rooms of the Building. Tenant is responsible for informing all of its vendors, service providers, agents, employees, licensees, and visitors of this policy. Landlord reserves the right to request that any person(s) engaged in the act of smoking (in the common areas recited above), at this or her choice, either cease smoking or leave the common areas of the Building immediately.

33. Canvassing, soliciting, and peddling in the Building and Parking Lot is prohibited. Landlord and Tenant shall cooperate to prevent same.

34. Tenant shall restrict parking by Tenant, its employees, service providers, agents, and visitors to the number of parking spaces specified in the lease and to the parking areas designated by Landlord and they shall comply with reasonable parking rules and regulations as may be posted and distributed from time to time.

35. Tenant will evacuate the Premises and Building in the event of emergency or catastrophe notification; whether practice drill, false alarm, or actual occurrence.

36. Tenant will notify Landlord of any incidents, accidents, injuries, or hazards which Tenant is aware of, which occur, or are present in Premises or Building.

37. Tenant will be requested to participate in recycling and other expense reduction programs offered by Building.

38. Landlord reserves the right to rescind any of these rules and make such other and further reasonable rules and regulations as in Landlord's judgment shall from time to time be needed for the safety, protection, care and cleanliness of the Premises and/or Building, the operation thereof, the preservation of good order therein, and the protection and comfort of its Tenants, their agents, employees, and invitees, which rules when made and notice thereof given to a Tenant shall be binding upon Tenant in the manner as if originally prescribed and enforced by Landlord without discrimination.

EXHIBIT D

LEGAL HOLIDAYS

BOSTON POST ROAD CORPORATE CENTER

MARLBOROUGH, MASSACHUSETTS

New Year’s Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Building Services will be provided on all other holidays based upon building occupancy at the discretion of the Manager.

EXHIBIT E:

CLEANING SCHEDULE

293 BOSTON POST ROAD
MARLBORO, MASSACHUSETTS

Janitorial services in accordance with the following schedule.

Cleaning in Premises to be performed after 6:00 P.M.

FIVE TIMES PER WEEK

A. Lobbies, Entries and Hallways (Building Common Area)

1. Vacuum entire carpeted area, replace furniture to its original position when completed.
2. Spot clean carpet and remove other foreign substances from carpet.
3. Damp mop spills as needed leaving floor in a clean, streak free condition.
4. Empty all waste containers, spot cleaning exterior surfaces and replacing liners as needed.
5. Dust all main lobby furniture and all horizontal and vertical surfaces within reach, returning to original position when completed.
6. Clean and polish elevator tracks, spot clean elevator paneling, saddles and doors inside and out as needed.
7. Spot clean elevator carpet, removing gum and other foreign substances as needed.
8. Police exterior front entrance, removing debris as needed (cigarette butts, etc.).
9. Spot clean and polish all metal bright work leaving a bright, streak free condition.
10. Spot clean all walls, doors and partition glass.
11. Clean and disinfect all drinking fountains.
12. Dust fire extinguisher boxes.
13. Properly arrange all furniture and reading material.

B. Restrooms

1. Sweep and dam mop with disinfectant entire floor surface with approved disinfectant floor cleaner and dry, leaving floor in a clean, streak free condition.
2. Clean and disinfect all sink basins, urinals and toilets completely, leaving toilet seat lids in an upright position.
3. Empty and wash all waste receptacles replacing liners as needed.
4. Empty and clean sanitary napkin waste receptacle and replace liners as needed.
5. Clean and polish all mirrors, chrome fixtures, metal bright work and dispensers.

