

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

Form 10-K

(Mark One)

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

For the fiscal year ended December 31, 2021

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

For the transition period from _____ to _____

Commission file number: 000-26727

BioMarin Pharmaceutical Inc.

(Exact name of registrant as specified in its charter)

Delaware

(State or other jurisdiction of
incorporation or organization)

68-0397820

(I.R.S. Employer
Identification No.)

770 Lindero Street San Rafael California
(Address of principal executive offices)

94901
(Zip Code)

(415) 506-6700

(Registrant's telephone number, including area code)

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

Title of each class

Trading Symbol(s)

Name of each exchange on which registered

Common Stock, par value \$.001

BMRN

The Nasdaq Global Select Market

Securities registered under Section 12(g) of the Act:

None

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, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer

Accelerated filer

Non-accelerated filer

Smaller reporting company

Emerging Growth company

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

Indicate by check mark whether the registrant 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. Yes No

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

The aggregate market value of the voting and non-voting common stock held by non-affiliates of the registrant as of June 30, 2021 was \$8.4 billion, based on the closing price reported for such date on the Nasdaq Global Select Market.

As of February 22, 2022, the registrant had 184,032,162 shares of common stock, par value \$0.001, outstanding.

Documents Incorporated by Reference: Specified portions of the registrant's definitive proxy statement for the registrant's 2022 annual meeting of stockholders, which will be filed with the Commission no later than 120 days after the end of the registrant's fiscal year ended December 31, 2021, are incorporated by reference under Part III of this Annual Report on Form 10-K.

BIOMARIN PHARMACEUTICAL INC.
2021 FORM 10-K ANNUAL REPORT
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Unless the context suggests otherwise, references in this Annual Report on Form 10-K to “BioMarin,” the “Company,” “we,” “us,” and “our” refer to BioMarin Pharmaceutical Inc. and, where appropriate, its wholly owned subsidiaries.

BioMarin®, Brineura®, Kuvan®, Naglazyme®, Palynziq® and Vimizim® are our registered trademarks. Voxzogo™ is our trademark. Aldurazyme® is a registered trademark of BioMarin/Genzyme LLC. All other brand names and service marks, trademarks and other trade names appearing in this report are the property of their respective owners.

Forward-Looking Statements

This Annual Report on Form 10-K contains “forward-looking statements” as defined under securities laws. Many of these statements can be identified by the use of terminology such as “believes,” “expects,” “intends,” “anticipates,” “plans,” “may,” “will,” “could,” “would,” “projects,” “continues,” “estimates,” “potential,” “opportunity” or the negative versions of these terms and other similar expressions. You should not place undue reliance on these types of forward-looking statements, which speak only as of the date that they were made. These forward-looking statements are based on the beliefs and assumptions of our management based on information currently available to management and should be considered in connection with any written or oral forward-looking statements that we may issue in the future as well as other cautionary statements we have made and may make. Our actual results or experience could differ significantly from the forward-looking statements. Factors that could cause or contribute to these differences include those discussed in the section titled “Risk Factors” in Part I, Item 1A of this Annual Report on Form 10-K as well as information provided elsewhere in this Annual Report on Form 10-K. You should carefully consider that information before you make an investment decision. Moreover, we operate in a very competitive and rapidly changing environment. New risks emerge from time to time. It is not possible for our management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. In light of these risks, uncertainties and assumptions, the forward-looking events and circumstances discussed in this Annual Report on Form 10-K may not occur and actual results could differ materially and adversely from those anticipated or implied in the forward-looking statements.

Except as required by law, we do not undertake any obligation to release publicly any revisions to these forward-looking statements after completion of the filing of this Annual Report on Form 10-K to reflect later events or circumstances or the occurrence of unanticipated events.

Risk Factors Summary

The following is a summary of the principal risks that could adversely affect our business, financial condition, operating results, cash flows or stock price. Discussion of the risks listed below, and other risks that we face, are discussed in the section titled “Risk Factors” in Part I, Item 1A of this Annual Report on Form 10-K.

Business and Operational Risks

- The COVID-19 pandemic could continue to materially adversely affect our business, results of operations, and financial condition.
- Because the target patient populations for our products are small, we must achieve significant market share and maintain high per-patient prices for our products to achieve and maintain profitability.
- If we fail to obtain and maintain an adequate level of coverage and reimbursement for our products by third-party payers, the sales of our products would be adversely affected or there may be no commercially viable markets for our products.
- If we fail to compete successfully with respect to product sales, we may be unable to generate sufficient sales to recover our expenses related to the development of a product program or to justify continued marketing of a product and our revenues could be adversely affected.
- Changes in methods of treatment of disease could reduce demand for our products and adversely affect revenues.
- If we fail to develop new products and product candidates or compete successfully with respect to acquisitions, joint ventures, licenses or other collaboration opportunities, our ability to continue to expand our product pipeline and our growth and development would be impaired.
- The sale of generic versions of Kuvan by generic manufacturers has adversely affected and will continue to adversely affect our revenues and may cause a decline in Kuvan revenues faster than expected.

- If we do not achieve our projected development goals in the timeframes we announce and expect, the commercialization of our product candidates may be delayed and the credibility of our management may be adversely affected and, as a result, our stock price may decline.

Regulatory Risks

- If we fail to obtain regulatory approval to commercially market and sell our product candidates, or if approval of our product candidates is delayed, we will be unable to generate revenues from the sale of these product candidates, our potential for generating positive cash flow will be diminished, and the capital necessary to fund our operations will increase.
- Any product for which we have obtained regulatory approval, or for which we obtain approval in the future, is subject to, or will be subject to, extensive ongoing regulatory requirements by the Food and Drug Administration, the European Medicines Agency and other comparable international regulatory authorities, and if we fail to comply with regulatory requirements or if we experience unanticipated problems with our products, we may be subject to penalties, we will be unable to generate revenues from the sale of such products, our potential for generating positive cash flow will be diminished, and the capital necessary to fund our operations will be increased.
- To obtain regulatory approval to market our products, preclinical studies and costly and lengthy clinical trials are required and the results of the studies and trials are highly uncertain. Likewise, preliminary, initial or interim data from clinical trials should be considered carefully and with caution because the final data may be materially different from the preliminary, initial or interim data, particularly as more patient data become available.
- Government price controls or other changes in pricing regulation could restrict the amount that we are able to charge for our current and future products, which would adversely affect our revenues and results of operations.
- Government healthcare reform could increase our costs and adversely affect our revenues and results of operations.

Risks Related to Valoctocogene Roxaparovec

- Our valoctocogene roxaparovec program is based on a gene therapy approach, which, as a novel technology, presents additional development and treatment risks in relation to our other, more traditional drug development programs.
- As compared to our other, more traditional products, our gene therapy product candidate valoctocogene roxaparovec, if approved, may present additional problems with respect to the pricing, coverage, and reimbursement and acceptance of the product candidate.

Financial and Financing Risks

- If we continue to incur operating losses or are unable to sustain positive cash flows for a period longer than anticipated, we may be unable to continue our operations at planned levels and be forced to reduce our operations.

Manufacturing Risks

- If we fail to comply with manufacturing regulations, our financial results and financial condition will be adversely affected.
- If we are unable to successfully develop and maintain manufacturing processes for our product candidates to produce sufficient quantities at acceptable costs, we may be unable to support a clinical trial or be forced to terminate a program, or if we are unable to produce sufficient quantities of our products at acceptable costs,

we may be unable to meet commercial demand, lose potential revenue, have reduced margins or be forced to terminate a program.

- Supply interruptions may disrupt our inventory levels and the availability of our products and product candidates and cause delays in obtaining regulatory approval for our product candidates, or harm our business by reducing our revenues.

Risks Related to International Operations

- We conduct a significant amount of our sales and operations outside of the United States (U.S.), which subjects us to additional business risks that could adversely affect our revenues and results of operations.
- A significant portion of our international sales are made based on special access programs, and changes to these programs could adversely affect our product sales and revenues in these countries.

Intellectual Property Risks

- If we are unable to protect our intellectual property, we may not be able to compete effectively or preserve our market shares.
- Competitors and other third parties may have developed intellectual property that could limit our ability to market and commercialize our products and product candidates, if approved.

Part I

Item 1. Business

Overview

BioMarin Pharmaceutical Inc. (BioMarin, we, us or our) is a global biotechnology company that develops and commercializes innovative therapies for people with serious and life-threatening rare diseases and medical conditions. We select product candidates for diseases and conditions that represent a significant unmet medical need, have well-understood biology and provide an opportunity to be first-to-market or offer a significant benefit over existing products.

Our portfolio consists of seven commercial products and multiple clinical and preclinical product candidates for the treatment of various diseases. We continue to invest in our clinical and preclinical product pipeline by committing significant resources to research and development programs and business development opportunities within our areas of scientific, manufacturing and technical expertise.

Recent Developments

In 2021, we achieved over \$1.8 billion in total revenues despite impacts from the novel coronavirus disease (COVID-19) pandemic, while making important advancements in our product development pipeline. Our key business developments since the beginning of 2021 include the regulatory approvals of Voxzogo for the treatment of children with achondroplasia in the United States (U.S.), the European Union (EU) and Brazil, our release of positive two-year data from our Phase 3 study of valoctocogene roxaparvovec for the treatment of adults with severe hemophilia A, and the European Medicines Agency (EMA) validation of our resubmission of a Marketing Authorization Application (MAA) for valoctocogene roxaparvovec. The U.S. Food and Drug Administration (FDA) placed a clinical hold on our Phase 1/2 study of BMN 307 for the treatment of adults with phenylketonuria (PKU) and requested data from additional non-clinical studies. We plan to communicate next steps for the BMN 307 program when available. Please see the disclosures below in this Part I, Item 1 of this Annual Report on Form 10-K for further discussion of these recent developments.