6. Restock all toilet, toweI, seat cover, soap and sanitary napkin dispensers.

7. Spot clean walls around sinks, towel dispensers, urinals, partitions and doors.

8. Dust partitions, top of mirrors and frames.

C. Conference Room / Classroom Areas

1. Empty all waste containers, spot cleaning exterior surfaces and replacing liners as needed.

2. Dust all desks, chairs, chair bases, tables, file cabinets, and other furniture.

3. Clean counters and telephones.

4. Properly arrange all furniture and reading literature.

5. Spot clean carpet and carpet protectors.

D. Office Areas

1. Empty all waste containers, replacing liners as needed to prevent odors, spills or any offensive appearance.

2. Sweep and dust mop all hard floor surfaces with dust control treated dust mop.

3. Dust all horizontal and vertical surfaces within reach (such as desks, table and cabinet tops, and credenzas) without disturbing papers or accessories on desks.

4. Damp mop spills, leaving floor in a clean, steak free condition.

5. Spot clean carpets as needed, removing gum and other foreign substances.

6. Vacuum all carpeted traffic aisles, offices, classrooms, conference and cubicle areas.

7. Vacuum and clean all tenant lunchroom/coffee kitchen/eating areas. Spot clean tables,

8. Restock lunchroom/coffee kitchen/eating areas with paper towels.

9. Properly arrange all furniture and reading material.

E. Stairways and Elevators

1. Police stairwells, removing debris as needed.

2. Spot clean doors and al walls (especially stairway walls.)

3. Vacuum all carpets and area rugs.

4. Clean and shine elevator tracks.

F. Other Services

1. Police outside by entries.

2. Keep janitor closets neat and orderly.

3. Leave on only designated lights.

4. Inform Lincoln Properties of any problems notices (i.e., lights burned out, dispensers broken, door handles broken, etc.) within 24 hours.

G. **Exterior of Building**

1. Empty exterior trash receptacles and clean cigarette ash urns where applicable.

THREE TIMES PER WEEK

A. **Entrance Lobby**

1. Sweep and damp mop entire hard surfaced flooring, replacing all furniture to its original position when completed.

ONE TIME PER WEEK

A. Lobbies, Entries and Hallways

1. Clean stairwell glass leaving a bright streak free condition.
2. Brush and clean door thresholds as needed.
3. Buff hard surface floors, if needed, so as to enable them to present the best possible appearance.
4. Dust all window ledges and flat surfaces within reach.
5. Dust vents, diffusers and grills.
6. Vacuum all upholstered furniture.
7. Dust all high partition ledges, moldings, window ledges, baseboards and low ledges.

B. Stairways and Elevators

1. Vacuum carpeted stairs and landings.
2. Police and remove all waste and debris.
3. Spot clean carpet as needed, removing gum and other foreign substances.
4. Dust handrails, door frames, ledges and other flat surfaces within reach.
5. Dust all vents, diffusers and grills.
6. Dust all high partition ledges, moldings, window ledges, baseboards and low ledges.

C. Office Areas

1. Spot clean smudges and handprints from walls, doors and light switches.
2. Sweep and damp mop all hard surface floors, leaving in a clean, streak free condition.
3. Damp wipe telephone using a disinfectant.
4. Dust chair bases and other low ledges.

5. Dust all window ledges and other flat surfaces within reach.

6. Dust vents, diffusers and grills.

7. Vacuum all upholstered furniture.

8. Dust all high partition ledges, moldings, window ledges, baseboards and low ledges.

D. Restrooms

1. Dust all horizontal surfaces within reach.

E. Exterior of Building

1. Sweep all exterior stairways and landings.

ONE TIME PER MONTH

A. Lobbies, Entries and Hallways

2. Vacuum edges along baseboards and interior of elevators.

3. Spot clean smudges and scuffs from baseboards as needed.

4. Dust mini blinds.

B. Stairways and Elevators

1. Dust handrails.

2. Spot clean doors and wall surfaces within reach.

3. Vacuum edges of carpets and concrete along baseboards where upright vacuum cleaner will not reach.

4. Vacuum edges of cement stairwells.

ONE TIME PER QUARTER

A. Lobbies, Entries and Hallways (Common Areas of Building)

1. Strip wax, scrub and wax tile floors once every three months (four times per year).

B. Restrooms

1. Strip wax, scrub and wax tile floors once every three months (four times per year).

Exhibit 10.53

FIRST AMENDMENT TO LEASE

THIS FIRST AMENDMENT TO LEASE (the " Amendment ") is made as of the 11th day of February 2019 (the "Effective Date ") by and between **BPR 293 EQUITY PARTNERS, LLC** , a Massachusetts limited liability company ("Landlord "), and **VALERITAS, INC** ., a Delaware corporation (" Tenant ").

RECITALS

A. Pursuant to that certain lease dated as of May 10, 2017 (the " Original Lease "), Landlord, as successor-in-interest to RFP Lincoln 293, LLC, a Massachusetts limited liability company, leases to Tenant certain premises in a building located at 293 Boston Post Road, Marlborough, Massachusetts (the " Building "), which premises consist of approximately 10,203 rentable square feet of space on the third (3rd) floor of the Building (the " Third Floor Space ") and approximately 4,968 rentable square feet of space on the lower level of the Building (the " Lower Level Space "), which Original Lease was amended by that certain Term Commencement Date Agreement dated as of December 19, 2017 (the Original Lease, as so amended, the " Existing Lease "). The Third Floor Space and the Lower Level Space collectively contain approximately 15,171 rentable square feet and are collectively referred to herein as the " Existing Premises ."

B. Landlord and Tenant now desire to amend the Existing Lease to add certain additional space on the third (3rd) floor of the Building, adjacent to the Third Floor Space (the " Expansion Premises "), as shown on Exhibit A hereto, to extend the term thereof, and in certain other respects, all as more particularly set forth below.

C. NOW, THEREFORE, in consideration of the mutual covenants and agreements contained herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Landlord and Tenant hereby agree as follows:

1. Definitions . Capitalized terms used and not otherwise defined herein shall have the respective meanings ascribed to such terms in the Existing Lease. The Existing Lease, as amended and affected by this Amendment, is hereinafter referred to as the " Lease ." The above recitals are incorporated into and made a part of this Amendment by this reference.

2. Premises . As of the Expansion Premises Commencement Date (as defined in Section 7(a) below), Landlord hereby leases to Tenant, and Tenant hereby accepts, the Expansion Premises, subject to and with the benefit of the terms, covenants, conditions, and provisions of the Lease, and the lease of the Expansion Premises by Tenant shall be on all of the terms, covenants and provisions of the Existing Lease, except as modified by this Amendment. The anticipated Expansion Premises Commencement Date is estimated to be May 15, 2019 (the " Target Expansion Premises Commencement Date "). From and after the Expansion Premises Commencement Date, all references to the "Premises" in this Amendment and the Lease shall be deemed to refer to the Existing Premises and the Expansion Premises. Landlord and Tenant hereby acknowledge and agree that, notwithstanding anything to the contrary contained in the Existing Lease, from and after the Expansion Premises Commencement Date, the Third Floor Space and the Expansion Premises shall be deemed to contain 15,259 rentable square feet in the aggregate. In addition to Landlord's Expansion Premises Work, Landlord, at its expense, shall deliver the Expansion Premises on the Expansion Premises Commencement Date (i) free from asbestos-containing materials and any other materials recognized by law to be "hazardous" or "toxic," (ii) otherwise in compliance with all applicable laws and codes, (iii) with the heating, ventilating and air conditioning (HVAC), electrical, plumbing, mechanical and fire/life safety systems serving the Expansion Premises in good working order, and (iv) vacant, free from personal property. Notwithstanding anything herein to the contrary, Tenant shall not be responsible for the costs and expenses incurred in connection with the removal or remediation of Hazardous Material that is not in compliance with applicable law as of the Expansion Premises Commencement Date and which is located in, on or under the Building or the Property prior to the Expansion Premises Commencement Date unless such Hazardous Material was brought on to the Property by Tenant or its agents. Landlord hereby represents that, to its actual knowledge, there are currently no Hazardous Materials in the Expansion Premises.