Commercial Products

A summary of our commercial products is provided below:

Commercial Products	Indication	2021 Net Product Revenues	
Products marketed by BioMarin:			
Vimizim (elosulfase alpha)	MPS ⁽¹⁾ IVA	\$	623.1
Naglzyme (galsulfase)	MPS VI	\$	380.4
Kuvan (sapropterin dihydrochloride)	PKU	\$	285.8
Palyngiq (pegvaliase-pgpz)	PKU	\$	237.5
Brineura (cerliponase alfa)	CLN2 ⁽²⁾	\$	128.0
Voxzogo (vosoritide)	Achondroplasia	\$	5.9
Products not marketed by BioMarin:			
Aldurazyme (laronidase) ⁽³⁾	MPS I	\$	122.8

(1) Mucopolysaccharidosis

(2) Neuronal ceroid lipofuscinosis type 2

(3) Marketed by Sanofi (formerly referred to as Sanofi Genzyme)

Vimizim

Vimizim is an enzyme replacement therapy for the treatment of MPS IVA, a lysosomal storage disorder. MPS IVA is a disease characterized by deficient activity of N-acetylgalactosamine-6-sulfatase (GALNS) causing excessive lysosomal storage of certain complex carbohydrates known as glycosaminoglycans (GAGs), such as keratan sulfate and chondroitin sulfate. This excessive storage causes a systemic skeletal dysplasia, short stature, and joint abnormalities, which limit mobility and endurance. Malformation of the chest impairs respiratory function, and looseness of joints in the neck cause spinal instability and potentially spinal cord compression. Other symptoms may include hearing loss, corneal clouding, and heart disease. Initial symptoms often become evident in the first five years of life. The disease substantially limits both the quality and length of life of those affected. We

have identified over 2,000 patients worldwide suffering from MPS IVA and estimate that the total number of patients suffering from MPS IV A worldwide could be as many as 3,000.

Vimizim is approved for marketing in the U.S., the EU and other international markets.

Naglazyme

Naglazyme is a recombinant form of N-acetylgalactosamine 4-sulfatase (arylsulfatase B) indicated for patients with MPS VI. MPS VI is a debilitating life-threatening genetic disease for which no other drug treatment currently exists and is caused by the deficiency of arylsulfatase B, an enzyme normally required for the breakdown of GAGs. Patients with MPS VI typically become progressively worse and experience multiple severe and debilitating symptoms resulting from the build-up of carbohydrate residues in tissues in the body. These symptoms include: inhibited growth, spinal cord compression, enlarged liver and spleen, joint deformities and reduced range of motion, skeletal deformities, impaired cardiovascular function, upper airway obstruction, reduced pulmonary function, frequent ear and lung infections, impaired hearing and vision, sleep apnea, malaise and reduced endurance.

Naglazyme is approved for marketing in the U.S., the EU and other international markets.

Kuvan

Kuvan is a proprietary synthetic oral form of 6R-BH4, a naturally occurring enzyme co-factor for phenylalanine hydroxylase (PAH), indicated for patients with PKU. Kuvan is the first drug for the treatment of PKU, which is an inherited metabolic disease that affects at least 50,000 diagnosed patients under the age of 40 in the developed world. We believe that approximately 30% to 50% of those with PKU could benefit from treatment with Kuvan. PKU is caused by a deficiency of activity of an enzyme, PAH, which is required for the metabolism of phenylalanine (Phe). Phe is an essential amino acid found in all protein-containing foods. Without sufficient quantity or activity of PAH, Phe accumulates to abnormally high levels in the blood, resulting in a variety of serious neurological complications, including severe mental retardation and brain damage, mental illness, seizures and other cognitive problems. As a result of newborn screening efforts implemented in the 1960s and early 1970s, virtually all PKU patients under the age of 40 in developed countries have been diagnosed at birth. Currently, PKU can be managed by a Phe-restricted diet, which is supplemented by nutritional replacement products, like formulas and specially manufactured foods; however, it is difficult for most patients to adhere to the strict diet to the extent needed for achieving adequate control of blood Phe levels.

Kuvan is approved for marketing in the U.S., the EU and other international markets (excluding Japan). In certain international markets, Kuvan is also approved for, or is only approved for, the treatment of primary BH4 deficiency, a different disorder than PKU.

Generic versions of Kuvan are available in several countries around the world, including multiple generic versions in the U.S. We are also aware that manufacturers are challenging our patent portfolio related to Kuvan in several jurisdictions, and one generic version of Kuvan has been approved by the EMA, although it is not yet commercially available. Please see "Risk Factors" included in Part I, Item 1A of this Annual Report on Form 10-K for a discussion of the risks posed by generic versions of Kuvan in the U.S. and international markets.

Palynziq

Palynziq is a PEGylated recombinant phenylalanine ammonia lyase enzyme, which is delivered through subcutaneous injection to reduce blood Phe concentrations. Palynziq is our second approved treatment for PKU. Palynziq is approved for marketing in the U.S. for adult patients with PKU who have uncontrolled blood Phe concentrations greater than 600 micromol/L on existing management. Palynziq is also approved for marketing in the EU and Australia for patients ages 16 and older who have inadequate blood Phe control (blood Phe concentrations greater than 600 micromol/L) despite prior management with available treatment options.

Palynziq is only available in the U.S. through the Palynziq Risk Evaluation and Mitigation Strategy (REMS) program, which is required by the FDA to mitigate the risk of anaphylaxis while using the product. Notable requirements of our REMS program include the following:

- prescribers must be certified by enrolling in the REMS program and completing training;
- prescribers must prescribe auto-injectable epinephrine with Palynziq;
- pharmacies must be certified with the REMS program and must dispense Palynziq only to patients who are authorized to receive it;
- patients must enroll in the REMS program and be educated about the risk of anaphylaxis by a certified prescriber to ensure they understand the risks and benefits of treatment with Palynziq; and

- patients must have auto-injectable epinephrine available at all times while taking Palynziq.

Please see “Risk Factors” included in Part I, Item 1A of this Annual Report on Form 10-K for a discussion of the risks posed by the REMS program.

Brineura

Brineura is a recombinant human tripeptidyl peptidase 1 (TPP1) for the treatment of patients with CLN2, a form of Batten disease. CLN2 is an incurable, rapidly progressive disease that typically ends in patient death by 10-12 years of age. Patients are initially healthy but begin to decline at approximately the age of three. We estimate that up to 1,200 to 1,600 cases exist worldwide. Brineura is the first treatment approved to slow the progression of loss of ambulation in children with CLN2 disease and was one of the first therapies to go through an accelerated review procedure in the EU.

Brineura is administered via intracerebroventricular (ICV) infusion and intended to be used in combination with a delivery device, such as an injector or other delivery system. Please see “Government Regulation – Regulation of Product Marketing and Promotion – Combination Products” in this Annual Report on Form 10-K for additional information on combination products.

Brineura is approved for marketing in the U.S. (for ages three and older) and in the EU (for all ages from birth) and in other international markets.

Voxzogo

Voxzogo (formerly referred to as vosoritide) is a once daily injection analog of C-type Natriuretic Peptide (CNP) for the treatment of achondroplasia, the most common form of disproportionate short stature in humans. In patients with achondroplasia, endochondral bone growth, an essential process by which bone tissue is created, is negatively regulated due to a gain of function mutation in fibroblast growth factor receptor 3 gene (FGFR3). Voxzogo acts as a positive regulator of the signaling pathway downstream of FGFR3 to promote endochondral bone growth.

Voxzogo was approved for marketing in the EU in August 2021 and in Brazil in November 2021, in both cases for patients ages two and older with open growth plates. In November 2021, the FDA granted accelerated approval for the use of Voxzogo in the U.S for patients ages five and older with open growth plates. The FDA issued us a Rare Pediatric Disease Priority Review Voucher (PRV) in connection with Voxzogo’s accelerated approval, which confers priority review to a subsequent drug application that would not otherwise qualify for priority review. The PRV program is designed to encourage development of new drugs and biologics for the treatment of rare pediatric diseases. On February 9, 2022, we announced that we entered into a definitive agreement to sell the PRV we obtained in connection with Voxzogo’s accelerated approval for a lump sum payment of \$110 million. The transaction remains subject to customary closing conditions, including anti-trust review. Voxzogo was available to patients in the EU in September 2021 and in the U.S. in December 2021 and is expected to be available in Brazil in the first quarter of 2022.

We continue to research Voxzogo’s safety and effectiveness in children with achondroplasia. On February 23, 2022, we announced results from our Phase 2 randomized, double-blind, placebo-controlled clinical trial of Voxzogo in infants and young children up to five years of age with achondroplasia. Results at 52 weeks trended in favor of Voxzogo compared to placebo on height (adjusted for age and gender) and annualized growth velocity, with no worsening in proportionality in the overall study population. The safety profile was generally consistent with older children from the Phase 3 study and product label population. Serious adverse events (SAEs) were higher in the placebo group (18%) compared to children treated with Voxzogo (7%). All SAEs, including a fatal event of sudden infant death syndrome in the treatment group, were deemed by the study investigators to be unrelated to treatment. A small increase in events of sleep apnea were reported in the treatment group that were mild or moderate in severity and did not require treatment discontinuation. These events will be fully assessed when sleep study and magnetic resonance imaging data are available. We intend to initiate discussions with regulatory health authorities to discuss next steps regarding efforts to expand access to Voxzogo treatment for this younger age group. In addition, we are currently enrolling patients in our Phase 2 randomized, open-label clinical trial of Voxzogo in infants and young children with life-threatening foramen magnum compression at a heightened risk of requiring cervicomedullary decompression surgery.

Moreover, an investigator-initiated study sponsored by Children’s National Hospital in Washington, D.C. to investigate Voxzogo in children with selected genetic forms of short stature is currently enrolling patients.