3. Term . Notwithstanding anything to the contrary contained in the Existing Lease, the Lease Term is hereby extended by two (2) years, commencing on March 1, 2024 and, unless earlier terminated or extended in accordance with the Lease, terminating on February 28, 2026 (the " Extended Term "). Notwithstanding the foregoing, Landlord and Tenant hereby acknowledge and agree that the extension of the Lease Term for the Extended Term is subject to Landlord's delivery of the Expansion Premises to Tenant in accordance herewith.

4. Base Rent . Notwithstanding anything to the contrary in the Existing Lease, from and after the Expansion Premises Commencement Date (but in no event earlier than June 1, 2019), Tenant shall pay Base Rent for the Premises as follows:

Third Floor Space and Expansion Premises :

Lease Period	Annual Base Rent	Monthly Installment of Base Rent
From the later of (i) the Expansion Premises Commencement Date; and (ii) June 1, 2019 until the day immediately prior to the four (4) month anniversary thereof	$196,407.75 (calculated on the basis of $19.25/r.s.f. on 10,203 r.s.f. only)	$16,367.31
From the four (4) month anniversary of the later of (i) the Expansion Premises Commencement Date; and (ii) June 1, 2019 until October 31, 2019	$274,870.75 (calculated on the basis of $19.25/r.s.f. on 14,279 r.s.f. only)	$22,905.90
November 1, 2019 to October 31, 2020	$285,580.00 (calculated on the basis of $20.00/r.s.f. on 14,279 r.s.f. only)	$23,798.33
November 1, 2020 to October 31, 2021	$296,289.25 (calculated on the basis of $20.75/r.s.f. on 14,279 r.s.f. only)	$24,690.77
November 1, 2021 to October 31, 2022	$306,998.50 (calculated on the basis of $21.50/r.s.f. on 14,279 r.s.f. only)	$25,583.21
November 1, 2022 to February 29, 2024	$317,707.75 (calculated on the basis of $22.25/r.s.f. on 14,279 r.s.f. only)	$26,475.65
March 1, 2024 to February 28, 2025	$350,957.00 (calculated on the basis of $23.00/r.s.f. on 15,259 r.s.f.)	$29,246.42
March 1, 2025 to February 28, 2026	$362,401.25 (calculated on the basis of $23.75/r.s.f. on 15,259 r.s.f.)	$30,200.10

Lower Level Space which includes 4,968 rentable square feet :

Lease Period	Annual Base Rent	Per Square Foot	Monthly Installment of Base Rent
February 1, 2019 to October 31, 2019	$36,018.00	$7.25	$3,001.50
November 1, 2019 to October 31, 2020	$37,260.00	$7.50	$3,105.00
November 1, 2020 to October 31, 2021	$38,502.00	$7.75	$3,208.50
November 1, 2021 to October 31, 2022	$39,744.00	$8.00	$3,312.00
November 1, 2022 to February 29, 2024	$40,986.00	$8.25	$3,415.50
March 1, 2024 to February 28, 2025	$42,228.00	$8.50	$3,519.00
March 1, 2025 to February 28, 2026	$43,470.00	$8.75	$3,622.50

5. Tenant's Proportionate Share . Notwithstanding anything to the contrary in the Existing Lease, from and after the Expansion Premises Commencement Date, Tenant's Proportionate Share shall be 11.32% (based upon the rentable square feet of the Premises (including the Third Floor Space, the Lower Level Space and the Expansion Premises) of approximately 20,227, and total rentable Building square footage of approximately 178,697 square feet).

6. Parking . Notwithstanding anything to the contrary in the Existing Lease, from and after the Expansion Premises Commencement Date, Tenant shall have the right to use sixty-eight (68) parking spaces in the parking areas serving the Building, on a non-exclusive, "as available" basis, based on a parking ratio of 3.4 spaces per 1,000 rentable square feet of the Premises.

7. Expansion Premises Work .

(a) Landlord shall perform work in the Expansion Premises to prepare it for Tenant's occupancy (the " Expansion Premises Work "), pursuant to the plan attached hereto as Exhibit B (" Approved Plans "), using Building standard materials and finishes. Subject to any Tenant Delays and Force Majeure Events, Landlord shall use commercially reasonable efforts to substantially complete the Expansion Premises Work on or before the Target Expansion Premises Commencement Date; provided, however, that Landlord shall have no liability whatsoever to Tenant in the event that Landlord shall fail for any reason whatsoever to substantially complete the Expansion Premises Work on or before such date. Notwithstanding the foregoing, in the event Landlord fails to substantially compete the Expansion Premises Work on or before September 15, 2019, Tenant shall have the right, upon thirty (30) days' prior written notice to Landlord and Landlord's Mortgagee, to perform or cause to be performed the Expansion Premises Work in accordance with the plans and specifications therefor, unless, within such thirty (30) day period, Landlord substantially completes the Expansion Premises Work. In the event that Tenant exercises this option of self-help, Landlord shall reimburse Tenant for the costs reasonably incurred by Tenant in connection therewith within thirty (30) days of receipt of a request from Tenant together with reasonable and customary back-up documentation. Landlord hereby grants to Tenant, its contractors, agents and employees a temporary right and easement to enter upon any portion of the Expansion Premises for the purpose of performing any such portion or all of the Expansion Premises Work. Tenant shall not be obligated to pay Rent with respect to the Expansion Space while Tenant is performing the Expansion Premises Work. Landlord covenants and represents that the Expansion Work shall be completed in a good and workmanlike manner and in compliance with all applicable Legal Requirements, including without limitation, all applicable permits and governmental approvals in connection therewith. Furthermore, during the performance of the Expansion Premises Work, Landlord agrees to use commercially reasonable efforts to minimize any material interference with Tenant's business in the Existing Premises. The Expansion Premises Work shall be deemed to be substantially completed as of the date (i) when the Expansion Premises are in substantial accordance with Exhibit B , even though minor details of construction, decoration, and mechanical adjustments remain to be completed by Landlord, as determined by Landlord's architect, in such architect's sole reasonable discretion; and (ii) Tenant is permitted, in accordance with applicable Legal Requirements, to occupy the Expansion Premises for the conduct of its business and Tenant has been notified thereof (which notification may be verbal). Such date is referred to herein as the " Expansion Premises Commencement Date ." Landlord hereby agrees that it shall keep Tenant reasonably appraised of the status of the Expansion Premises Work and the anticipated Expansion Premises Commencement Date. Landlord shall have no obligation to perform any work not shown on Exhibit B . Landlord shall complete any punch-list items that remain to be performed by Landlord, if any, within thirty (30) days after the Expansion Premises Commencement Date. Tenant shall notify Landlord within thirty (30) days of Tenant's occupancy of the Expansion Premises of any portion of the Expansion Premises Work, including punch-list items, that remains incomplete or any manner in which the Expansion Premises is not in the condition required to be delivered pursuant to this Section 7 . Except as identified in any such notice from Tenant to Landlord, Tenant shall have no right to make any claim that Landlord has failed to perform any of the Expansion Premises Work fully, properly and in accordance with the terms hereof or to require Landlord to perform any further Expansion Premises Work.

(b) Subject to Section 7(c) below and Tenant's obligation to pay for the cost of all Change Orders in accordance therewith, Tenant shall be responsible for Sixteen Thousand Five Hundred and 00/100 Dollars ($16,500.00) of the cost of the Expansion Premises Work (the " Tenant's Cost ") and Landlord shall be responsible for the balance of the cost of the Expansion Premises Work. Tenant shall pay Tenant's Cost to Landlord within thirty (30) days of the Effective Date and any delay by Tenant in paying the Tenant's Cost to Landlord shall constitute a Tenant Delay

hereunder. Landlord shall have no obligation hereunder to commence the Expansion Premises Work until Tenant has paid the Tenant's Cost to Landlord. Landlord and Tenant hereby acknowledge and agree that the cost of the Expansion Premises Work shall include a construction management fee payable to Landlord equal to three percent of the total cost of the Expansion Premises Work, as well as costs in connection with engineering and design, as well as construction-related costs and expenses.