Aldurazyme

Aldurazyme is a highly purified protein that is designed to be identical to a naturally occurring form of the human enzyme alpha-L-iduronidase, a lysosomal enzyme normally required for the breakdown of GAGs. MPS I is a progressive and debilitating life-threatening genetic disease, for which no other drug treatment currently exists, that is caused by the deficiency of alpha-L-iduronidase. Patients with MPS I typically become progressively worse and experience multiple severe and debilitating symptoms resulting from the build-up of carbohydrate residues in all tissues in the body. These symptoms include: inhibited growth, delayed and regressed mental development (in the severe form of the disease), enlarged liver and spleen, joint deformities and reduced

range of motion, impaired cardiovascular function, upper airway obstruction, reduced pulmonary function, frequent ear and lung infections, impaired hearing and vision, sleep apnea, malaise and reduced endurance.

We developed Aldurazyme through collaboration with Sanofi. Under our collaboration agreement with Sanofi, we are responsible for manufacturing Aldurazyme and supplying it to Sanofi. We receive payments ranging from 39.5% to 50% on worldwide net Aldurazyme sales by Sanofi depending on sales volume. Sanofi and we are members of BioMarin/Genzyme LLC, a 50/50 limited liability company (the BioMarin/Genzyme LLC) that: (1) holds the intellectual property relating to Aldurazyme and other collaboration products and licenses all such intellectual property on a royalty-free basis to us and Sanofi to allow us to exercise our rights and perform our obligations under the agreements related to the BioMarin/Genzyme LLC, and (2) engages in research and development activities that are mutually selected and funded by Sanofi and us.

Aldurazyme is approved for marketing in the U.S., the EU and other international markets.

Clinical Development Programs

A summary of our clinical development programs is provided below:

Clinical Development Programs	Target Indication	Stage
Valoctocogene roxaparvovec	Severe Hemophilia A	Clinical Phase 3
BMN 307	PKU	Clinical Phase 1/2
BMN 255	Primary hyperoxaluria	Clinical Phase 1/2

Valoctocogene Roxaparvovec

Valoctocogene roxaparvovec is an adeno associated virus (AAV5) vector drug development candidate designed to restore factor VIII plasma concentrations in patients with severe hemophilia A. Hemophilia A, also called factor VIII deficiency or classic hemophilia, is a genetic disorder caused by missing or defective factor VIII, a clotting protein. According to the World Federation of Hemophilia rankings of severity of hemophilia A, the normal range of factor VIII activity levels is between 50% and 150%, expressed as a percentage of normal factor activity in blood, the mild hemophilia A range of factor VIII activity levels is between 5% and 40%, the moderate hemophilia A range of factor VIII activity levels is between 1% and 5%, and the severe hemophilia range of factor VIII activity levels is less than 1%. People living with hemophilia A are not able to form blood clots efficiently and are at risk for excessive bleeding from modest injuries, potentially endangering their lives. People with severe hemophilia often bleed spontaneously into their muscles or joints.

On July 21, 2021, we announced an update to our previously reported results of an open-label Phase 1/2 study of valoctocogene roxaparvovec for the treatment of adults with severe hemophilia A. The five-year update for the 6e13 vg/kg and four-year update for the 4e13 vg/kg cohorts showed a sustained treatment benefit of valoctocogene roxaparvovec. All participants in both cohorts had remained off prophylactic factor VIII treatment since receiving their single dose of valoctocogene roxaparvovec. In addition, cumulative mean annualized bleed rates (ABR) remained one or less in both cohorts and below pre-treatment baseline levels.

On January 9, 2022, we announced topline results from our two-year analysis of the global Phase 3 study of valoctocogene roxaparvovec for the treatment of adults with severe hemophilia A, and on February 4, 2022, we announced additional details from the two-year analysis. All 134 study participants received a single dose of valoctocogene roxaparvovec and had a minimum of 24 months of follow-up. For a pre-specified group of 112 participants in a non-interventional prospective baseline observational study with a median follow-up of 110 weeks after dosing with valoctocogene roxaparvovec (the Rollover Population), Annualized Bleeding Rate (ABR) was significantly reduced by 4.1 treated bleeds per year (p-value <0.0001), or 85% from a baseline mean of 4.8 (median 2.8). The percentage of the Rollover Population participants with zero treated bleeds increased from 32% at baseline to 82% during year one and 84% during year two. The mean ABR for the Rollover Population was 0.8 (median 0.0) through the entire efficacy evaluation period, 0.9 (median 0.0) during year one, and 0.7 (median 0.0) during year two. Valoctocogene roxaparvovec also significantly reduced the mean annualized factor VIII infusion rate in the Rollover Population by 133 infusions per year (p-value <0.0001), or 98% from baseline. The mean annualized infusion rate was 2.6 (median 0.0) through the entire efficacy evaluation period, 1.5 (median 0.0) during year one, and 3.4 (median 0.0) during year two. As of the two-year data cut, 95% of the Rollover Population participants remained off factor VIII prophylactic therapy. At the end of the second year post-infusion with valoctocogene roxaparvovec, 132 participants in the modified intent-to-treat (mITT) population had a mean endogenous factor VIII activity level of 23.0 (median 11.8) IU/dL, as measured by the chromogenic substrate (CS) assay and 36.1 (median 21.6) IU/dL, as measured by the one-stage (OS) assay. In the 17 participants who comprise a subset of the mITT population and had been dosed at least three years prior to the data cut, mean factor VIII activity was 16.8 (median 9.3) IU/dL by the CS assay and 27.0 (median 19.1) IU/dL by the OS assay at the end of year three. The mean cumulative ABR for this subpopulation was 0.7 (median 0.0) through the entire efficacy evaluation period (median follow up of 174 weeks) and 0.6 (median 0.0) during year three.

In addition to the ongoing Phase 1/2 and Phase 3 studies of valoctocogene roxaparvovec described above, we have multiple other clinical studies of valoctocogene roxaparvovec underway. We recently completed enrolling participants in a Phase 3b, single arm, open-label study to evaluate the efficacy and safety of valoctocogene roxaparvovec at a dose of 6e13 vg/kg with prophylactic corticosteroids in people with severe hemophilia A. We are conducting a Phase 1/2 study with the 6e13kg/vg dose of valoctocogene roxaparvovec which aims to dose approximately 10 participants with pre-existing AAV5 antibodies, as well as another Phase 1/2 Study with the 6e13 vg/kg dose of valoctocogene roxaparvovec in people with severe hemophilia A with active or prior factor VIII inhibitors.

Overall, valoctocogene roxaparvovec continues to have a favorable safety profile and has been generally well tolerated by participants across all doses in the Phase 1/2 and Phase 3 studies. No participants developed inhibitors to factor VIII, malignancy, or thromboembolic events. The most common adverse events associated with valoctocogene roxaparvovec across studies occurred early and included transient infusion-associated reactions and mild to moderate rise in liver enzymes with no long-lasting clinical sequelae. During year two of the Phase 3 study, no new safety signals emerged, and no treatment-related SAEs were reported. Most patients had discontinued any corticosteroid (CS) use in year one, and there were no CS-related serious adverse events in the remaining patients being tapered off CS in year two.

On February 20, 2020, we announced that the FDA accepted for priority review our BLA for valoctocogene roxaparvovec for the treatment of adults with severe hemophilia A. On August 18, 2020, the FDA issued a Complete Response Letter (CRL) to our BLA for valoctocogene roxaparvovec for the treatment of adults with severe hemophilia A. In the CRL, the FDA introduced a new request for two-year follow-up safety and efficacy data on all study participants from our ongoing Phase 3 study of valoctocogene roxaparvovec. We are planning to meet with the FDA to discuss resubmission of our BLA, including the requested two-year data analysis. The BLA resubmission is targeted for the second quarter of 2022. If the FDA deems our resubmission to be a complete response to the CRL, we expect the resubmission will be followed by a six-month review procedure by the FDA.

The EMA validated our resubmission of a Marketing Authorization Application (MAA) on July 15, 2021. In May 2021, the EMA granted our request for accelerated assessment. Accelerated assessment potentially reduces the time frame for the EMA Committee for Medicinal Products for Human Use (CHMP) and Committee for Advanced Therapies (CAT) to review a MAA for an Advanced Therapy Medicinal Product (ATMP), although an application initially designated for accelerated assessment can revert to the standard procedure during the review for a variety of reasons. The decision to grant accelerated assessment has no impact on the eventual CHMP and CAT opinion on whether a marketing authorization should be granted. The MAA submission included safety and efficacy data from the 134 subjects enrolled in the Phase 3 GENE8-1 study, all of whom have been followed for at least one year after treatment with valoctocogene roxaparvovec, as well as four and three years of follow-up from the 6e13 vg/kg and 4e13 vg/kg dose cohorts, respectively, in the ongoing Phase 1/2 dose escalation study. We also recently submitted our 2-year Phase 3 data to the EMA. A CHMP and CAT opinion is anticipated in the first half of 2022, with potential launch of the product, if approved, in the EU in the second quarter of 2022.

Valoctocogene roxaparvovec has Orphan Drug designation from the FDA and the EMA. Valoctocogene roxaparvovec has also been accepted for Priority Medicines (PRIME) program from the EMA. Additionally, the FDA has granted valoctocogene roxaparvovec Regenerative Medicine Advanced Therapy (RMAT) designation and Breakthrough Therapy designation, which are intended to expedite development of drugs for serious or life-threatening diseases and conditions.