(c) To the extent that Tenant requests any modifications to the Approved Drawings (a " Change Order "), and such modification is reasonably acceptable to Landlord and the parties agree in writing to the costs of such Change Order, Tenant shall pay to Landlord, promptly on demand, all costs of such Change Order as reasonably estimated by Landlord's contractor as of the time of Landlord's approval of any such modifications requested by Tenant. Tenant shall, if requested by Landlord, execute a work letter confirming such excess costs prior to the time Landlord shall be required to commence work. Landlord shall have no obligation to commence such work unless and until the Tenant shall have paid such excess costs to Landlord. In the event that the actual cost to Landlord of completing any Change Order is greater than the estimate of Landlord's contractor, then Tenant shall pay to Landlord such difference within ten (10) days after Landlord advises Tenant of such actual cost and submits to Tenant reasonable and customary evidence substantiating such actual cost. The costs of any Change Order may include a construction management fee, as more particularly described above.

(d) As used in this Amendment, a " Tenant Delay " means each day of delay in the performance of the Expansion Premises Work that occurs because (a) Tenant requests any change to the Approved Plans, or (b) Tenant or any agent, contractor, or employee of Tenant otherwise delays the completion of the Expansion Premises Work (provided that Landlord shall notify Tenant within twenty-four (24) hours of such request or act or omission of Tenant or any agent, contractor or employee of Tenant that such request, act or omission constitutes a Tenant Delay hereunder). In the event that the Expansion Premises Work shall not be substantially completed by Landlord on or before the day immediately preceding the Target Expansion Premises Commencement Date as a result of the occurrence of a Tenant Delay, then in such event, (a) for all intents and purposes of this Amendment, the Expansion Premises Work shall be deemed to have been substantially completed by Landlord as of the date Landlord shall determine, in its reasonable discretion, that Landlord would have substantially completed the Expansion Premises Work but for the occurrence of such Tenant Delay; and (b) the Expansion Premises Commencement Date shall be the day after the date determined by Landlord to be the date as of which Landlord would have substantially completed the Expansion Premises Work but for the occurrence of such Tenant Delay.

(e) Provided no Default of Tenant or event that, with the passage of time or notice would constitute a Default of Tenant under the Lease, then exists under the Lease, Tenant and Tenant's vendors shall have access to the Expansion Premises prior to the Expansion Premises Commencement Date for the sole purpose of installing telecommunications, audio-visual and other similar wiring and equipment and Tenant's furniture and fixtures therein. Any such early entry upon the Expansion Premises by Tenant or any of the agents, employees, and contractors of Tenant shall be at Tenant's sole risk and expense and shall be upon all of the terms and conditions of the Lease (including, without limitation, all of the terms and conditions of the Lease with respect to insurance and indemnification obligations) except for Tenant's obligation to pay Rent or Additional Rent with respect to the Expansion Premises. Further and at Tenant's sole cost and expense, Tenant shall cooperate, fully and in all respects, and cause its agents, employees, and contractors to cooperate, fully and in all respects, with Landlord and all of the agents, employees, and contractors of Landlord so as not to delay, hinder, limit, or in any way impede the construction and/or installation by Landlord of any of the Expansion Premises Work.

8. Utilities . Landlord and Tenant hereby acknowledge and agree that, notwithstanding anything to the contrary contained in the Existing Lease, the Lower Level Space is presently separately metered with respect to electricity usage and that the Expansion Premises are not presently separately metered with respect to electricity usage. If Tenant elects to cause the Expansion Premises to be separately metered for electricity usage, such meters may be included in the Expansion Premises Work as a Change Order and the cost thereof shall be paid by Tenant in accordance with Section 7(c) above. In the event that Tenant elects not to cause the Expansion Premises to be separately metered, Landlord shall have the right to invoice Tenant, and Tenant shall pay when Rent is due its equitable portion of electricity usage for the Expansion Premises as reasonably determined by Landlord. Landlord, upon request of Tenant, shall provide reasonable backup for such electricity usage charges invoiced to Tenant. Landlord and Tenant hereby acknowledge and agree that

the current charge for electricity usage for the Expansion Premises shall be [$2.36] per square foot of the Expansion Premises per annum.

9. Condition of the Premises . Tenant acknowledges and agrees that, subject to Landlord's obligations as expressly set forth in the Existing Lease and in this Amendment, Tenant is leasing the Premises in their "as is," "where is" condition and with all faults, without representations or warranties, express or implied, in fact or by law, and without recourse to Landlord. Tenant acknowledges that it has been occupying the Existing Premises and has found the same satisfactory. Tenant agrees that, subject to Landlord's obligations as expressly set forth in the Lease, Landlord shall have no obligation to perform any work of construction or repair to render the Existing Premises or the Expansion Premises fit for use or occupation, or for Tenant's particular purposes or to make them acceptable to Tenant. Except as expressly provided herein, Landlord shall not be obligated to provide any rental abatements, improvement allowances, or other payments, credits or allowances of any kind with respect to this Amendment.

10. Brokerage . Landlord and Tenant hereby each represent and warrant that it has dealt with no broker in connection with the negotiation or execution of this Amendment other than Lincoln Property Group (the " Broker "). Landlord and Tenant agree to indemnify each other against any costs incurred by the other party (including reasonable attorneys' fees) if the foregoing representations are untrue. Landlord shall pay directly to the Broker any commissions and/or fees that are payable to the Broker with respect to this Amendment under the terms of a separate agreement. The foregoing indemnification obligations shall survive the expiration or any termination of the Lease.

11. Ratification of Lease . Except as amended and modified by this Amendment, all the terms, provisions, agreements, covenants and conditions of the Lease are hereby affirmed and ratified, including without limitation, Tenant's right to extend the Lease Term pursuant to Section 3.2 of the Existing Lease and Tenant's right of first offer pursuant to Section 2.3 of the Existing Lease From and after the date hereof, all references to the Lease shall mean the Lease as amended hereby, and to the extent there is any conflict between the provisions of the Lease prior to the date hereof and this Amendment, the terms of this Amendment shall take precedence and be controlling. Landlord and Tenant each hereby ratifies and confirms its obligations under the Lease, and represents and warrants to the other that, to its knowledge, it has no defenses thereto. Additionally, Landlord and Tenant further confirm and ratify that, as of the date hereof, (a) Landlord and Tenant are and remain in good standing and the Lease is in full force and effect, and (b) neither Landlord nor Tenant has any claims, counterclaims, set-offs or defenses against the other arising out of the Lease or in any way relating thereto or arising out of any other transaction between Landlord and Tenant.

12. Execution/Entire Agreement . This Amendment, together with the Lease as affected hereby, constitutes the entire agreement of the parties, and may not be amended except by written instrument signed by all parties. This Amendment shall have the effect of an agreement under seal and shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns. This Amendment may be executed in counterparts all of which taken together shall constitute an original executed document.

13. Transmission of Amendment by Facsimile or PDF . The transmission of a signed counterpart of this Amendment by facsimile or by portable document file ("PDF") shall have the same force and effect as delivery of an original signed counterpart of this Amendment, and shall constitute valid and effective delivery for all purposes. If either party delivers a signed counterpart of this Amendment by transmission of a facsimile or PDF, it shall also send to the other party, promptly upon the request of such other party, by overnight courier or personal delivery a signed original counterpart of this Amendment, but failure to do so shall not render this Amendment void or voidable by either party.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, this Amendment has been executed as of the day and year first above written.