BMN 307

BMN 307 is an AAV5 mediated gene therapy that is designed to normalize blood Phe concentration levels in patients with PKU. We tested a broad range of vector constructs and combinations to optimize the vector and increase potency, resulting in a 10-fold increase in potency for the selected vector. Treatment of mice in a validated PKU mouse model with BMN 307 showed a lifetime normalization of Phe and normalized neurotransmitter levels. We intend to evaluate BMN 307 to determine the treatment's safety and whether a single dose of BMN 307 can restore natural Phe metabolism, normalize plasma Phe levels, and enable a normal diet in patients with PKU. On January 13, 2020, we announced that both the FDA and the Medicines and Healthcare Products Regulatory Agency (MHRA) in the United Kingdom (U.K.) granted IND status and approved our Clinical Trial Application (CTA), respectively, for BMN 307 for the treatment of PKU. On September 24, 2020, we announced that we had dosed the first participant in the global PHEarless Phase 1/2 study of BMN 307. On February 25, 2021, we announced that we planned to dose escalate in the PHEarless Phase 1/2 study of BMN 307 based on encouraging Phe lowering and safety signals observed in study participants who were treated with the lowest dose. In September 2021, the FDA placed a clinical hold on our PHEarless study. The hold was based on pre-clinical study findings from a model designed to understand the durability of BMN 307 activity in mice bearing two germline mutations, one rendering the mice immunodeficient. Of 63 animals treated, six of seven animals administered BMN 307 at the highest dose group (2e14 Vg/kg) had tumors on liver necropsy 52 weeks after dosing with evidence for integration of portions of AAV vector into the genome. No lesions were observed in any mice at 24 weeks. The clinical significance of these findings is being evaluated to assure safe and appropriate use of BMN 307. To date, we have seen no evidence from our studies or scientific literature indicating these findings are translatable to humans, species other than mice or other gene therapy vectors. The durability study was one of multiple pre-clinical studies we conducted and was not designed to test safety. However, we promptly notified the FDA upon availability of the integration site analysis results. The FDA initiated a clinical hold shortly after being notified, and we announced the hold before the next business day after we were informed of the FDA's decision. In February 2022, the FDA

requested data from additional non-clinical studies to assess the theoretical oncogenic risk to human study participants, which is expected to take several quarters. We will communicate next steps for the program when available.

BMN 307 has Orphan Drug designation from the FDA and the EMA and Fast Track designation from the FDA.

BMN 255

BMN 255 is a small-molecule therapy that is designed to treat primary hyperoxaluria type 1, a subset of chronic renal disease. The IND for BMN 255 is active and we are dosing subjects with dose selection for advanced studies expected in the second half of 2022. We believe the availability of a potent, orally bioavailable, small molecule like BMN 255, may be able to significantly reduce disease and treatment burden in certain people with chronic renal disease.

Manufacturing

We manufacture the active pharmaceutical ingredients (API) for Aldurazyme, Naglazyme, Palynziq and Voxzogo in our production facilities located in Novato, California. We manufacture the API for Brineura and Vimizim in our manufacturing facility in Shanbally, Cork, Ireland. These facilities have been inspected and have demonstrated compliance with current Good Manufacturing Practices (cGMPs) to the satisfaction of the FDA, the European Commission (EC) and health agencies in other countries.

We contract with third parties to manufacture Kuvan API. All our product manufacturing (which includes vials, syringes, tablets, and powder) and most packaging operations are performed by contract manufacturers. We expect to continue to contract with outside service providers for certain manufacturing services, including drug substance, drug product, and packaging operations for our products. All of our facilities and those of any third-party manufacturers will be subject to periodic inspections confirming compliance with applicable law and must pass inspection before we can manufacture our drugs for commercial sales. Third-party manufacturers' facilities are subject to periodic inspections to confirm compliance with applicable law and must be cGMP certified. We believe that our current agreements with third-party manufacturers and suppliers provide for ample operating capacity to support the anticipated clinical and commercial demand for these products. In certain instances, there is only one approved contract manufacturer for certain aspects of the manufacturing process. In such cases, we attempt to prevent disruption of supplies through supply agreements, maintaining safety stock and other appropriate strategies.

In July 2017, we commissioned our commercial-scale gene therapy manufacturing facility, located in Novato, California, where we conduct cGMP production of valoctocogene roxaparovec and BMN 307 to support clinical development activities and anticipated commercial demand. This facility has the potential to produce multiple gene therapy products to meet global commercial demand, depending on dose and production mix. The facility holds a GMP certificate and its production processes have been developed in accordance with International Conference on Harmonisation Technical Requirements for Registration of Pharmaceuticals for Human Use facilitating worldwide registration with health authorities.

Raw Materials

Raw materials and supplies required for the production of our products and product candidates are available in some instances from one supplier and in other instances from multiple suppliers. In those cases where raw materials are only available through one supplier, such supplier may be either a sole source (the only recognized supply source available to us) or a single source (the only approved supply source for us among other sources). We have adopted policies to attempt, to the extent feasible, to minimize our raw material supply risks, including maintenance of greater levels of raw materials inventory and implementation of multiple raw materials sourcing strategies, especially for critical raw materials. Although to date we have not experienced any significant delays in obtaining any raw materials from our suppliers, we cannot provide assurance that we will not face shortages from one or more of them in the future.

Sales and Marketing

We have established a commercial organization, including a sales force, to support our product lines directly in the U.S., Europe, South America and certain other significant markets. For other selected markets, we have signed agreements with other companies to act as distributors of all our products, other than Aldurazyme. Most of these agreements generally grant the distributor the right to market the product in the territory and the obligation to secure all necessary regulatory approvals for commercial or named patient sales. Additional markets are being assessed at this time and additional agreements may be signed in the future.

Sanofi has the exclusive right to distribute, market and sell Aldurazyme globally and is required to purchase its requirements exclusively from us.

In the U.S., our products (other than Aldurazyme) are marketed through our commercial teams, including sales representatives and supporting staff members, who promote our products, directly to physicians in specialties appropriate for each

product. Outside of the U.S., our sales representatives and supporting staff members market our products (other than Aldurazyme). We believe that with moderate changes in 2022, the size of our sales force will be appropriate to effectively reach our target customers in markets where our products are directly marketed. The launch of any future products, if approved, will likely require expansion of our commercial organization, including our sales force, in the U.S. and international markets.

We utilize third-party logistics companies to store and distribute our products. Moreover, we use third-party vendors, such as advertising agencies, market research firms and suppliers of marketing and other sales support-related services, to assist with our commercial activities.

Customers

Our Brineura, Kuvan, Naglazyme, Palynziq, Vimizim and Voxzogo customers include a limited number of specialty pharmacies and end-users, such as hospitals and non-U.S. government agencies. We also sell Brineura, Kuvan, Naglazyme, Palynziq, Vimizim and Voxzogo to our authorized distributors and to certain larger pharmaceutical wholesalers globally, which act as intermediaries between us and end-users and generally do not stock significant quantities of our products. However, in certain countries, governments place large periodic orders for Naglazyme and Vimizim. The timing of these orders can be inconsistent and can create significant quarter to quarter variation in our revenue. Palynziq is currently distributed in the U.S. pursuant to the REMS program through a limited number of certified specialty pharmacies. During 2021, 44% of our net product revenues, excluding Aldurazyme, was generated by three customers. Sanofi is our sole customer for Aldurazyme and is responsible for marketing and selling Aldurazyme to third parties.

Competition

The biopharmaceutical industry is rapidly evolving and highly competitive. Within the industry, there are many public and private companies, including pharmaceutical companies and biotechnology companies that have or may soon initiate programs for the same indications that our products and product candidates are intended to treat. Furthermore, universities and non-profit research organizations may have research programs, both early-stage and clinical, in the same disease areas. Our competitors may have advantages over us due to greater financial or scientific resources, lower labor and other costs, or due to higher headcount and more robust organizational structures. Our competitors have considerable experience in drug manufacturing, preclinical and clinical research and development, regulatory affairs, marketing, sales, and distribution. They pursue broad patent portfolios and other intellectual property to protect the products they are developing. Their products may outcompete ours due to one or more factors, including faster progress through preclinical and clinical development, lower manufacturing costs, superior safety and efficacy, lower pricing, stronger patent protection, and better marketing, sales, and distribution capabilities. In this event, our products and product candidates, if approved, could fail to gain significant market share, and as a result, our business, financial condition and results of operations could be adversely affected.

Other than Kuvan (which faces generic competition, as described below), our products have no direct approved competition currently on the market in the U.S. or the EU; however, other companies are in the development phase with new and generic products. Our products and product candidates have potential competition from products under development either using similar technology to our programs or different treatment strategies. The following is a summary of some of the primary possible future competitors for our products and product candidates, but the information below may not include all potential competition.

Commercial Products

Aldurazyme, Naglazyme, and Vimizim

In the mucopolysaccharidosis field, several companies are researching treatments using small molecules, gene therapy, and other novel technologies. Aldurazyme, for the treatment of MPS I, has potential competition from clinical stage product candidates from ArmaGen, Inc., JCR Pharmaceuticals Co., Ltd., Orchard Therapeutics Plc, RegenzBio Inc. and earlier stage product candidates, including a product candidate from Immusoft Corporation. Naglazyme, for the treatment of MPS VI, has potential competition from a clinical stage product candidate from Inventiva S.A. and other potential candidates in earlier stages. Vimizim, for the treatment of MPS IVA, has potential competition from a preclinical product candidate from Esteve Pharmaceuticals, S.A. and other potential candidates in earlier stages.

Brineura

Brineura, for the treatment of CLN2, has potential competition from preclinical product candidates from RegenzBio Inc. and the Roche Group.

Kuvan and Palynziq

There are currently no other approved, non-generic drugs on the market in the U.S. or the EU for the treatment of PKU. However, generic versions of Kuvan are available in several countries around the world, including multiple generic versions in the

U.S. We are also aware that manufacturers are challenging our patent portfolio related to Kuvan in several jurisdictions, and one generic version of Kuvan has been approved by the EMA, although it is not yet commercially available. Please see “Risk Factors” included in Part I, Item 1A of this Annual Report on Form 10-K for a discussion of the risks posed by generic versions of Kuvan in the U.S. and international markets. Kuvan and Palyngiq also have potential competition from clinical stage product candidates from Homology Medicines, Inc., Nestle Health Science, S.A., PTC Therapeutics, Inc. and Synlogic, Inc. and earlier stage product candidates, including product candidates from Codexis, Inc., Generation Bio Co., Jnana Therapeutics Inc., LogicBio Therapeutics, Inc., Moderna Therapeutics, Inc., Sangamo Therapeutics, Inc. and SOM Innovation Biotech, S.A. BMN 307 is our clinical gene therapy program for PKU, and other companies are also developing gene therapy product candidates for PKU, as described in “Competition—Product Candidates—BMN 307” in this Annual Report on Form 10-K.

Voxzogo

Voxzogo, for the treatment of achondroplasia, could have competition from clinical stage products under development by Ascendis Pharma A/S, Pfizer, Inc. and QED Therapeutics, Inc (a subsidiary of BridgeBio Pharma, Inc.) and preclinical product candidates from other companies, including Astellas Pharma Inc.

Clinical Development Programs

Valoctocogene roxaparvovec

Valoctocogene roxaparvovec, a gene therapy product candidate for severe hemophilia A, has potential competition from marketed recombinant factor VIII replacement therapies, a novel bispecific antibody marketed by the Roche Group, and clinical stage programs, including gene therapy product candidates under development by Bayer AG, Pfizer, Inc., the Roche Group, Sangamo Therapeutics, Inc., Takeda Pharmaceutical Company Ltd. and preclinical product candidates from other companies, including Freeline Therapeutics Ltd., Uniqure N.V. and ASC Therapeutics, Inc. In addition, Novo Nordisk A/S, Pfizer, Inc. and Sanofi S.A. are developing novel non-factor replacement product candidates in the clinic for the treatment of hemophilia A.

BMN 255

BMN 255, a small-molecule product candidate for primary hyperoxaluria type 1, a subset of chronic renal disease, has potential competition from marketed products from Alnylam Pharmaceuticals, Inc., clinical stage product candidates from Allena Pharmaceuticals, Inc., BridgeBio Pharma, Inc, Dicerna Pharmaceuticals, Inc. (a subsidiary of Novo Nordisk A/S.) and preclinical product candidates from other companies, including Amarna Therapeutics and Chinook Therapeutics, Inc.

BMN 307

BMN 307, a gene therapy product candidate for the treatment of PKU, has potential competition from clinical stage product candidates from PTC Therapeutics, Inc., Homology Medicines, Inc., Nestle Health Science, S.A., Synlogic, Inc. and earlier stage product candidates, including product candidates from Generation Bio Co., LogicBio Therapeutics, Inc., Moderna Therapeutics, Inc., Sangamo Therapeutics, Inc. and SOM Innovation Biotech, S.A.

Patents, Proprietary Rights and Regulatory Exclusivity

Our success depends on an intellectual property portfolio that supports our future revenue streams and also erects barriers to our competitors. We are maintaining and building our patent portfolio through: filing new patent applications; prosecuting existing applications; and licensing and acquiring new patents and patent applications. Furthermore we seek to protect our ownership of know-how, trade secrets and trademarks through an active program of legal mechanisms including registrations, assignments, confidentiality agreements, material transfer agreements, research collaborations and licenses.

U.S. patents, as well as most foreign patents, are generally effective for 20 years from the date the earliest application was filed. U.S. patents that were issued on applications filed before June 8, 1995, may be effective until 17 years from the issue date, if that is later than the 20-year date. In some cases, the patent term may be extended to recapture a portion of the term lost during regulatory review of the claimed therapeutic or, in the case of the U.S., because of U.S. Patent and Trademark Office (USPTO) delays in prosecuting the application. In the U.S., under the Drug Price Competition and Patent Term Restoration Act of 1984 (commonly known as the Hatch-Waxman Act), a patent that covers a drug approved by the FDA may be eligible for patent term extension (for up to five years, but not beyond a total of 14 years from the date of product approval) as compensation for patent term lost during the FDA regulatory review process. The duration and extension of the term of foreign patents varies in accordance with local law. In the EU, Supplementary Protection Certificates, or SPCs, are available to extend a patent term up to five years to compensate for patent protection lost during regulatory review. Although all EU Member States must provide SPCs, SPCs must be applied for and granted on a country-by-country basis. Limited exceptions apply to the protection conferred by the SPC.

The table below lists our outstanding patents and patent applications of primary importance for our products other than Aldurazyme by territory, general subject matter (including composition, methods of treatment and approved use, methods of production and purification, pharmaceutical compositions and clinical formulations) and latest expiry date. With respect to Aldurazyme, the last of our patents expired in November 2020. One or more patents with the same or earlier expiry dates may fall under the same general subject matter and are not listed separately in the table below. We continue to pursue additional patents and patent term extensions in the U.S. and other territories covering various aspects of our products that may, if issued, extend patent exclusivity beyond the expiration dates listed in the table below.

Product	Territory	Patent No(s).	General Subject Matter	Patent Expiration
Brineura	U.S.	8,029,781	Method of treatment	July 3, 2023 ⁽¹⁾
		9,044,473	Method of treatment by administration into the cerebrospinal fluid	February 18, 2032
	EU	10,279,015	Formulation; kit	May 5, 2036
		1,673,104	Pharmaceutical composition	August 30, 2024
		16793229.2 ⁽²⁾	Formulation	May 5, 2036
Kuvan	EU	3138566 ⁽²⁾	Use for treating with once daily dosing regimen	November 7, 2024
		2545939;	Use for treating once daily after a meal	April 11, 2028
		3461503	Use for treating after a meal	April 11, 2028
Naglazyme	U.S.	6,866,844	Compositions; methods of treatment; production; purification	November 7, 2022
		7,713,709	Antibody assays	July 20, 2028
	EU	1565209; 2327414	Compositions; pharmaceutical compositions; use to treat an enzyme deficiency	November 7, 2023
Palyzinq	U.S.	7,534,595	Composition; method of treating	August 16, 2027 / May 24, 2032 ⁽³⁾
		10,221,408	Purification	February 3, 2031
		9,557,340	Antibody detection assay	July 30, 2029
	EU	2,152,868	Composition; pharmaceutical composition	May 23, 2028 / May 23, 2033 ⁽⁴⁾
		2531209; 3025728	Formulation; purification	February 03, 2031
Vimizim ⁽⁷⁾	U.S.	8128925	Compositions; methods of treatment	April 10, 2030
		8765437	Purification; formulation; methods of treatment	January 10, 2032
	EU	2,245,145	Composition; use for treating	April 30, 2029
		2,595,650	Purification; composition; use for treating; formulation	July 22, 2031
Voxzogo	U.S.	8,198,242	Compositions, Methods of Treatment	June 11, 2030 ⁽⁵⁾
		9,907,834	Formulation	August 1, 2036
		10,646,550	Clinical methods of treatment	August 1, 2036
	EU	2,432,489	Compositions, Methods of Treatment	May 20, 2030 ⁽⁶⁾

(1) Under a patent term extension (PTE) that has been granted.

(2) Patent application.

(3) We filed for a PTE for this patent, and if granted, the patent expiration will extend to May 24, 2032.

(4) We applied for SPCs for this patent, and we have to date received SPC to extend the patent expiration to May 23, 2033 in certain European countries, including Austria, Cyprus, Czech Republic, Denmark, Estonia, France, Greece, Hungary, Ireland, Iceland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Spain, Slovenia, and Sweden.

(5) We filed for a PTE for this patent, and if granted, the patent expiration will extend to May 20, 2035.

(6) We applied for SPCs for this patent, and if granted, the patent expiration will extend to May 30, 2035.

(7) We applied for SPCs for this patent, and we have to date received SPC to extend the patent expiration in certain European countries, including Austria, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Greece,

Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, to April 30, 2029.

In addition to patent protection, certain of our products are entitled to regulatory exclusivity in the U.S. and the EU through the dates set forth below:

Commercial Products	United States Orphan Drug Exclusivity Expiration ⁽¹⁾	United States Biologic Exclusivity Expiration ⁽²⁾	European Union Orphan Drug Exclusivity Expiration ⁽¹⁾
Brineura	2024	2029	2027
Palyngiq	2025	2030	2029
Vimizim	Expired	2026	2024
Voxzogo	Pending	Not Applicable	2031

(1) See “Government Regulation—Other Regulation—Orphan Drug Designation” in this Annual Report on Form 10-K for further discussion.

(2) See “Government Regulation—Other Regulation—Exclusivity for Biologics in the U.S.” in this Annual Report on Form 10-K for further discussion.

With respect to our clinical product candidates, we believe we have the necessary intellectual property rights to allowing us to undertake the development of these candidates. Certain of our product candidates are in therapeutic areas that have been the subject of many years of extensive research and development by academic organizations and third parties who may control patents or other intellectual property that they might assert against us, should one or more of our product candidates in these therapeutic areas succeed in obtaining regulatory approval and thereafter be commercialized. We continually evaluate the intellectual property rights of others in these areas in order to determine whether a claim of infringement may be made by others against us. Should we determine that a third party has intellectual property rights that could impact our ability to freely market a compound we consider a number of factors in determining how best to prepare for the commercialization of any such product candidate. In making this determination we consider, among other things, the stage of development of our product candidate and whether we and our outside counsel believe the intellectual property rights of others are valid, whether we infringe the intellectual property rights of others, whether a license is available upon commercially reasonable terms, whether we will seek to challenge the intellectual property rights of others, and the likelihood of and liability resulting from an adverse outcome should we be found to infringe the intellectual property rights of others.