LANDLORD:

BPR 293 EQUITY PARTNERS, LLC ,
a Massachusetts limited liability company

By: s/ Kambiz Shahbazi _____
Kambiz Shahbazi, Manager

TENANT:

VALERITAS, INC.

By: s/ Erick Lucera _____
Name: Erick Lucera
Title: Chief Financial Officer

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in Registration Statement Nos. 333-182457, 333-188790, 333-213366, 333-225428, 333-226648, and 333-242367 on Form S-8, and Registration Statement No. 333-262981 on Form S-3 of our reports dated February 23, 2023, relating to the financial statements of MannKind Corporation and subsidiaries ("MannKind Corporation") and the effectiveness of MannKind Corporation's internal control over financial reporting appearing in this Annual Report on Form 10-K of MannKind Corporation for the year ended December 31, 2022.

/s/ Deloitte & Touche LLP

Los Angeles, CA

February 23, 2023

Exhibit 31.1

RULE 13a-14(a)/15d-14(a) CERTIFICATION

I, Michael E. Castagna, certify that:

1. I have reviewed this Annual Report on Form 10-K of MannKind Corporation;

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

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

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

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

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

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

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

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

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

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

/s/ Michael E. Castagna

Michael E. Castagna
Chief Executive Officer and Director

Date: February 23, 2023

Exhibit 31.2

RULE 13a-14(a)/15d-14(a) CERTIFICATION

I, Steven B. Binder, certify that:

1. I have reviewed this Annual Report on Form 10-K of MannKind Corporation;

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

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

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

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

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

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

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

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

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

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

/s/ Steven B. Binder

Steven B. Binder
Chief Financial Officer

Date: February 23, 2023

Exhibit 32.1

CERTIFICATION[1]

Pursuant to the requirement set forth in Rule 13a-14(b) or Rule 15d-14(b) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and Section 1350 of Chapter 63 of Title 18 of the United States Code (18 U.S.C. §1350), Michael E. Castagna, Chief Executive Officer of MannKind Corporation (the "Company"), hereby certifies that, to the best of his knowledge:

1. The Company's Annual Report on Form 10-K for the period ended December 31, 2022, to which this Certification is attached as Exhibit 32.1 (the "Annual Report") fully complies with the requirements of Section 13(a) or Section 15(d) of the Exchange Act, and

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

In Witness Whereof, the undersigned has set his hand hereto as of the 23rd day of February, 2023.

/s/ Michael E. Castagna
Michael E. Castagna
Chief Executive Officer

1 This certification accompanies the Annual Report on Form 10-K to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of MannKind Corporation under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Annual Report on Form 10-K to which this certification relates), irrespective of any general incorporation language contained in such filing.

Exhibit 32.2

CERTIFICATION[1]

Pursuant to the requirement set forth in Rule 13a-14(b) or Rule 15d-14(b) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and Section 1350 of Chapter 63 of Title 18 of the United States Code (18 U.S.C. §1350), Steven B. Binder, Chief Financial Officer of MannKind Corporation (the "Company"), hereby certifies that, to the best of his knowledge:

1. The Company's Annual Report on Form 10-K for the period ended December 31, 2022, to which this Certification is attached as Exhibit 32.2 (the "Annual Report") fully complies with the requirements of Section 13(a) or Section 15(d) of the Exchange Act, and

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

In Witness Whereof, the undersigned has set his hand hereto as of the 23rd day of February, 2023.

/s/ Steven B. Binder
Steven B. Binder
Chief Financial Officer

1 This certification accompanies the Annual Report on Form 10-K to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of MannKind Corporation under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Annual Report on Form 10-K to which this certification relates), irrespective of any general incorporation language contained in such filing.