Government Regulation

Regulation by governmental authorities in the U.S., European countries and other countries is a significant factor in the development, manufacture, commercialization, pricing and reimbursement of our products. Our industry is subject to significant federal, state, local and non-U.S. regulation. Our products require approval from the FDA, the EC (on the basis of the scientific opinions issued by the EMA) and corresponding agencies in other countries before they can be marketed. Failure to comply with applicable U.S. and foreign requirements may subject a company to a variety of administrative or judicial sanctions, such as FDA refusal to approve pending NDAs or BLAs, warning or untitled letters, product recalls, product seizures, total or partial suspension or withdrawal of marketing, production or distribution authorizations, injunctions, fines, civil penalties, and criminal prosecution.

Approval Process in the U.S. and EU

Satisfaction of FDA and EU pre-market approval requirements typically takes many years and the actual time required may vary substantially based upon the type, complexity and novelty of the product or disease. Pharmaceutical product development in the U.S. and the EU typically involves preclinical laboratory and animal tests, the submission to the applicable regulatory agency of an application (e.g., an IND in the U.S. or a CTA in the EU), which must become effective before clinical testing may commence, and adequate and well-controlled human clinical trials to establish the safety and effectiveness of the drug for each indication for which marketing approval is sought. On January 31, 2022, Regulation EU No 536/2014 (CTR) became fully applicable in the EU. The CTR established a centralized application procedure where one of the National Competent Authorities (NCA) of the Member States where the trial will take place takes the lead in reviewing certain aspects of the application, while the other NCAs have a lesser involvement than they had under the previous regime established by Directive 2001/20/EC (CTD). The CTD indeed introduced the first set of harmonized rules on clinical trials in the EU but resulted in a patchwork of different national regimes. The CTR was adopted with a view to introducing a more uniform set of the rules across the EU for the authorization of clinical trials. Such authorization still involves the national regulatory authorities and Ethics Committees of each of the EU Member States where the trial is to be conducted. However, the relevant procedures have now been streamlined with a view to facilitating a swifter and more seamless authorization and deployment of multi-center trials occurring in more than one EU Member State. More

specifically, the CTR allows sponsors to rely on one single submission for CTAs regardless of the number of Member States where the trial takes place and based on a single harmonized application. Furthermore, under the CTR, deadlines for regulatory approvals are shortened with a view to accelerating the authorization process. The CTR also established an EU Portal which will act as a single-entry point for submission of data and information relating to clinical trials. The CTD will continue to apply in parallel to the CTR for a transitional period.

Preclinical tests include laboratory evaluation, as well as animal studies, to assess the characteristics and potential pharmacology, pharmacokinetics and toxicity of the product. The conduct of the preclinical tests must comply with FDA and/or EU and national regulations and requirements, including good laboratory practices (GLP). The results of preclinical testing, along with other information, including information about product chemistry, manufacturing and controls and a proposed clinical trial protocol are reviewed by the applicable regulatory agency as part of an IND or CTA. Long-term preclinical tests, such as animal tests of reproductive toxicity and carcinogenicity, may continue after the IND or CTA is submitted. Until the CTA or IND is approved, or becomes effective following a waiting period, and appropriate reviews have been satisfactorily completed by the applicable Institutional Review Boards (IRBs) or Ethics Committees, we may not start the clinical trial in the relevant jurisdiction.

Clinical trials involve the administration of the investigational new drug to healthy volunteers or patients under the supervision of a qualified investigator. Clinical trials must be conducted in compliance with applicable regulations, good clinical practices (GCP), as well as under protocols detailing the objectives of the trial and the parameters to be used in monitoring safety and the effectiveness criteria to be evaluated. Each protocol involving testing on patients and subsequent protocol amendments must be submitted to the FDA as part of the IND and to the relevant regulatory agency in the EU as part of a new CTA.

The regulatory agencies may order the temporary halt or permanent discontinuation of a clinical trial at any time or impose other sanctions if they believe that the clinical trial is not being conducted in accordance with applicable requirements or presents an unacceptable risk to the clinical trial patients. An IRB/Ethics Committee may also require the clinical trial at the site to be halted, either temporarily or permanently, for failure to comply with the IRB/Ethics Committee's requirements, or may impose other conditions. Clinical trials that are deployed to support NDAs, BLAs or MAAs for marketing approval are typically conducted in three sequential phases, but the phases may overlap or be combined. Typically, we undertake a three-phase human clinical testing program as follows:

- Phase 1 - the initial introduction of the drug into healthy human subjects or patients, the drug is tested to assess metabolism, pharmacokinetics, pharmacological actions, side effects associated with increasing doses and, if possible, early evidence on effectiveness.
- Phase 2 - usually involves trials in a limited patient population, to determine the effectiveness of the drug for a particular indication or indications, dosage tolerance and optimum dosage, and to identify common adverse effects and safety risks. If a compound demonstrates evidence of effectiveness and an acceptable safety profile in Phase 2 evaluations.
- Phase 3 - undertaken to obtain the additional information about clinical efficacy and safety in a larger number of patients, typically at geographically dispersed clinical trial sites.

After completion of the required clinical testing, an application is prepared and submitted to the applicable regulatory agency. Approval of the application by the applicable regulatory agency is required before marketing of the product may begin. In the European Economic Area (i.e., the EU as well as Iceland, Liechtenstein and Norway) (the EEA), there are two types of marketing authorizations (MA), namely: (i) the "Union" MA, which is issued by the EC through the so-called "centralized procedure", based on the positive opinion of the EMA's Committee for Medicinal Products for Human Use, and results in a single marketing authorization that is valid across the EEA; and (ii) "National MAs," which are issued by the competent NCAs and only cover their respective territory. The centralized procedure is mandatory for certain types of products such as: (i) medicinal products derived from certain biotechnology processes, (ii) designated orphan medicinal products, (iii) medicinal products containing a new active substance indicated for the treatment of certain diseases such as HIV/AIDS, cancer, neurodegenerative disorders, diabetes, autoimmune diseases and other auto-immune dysfunctions, viral diseases; and (iv) Advanced Therapy Medicinal Products (ATMPs) (such as gene therapy, somatic cell therapy or tissue-engineered medicines). The NDA, BLA or MAA must include the results of all preclinical, clinical and other testing, a compilation of data relating to the product's pharmacology, chemistry, manufacture and controls and proposed labeling, among other things. In the U.S., each NDA or BLA is subject to a significant user fee at the time of submission, unless a waiver is granted by the FDA. Similarly, in the EU, the submission of an MAA is subject to the payment of fees, a waiver of which may be obtained only under limited circumstances. The FDA and the EMA initially review the applications for a threshold determination that it is sufficiently complete to permit substantive review. The regulatory agency may request additional information rather than accepting an application for filing or validation. Once the submission is accepted, the applicable agency begins an in-depth review. For the FDA, the review period for standard review applications is typically an additional ten months and, for priority review of drugs, that is, drugs that the FDA determines address a significant unmet need and represent a significant improvement over existing therapy, the review period is typically an additional six months in duration. The review process may be extended by the FDA for three additional months to consider new information submitted during the review or clarification regarding information already provided in the submission. The FDA may also refer applications for novel products or products that present difficult questions of safety or efficacy to an advisory committee, typically a panel that includes clinicians and other experts, for review, evaluation and a recommendation as to whether the application should be approved. The FDA is not bound by the recommendation of an advisory committee, but it generally follows such recommendations. After the FDA evaluates

the information provided in the NDA/BLA, it issues an approval letter, or a complete response letter. A complete response letter outlines the deficiencies in the submission and may require substantial additional testing or information in order for the FDA to reconsider the application. If and when those deficiencies have been addressed and the NDA/BLA has been resubmitted, the FDA will re-initiate review. If it is satisfied that the deficiencies have been addressed, the FDA will issue an approval letter.

Under the centralized procedure in the EU, the maximum timeframe for the evaluation of an MAA by the EMA is 210 days. This excludes so-called clock stops, during which additional written or oral information is to be provided by the applicant in response to questions asked by the CHMP. At the end of the review period, the CHMP provides an opinion to the EC. If the opinion is favorable, the EC may then adopt a decision to grant marketing authorization. In the event of a negative opinion, the company may request a re-examination of the application within 15 days of receipt of the negative opinion. The company then has 60 days to provide the CHMP with detailed grounds for requesting the re-examination. Within 60 days of providing this information, the CHMP must re-examine its opinion. The EC follows the recommendation of the CHMP in almost all cases. In exceptional cases, the CHMP might perform an accelerated review of an MAA in no more than 150 days. This is usually when the product is of major interest from the point of view of public health and, in particular, from the viewpoint of therapeutic innovation.

During the review period, the FDA and/or the European authorities may typically inspect one or more clinical sites and/or the sponsor to assure compliance with GCP regulations and may equally inspect the facility or the facilities at which the drug is manufactured to ensure compliance with cGMPs regulations. Neither the FDA nor the EC will approve the product unless compliance is satisfactory and the application contains data that provide substantial evidence that the drug is safe and effective in the indication studied.

Fast Track Designation and Accelerated Approval

The FDA is required to facilitate the development and expedite the review of drugs that are intended for the treatment of a serious or life-threatening condition for which there is no effective treatment and that demonstrate the potential to address unmet medical needs for the condition. Under the FDA's fast track program, the sponsor of a new drug candidate may request that the FDA designate the drug candidate for a specific indication as a fast track drug concurrent with or after the filing of the IND for the drug candidate. The FDA must determine if the drug candidate qualifies for fast track designation within 60 days of receipt of the sponsor's request.

In addition to other benefits, such as the ability to use surrogate endpoints and have greater interactions with the FDA, the FDA may initiate review of sections of a fast track drug's NDA or BLA before the application is complete. This rolling review is available if the applicant provides and the FDA approves a schedule for the submission of the remaining information and the applicant pays applicable user fees. However, the FDA's time period goal for reviewing an application does not begin until the last section of the NDA or BLA is submitted. Additionally, the fast track designation may be withdrawn by the FDA if the FDA believes that the designation is no longer supported by data emerging in the clinical trial process.

Under the fast track program and the FDA's accelerated approval regulations, the FDA may approve a drug for a serious or life-threatening illness that provides meaningful therapeutic benefit to patients over existing treatments based upon a surrogate endpoint that is reasonably likely to predict clinical benefit, or on a clinical endpoint that can be measured earlier than irreversible morbidity or mortality, that is reasonably likely to predict an effect on irreversible morbidity or mortality or other clinical benefit, taking into account the severity, rarity, or prevalence of the condition and the availability or lack of alternative treatments. In clinical trials, a surrogate endpoint is a measurement of laboratory or clinical signs of a disease or condition that substitutes for a direct measurement of how a patient feels, functions, or survives. Surrogate endpoints can often be measured more easily or more rapidly than clinical endpoints. A drug candidate approved on this basis is subject to rigorous post-marketing compliance requirements, including the completion of a Phase 4 or post-approval clinical trial to confirm the effect on the clinical endpoint. Failure to conduct a required post-approval study or confirm a clinical benefit through a post-marketing study will allow the FDA to withdraw the drug from the market on an expedited basis. All promotional materials for drug candidates approved under accelerated regulations are subject to prior review by the FDA.

Breakthrough Therapy Designation

The FDA is also required to expedite the development and review of the application for approval of drugs that are intended to treat a serious or life-threatening disease or condition where preliminary clinical evidence indicates that the drug may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints. Under the breakthrough therapy program, the sponsor of a new drug candidate may request that the FDA designate the drug candidate for a specific indication as a breakthrough therapy concurrent with, or after, the filing of the IND for the drug candidate. The FDA must determine if the drug candidate qualifies for breakthrough therapy designation within 60 days of receipt of the sponsor's request.

Adaptive Pathways

The EMA has an adaptive pathways approach which allows for early and progressive patient access to a medicine in cases of high medical need. To achieve this goal, several approaches are envisaged including for example identifying small populations with severe disease where a medicine's benefit-risk balance could be favorable or making more use of real-world data

where appropriate to support clinical trial data. The adaptive pathways concept applies primarily to treatments in areas of high medical need where it is difficult to collect data via traditional routes and where large clinical trials would unnecessarily expose patients who are unlikely to benefit from the medicine. The approach builds on regulatory processes already in place within the existing EU legal framework. These include: scientific advice; compassionate use; the conditional MA; patient registries and other pharmacovigilance tools that allow collection of real-life data and development of a risk-management plan for each medicine.

A conditional MA may be granted prior to the submission of comprehensive clinical data if the benefit of the immediate availability on the market of the product is deemed to outweigh the risk inherent in the fact that additional data are still required. In emergency situations, a MA for such medicinal products may be granted also where comprehensive pre-clinical or pharmaceutical data have not been provided. Under this procedure a MA can be granted as soon as sufficient data becomes available to demonstrate that the drug's benefits outweigh its risks, with safeguards and controls in place post-authorization. This procedure can also be combined with a rolling review of data during the development of a promising medicine, to further expedite its evaluation. Conditional MAs are typically subject to obligations that are reviewed annually. These include the obligation to complete ongoing studies, or to conduct new studies, with a view to confirming that the risk-benefit balance is favorable. Conditional MAs are valid for one year and are renewable.

PRIME Program

The EMA launched its PRIME regulatory program to enhance support for the development of therapies that target an unmet medical need. The initiative focuses on drugs that may offer a major therapeutic advantage over existing treatments, or benefit patients with no treatment options. These therapies are considered priority medicines within the EU. Through PRIME, the EMA offers early, proactive and enhanced support to drug developers to optimize the generation of robust data on a therapy's benefits and risks and enable accelerated assessment of drug applications.

Regulation of Product Marketing and Promotion

A marketing approval authorizes commercial marketing of the drug with specific prescribing information for specific indications. As a condition of NDA or BLA approval, the FDA may require a REMS, to help ensure that the benefits of the drug outweigh the potential risks. A REMS can include medication guides, communication plans for healthcare professionals, and elements to assure safe use, such as special training or certification for prescribing or dispensing, dispensing only under certain circumstances, special monitoring and the use of patient registries. Moreover, product approval may require substantial post-approval testing and surveillance to monitor the drug's safety or efficacy. Once granted, product approvals may be withdrawn if compliance with regulatory standards is not maintained or problems are identified following initial marketing. Similar rules apply outside of the U.S. For example, products approved in the EU may be subject to post- authorization requirements such as the obligation to perform post-authorization efficacy studies (PAES) or post-authorization safety studies (PASS) imposed as conditions to the MA, or other Risk Minimization Measures (RMMs), such as educational programs or controlled access programs, which may sometimes vary from one EU Member State to another.

Regulation of Manufacturing Standards

The FDA as well as other regulatory agencies around the world, regulate and inspect the equipment, facilities, laboratories and processes used in the manufacturing and testing of products prior to granting approval to market products. If after receiving approval from the FDA and other agencies such as the EC we make a material change in manufacturing equipment, location or process, additional regulatory review and approval may be required. We also must adhere to cGMP regulations and product-specific regulations enforced by the FDA and other regulatory agencies through their facilities inspection program. The FDA and other regulatory agencies around the world conduct regular, periodic visits to reinspect our equipment, facilities, laboratories and processes following an initial approval.

Combination Products

Combination products are defined by the FDA as products composed of two or more regulated components (e.g., a biologic and/or drug and a device). Biologics/drugs and devices each have their own regulatory requirements, and combination products may have additional requirements. For example, in the EU, if a device intended to administer a medicinal product is sold together with such medicinal product in such a way that they form a single integral product which is intended exclusively for use in the given combination and which is not reusable, that single integral product is regulated as a medicinal product. In addition, the relevant general safety and performance requirements established for medical devices by EU medical devices legislation apply to the device component of such combination products. A number of our products qualify as combination products and are regulated under the applicable framework, and we expect that a number of our pipeline product candidates will be evaluated for regulatory approval under such framework as well.

Post-Approval Regulatory Requirements

Following approval, the FDA and the regulatory authorities around the world will impose certain post-approval requirements related to a product. For instance, the FDA and European authorities closely regulate the post-approval marketing and promotion of approved products, including standards and regulations for direct-to-consumer advertising (which is prohibited in the EU for prescription products such as our products), off-label promotion, industry-sponsored scientific and educational activities and promotional activities involving the Internet. Moreover, if a company obtains original approval for a product via an accelerated approval pathway, the company will be typically required to conduct a post-marketing confirmatory trial to verify and describe the clinical benefit in support of full approval. An unsuccessful post-marketing study or failure to complete such a study could result in the withdrawal of the marketing approval for a product.

Approved products may be marketed only for the approved indications and in accordance with the provisions of the approved labeling. Changes to some of the conditions established in an approved application, including changes in indications, labeling, or manufacturing processes or facilities, may require a submission to and approval by the FDA or the EC, as applicable, before the change can be implemented. An NDA/BLA or MAA supplement for a new indication typically requires clinical data similar to that in the original application, and similar procedures and actions in reviewing NDA/BLA or MAA supplements as in reviewing NDAs/BLAs and MAAs.

Adverse event reporting and submission of periodic reports is required following marketing approval. Either the FDA or the EC/EMA may also require post-marketing testing, known as Phase 4 testing, a risk evaluation and mitigation strategy, and surveillance to monitor the effects of an approved product or place conditions on an approval that could restrict the distribution or use of the product. In addition, quality control as well as the manufacture, packaging, and labeling procedures must continue to conform to cGMPs after approval. Drug and biological product manufacturers and certain of their subcontractors are subject to periodic unannounced inspections by the FDA, the EMA/NCAs, during which the inspectors audit manufacturing facilities to assess compliance with cGMPs. Regulatory authorities may withdraw product approvals or request product recalls if a company fails to comply with regulatory standards, if it encounters problems following initial marketing, or if previously unrecognized problems are subsequently discovered. In addition, prescription drug manufacturers in the U.S. must comply with applicable provisions of the Drug Supply Chain Security Act and provide and receive product tracing information, maintain appropriate licenses, ensure they only work with other properly licensed entities and have procedures in place to identify and properly handle suspect and illegitimate products. Similarly, in the EU, stringent rules have been introduced to fight medicine falsifications and to ensure that the trade in medicines is subject to rigorous controls. Measures required to ensure that include: a unique identifier and an anti-tampering device on the outer packaging of drugs, stringent rules on import of active pharmaceutical ingredients and record-keeping requirements for wholesale distributors.

Approval Regulation Outside of the U.S. and the EU

For marketing outside the U.S. and the EU, we are subject to non-U.S. regulatory requirements governing human clinical testing and marketing approval for our products. These requirements vary by jurisdiction, can differ from those in the U.S. and the EU and may require us to perform additional preclinical or clinical testing. The amount of time required to obtain necessary approvals may be longer or shorter than that required for FDA or EC approval. In many countries outside of the U.S., approvals for pricing, coverage and reimbursement offered by third-party payers, including government payers and private insurance plans, are also required.

Other Regulation

Exclusivity for Biologics in the U.S.

The Biologics Price Competition and Innovation Act of 2009 (BPCIA), which was enacted as part of the Patient Protection and Affordable Care Act of 2010, as amended by the Health Care and Education Reconciliation Act of 2010 (as amended, the PPACA), created an abbreviated approval pathway for biological products that are demonstrated to be “biosimilar” or “interchangeable” with an FDA-licensed reference biological product. Biosimilarity sufficient to reference a prior FDA-licensed product requires that there be no differences in conditions of use, route of administration, dosage form, and strength, and no clinically meaningful differences between the biological product and the reference product in terms of safety, purity, and potency. Biosimilarity must be shown through analytical studies, animal studies, and at least one clinical study, absent a waiver from the Secretary of the U.S. Department of Health and Human Services. In order to meet the higher hurdle of interchangeability, a sponsor must demonstrate that the biosimilar product can be expected to produce the same clinical result as the reference product, and for a product that is administered more than once, that the risk of switching between the reference product and biosimilar product is not greater than the risk of maintaining the patient on the reference product. The first biosimilar product was approved under the BPCIA in 2015, and the first interchangeable product was approved in 2021. Complexities associated with the larger, and often more complex, structures of biological products, as well as the process by which such products are manufactured, pose significant hurdles to implementation that are still being evaluated by the FDA. A reference biologic is granted 12 years of exclusivity from the time of first licensure of the reference product and no application for a biosimilar can be submitted for four years from the date of licensure of the reference product. The first biologic product submitted under the abbreviated approval pathway that is determined to be interchangeable with the reference product has exclusivity against a finding of interchangeability.

for other biologics for the same condition of use for the lesser of (i) one year after first commercial marketing of the first interchangeable biosimilar, (ii) eighteen months after the first interchangeable biosimilar is approved if there is not patent challenge, (iii) eighteen months after resolution of a lawsuit over the patents of the reference biologic in favor of the first interchangeable biosimilar applicant, or (iv) 42 months after the first interchangeable biosimilar's application has been approved if a patent lawsuit is ongoing within the 42-month period.

Data Exclusivity and Market Exclusivity in the EU

The EU provides opportunities for market and data exclusivity for all products containing a New Active Substance, or NAS (such as a chemical, biological or radiopharmaceutical substance not previously authorized as a medicinal product in the EU), which have been granted an MA. These products receive eight years of data exclusivity and an additional two years of market exclusivity. The data exclusivity period prevents generic or biosimilar applicants from relying on the pre-clinical and clinical trial data contained in the dossier of the reference product when applying for a generic or biosimilar MA in the EU during a period of eight years from the date on which the reference product was first authorized in the EU. The market exclusivity period prevents a successful generic or biosimilar applicant from commercializing its product in the EU until ten years have elapsed from the initial MA of the reference product in the EU. The overall ten-year market exclusivity period can be extended to a maximum of eleven years if, during the first eight years of those ten years, the MA holder obtains an authorization for one or more new therapeutic indications which, during the scientific evaluation prior to their authorization, are held to bring a significant clinical benefit in comparison with existing therapies.

Orphan Drug Designation

Orphan drug designation is granted by the FDA and the EC to drugs intended to treat a rare disease or condition, which in the U.S. is defined as having a prevalence of less than 200,000 individuals in the U.S. In the EU, orphan drug designation is available if a sponsor can establish: that the medicine is intended for the diagnosis, prevention or treatment of (1) a life-threatening or chronically debilitating condition affecting no more than five in 10,000 people in the EU, which is equivalent to around 250,000 people or fewer, or (2) a life-threatening, seriously debilitating or serious and chronic condition in the EU and that without incentives derived from the orphan status, it is unlikely that the marketing of the medicinal product in the EU would generate sufficient return to justify the necessary investment. For either of these criteria, the applicant must demonstrate that there exists no satisfactory method of diagnosis, prevention or treatment of the condition in question that has been authorized in the EU or, if such method exists, the medicinal product will be of significant benefit to those affected by that condition. Orphan drug designation must be requested before submitting a marketing application and, in the EU, it must be maintained until the time of the granting of the MA. Orphan designation is indeed lost in the EU if it is established that the product no longer meets the orphan criteria at the time a MA is granted for such product.

Orphan drug designation does not shorten the regulatory review and approval process. However, if an orphan drug later receives approval for the indication for which it has designation, the relevant regulatory authority may not approve any other applications to market the same drug for the same indication, except in very limited circumstances, for seven years in the U.S. and ten years in the EU (extendable to twelve years for medicines that have complied with an agreed Pediatric Investigation Plan (PIP) pursuant to Regulation 1901/2006) and, in addition, a range of other benefits during the development and regulatory review process are available in the EU, including scientific assistance for study protocols, authorization through the centralized marketing authorization procedure covering all member countries and a reduction or elimination of registration and marketing authorization fees. Among the benefits of orphan drug designation in the U.S. are tax credits for certain research and a waiver of the NDA/BLA application user fee. Orphan drug exclusive marketing rights may be lost under certain conditions, such as if the request for designation was materially defective or if the manufacturer is unable to assure sufficient quantity of the drug. In the EU, a MA may be granted to a similar medicinal product with the same orphan indication during the regulatory exclusivity period with the consent of the MA holder for the original orphan medicinal product or if the MA holder of the original orphan medicinal product is unable to supply sufficient quantities. A MA may also be granted to a similar medicinal product with the same orphan indication if the second applicant can establish that its medicinal product is safer, more effective or otherwise clinically superior to the original orphan medicinal product. The period of market exclusivity may, in addition, be reduced to six years if, at the end of the fifth year, it can be demonstrated on the basis of available evidence that the criteria for its designation as an orphan medicine are no longer satisfied, for example if the original orphan medicinal product has become sufficiently profitable not to justify maintenance of market exclusivity.

Healthcare Reform

The U.S. federal and state governments continue to propose and pass legislation designed to regulate the healthcare industry, including legislation that seeks to directly or indirectly regulate pharmaceutical drug pricing. For more information, see Item 1A. Risk Factors "Government healthcare reform could increase our costs and adversely affect our revenue and results of operations."

Other Regulatory Requirements

In addition to FDA restrictions on marketing of pharmaceutical products, several other types of state and federal laws have been applied to restrict certain business and marketing practices in the pharmaceutical industry in recent years. These laws include anti-kickback, false claims, patient data privacy and security, and transparency statutes and regulations.

The federal Anti-Kickback Statute prohibits, among other things, knowingly and willfully offering, paying, soliciting or receiving remuneration to induce or in return for purchasing, leasing, ordering or arranging for the purchase, lease or order of any healthcare item or service reimbursable under Medicare, Medicaid or other federally financed healthcare programs. The PPACA amended the intent requirement of the federal Anti-Kickback and certain other criminal healthcare fraud statutes such that a person or entity no longer needs to have actual knowledge of these statutes or specific intent to violate them in order to commit a violation. This statute has been interpreted to apply to arrangements between pharmaceutical manufacturers on the one hand and prescribers, purchasers and formulary managers on the other. Although there are a number of statutory exceptions and regulatory safe harbors protecting certain common activities from prosecution or other regulatory sanctions, the exceptions and safe harbors are drawn narrowly, and practices that involve remuneration intended to induce prescribing, purchases or recommendations may be subject to scrutiny if they do not qualify for an exception or safe harbor.

Federal false claims laws prohibit any person from knowingly presenting, or causing to be presented, a false claim for payment to the federal government, or knowingly making, or causing to be made, a false statement to have a false claim paid. The PPACA amended the statute so that the government may assert that a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the false claims laws. Recently, several pharmaceutical and other healthcare companies have been prosecuted under these laws for allegedly inflating drug prices they report to pricing services, which in turn are used by the government to set Medicare and Medicaid reimbursement rates, and for allegedly providing free product to customers with the expectation that the customers would bill federal programs for the product. In addition, certain marketing practices, including off-label promotion, may also violate false claims laws.

The federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, imposes criminal and civil liability for, among other things, executing a scheme to defraud any healthcare benefit program or making false statements relating to healthcare matters. HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act and their implementing regulations, also imposes obligations, including mandatory contractual terms, on certain types of individuals and entities, with respect to safeguarding the privacy, security and transmission of individually identifiable health information.

The federal Physician Payments Sunshine Act requires certain manufacturers of drugs, devices, biologics and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program, with specific exceptions, to report annually to the CMS information related to payments or other transfers of value made to physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors), physician assistants, certain types of advanced practice nurses and teaching hospitals, and applicable manufacturers and applicable group purchasing organizations to report annually to CMS ownership and investment interests held by the physicians and their immediate family members.

The majority of states also have statutes or regulations similar to the federal Anti-Kickback Statute and false claims laws, which apply to items and services reimbursed under Medicaid and other state programs, or, in several states, apply regardless of the payer. Several states now 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 these states while other states prohibit various other marketing-related activities. Other states require submission or disclosure of certain pricing information. Still other states require the posting of information relating to clinical studies and their outcomes. In addition, states including California, Connecticut, Nevada and Massachusetts require pharmaceutical companies to implement compliance programs or marketing codes. Currently, several additional states are considering similar proposals. Compliance with these laws is difficult and time consuming, and companies that do not comply with these state laws face civil penalties. Sanctions under these federal and state laws may include significant penalties, including administrative and criminal sanctions, civil monetary penalties, damages, monetary fines, disgorgement, exclusion of a company from federal healthcare programs, integrity oversight and reporting obligations, criminal fines, contractual damages, reputational harm, diminished profits and future earnings, curtailment of operations and imprisonment.

The U.S. Foreign Corrupt Practices Act (FCPA), to which we are subject, prohibits corporations and individuals from engaging in certain activities to obtain or retain business or to influence a person working in an official capacity. It is illegal to pay, offer to pay or authorize the payment of anything of value to any non-U.S. government official, government staff member, political party or political candidate in an attempt to obtain or retain business or to otherwise influence a person working in an official capacity. Similar laws exist in other countries, such as the U.K., that restrict improper payments to public and private parties. Many countries have laws prohibiting these types of payments within the respective country. In the EU, for example, harmonized rules prohibit gifts, pecuniary advantages or benefits in kind to Health Care Professionals (HCPs) unless they are inexpensive and relevant to the practice of medicine or pharmacy. Similarly, strict rules apply to hospitality at sales promotion events. Based on these rules, a body of industry guidelines and sometimes national laws in force in individual EU Member States has been introduced to fight improper payments or other transfers of value to HCPs, and in general inducements that may have a broadly promotional character. Historically, pharmaceutical companies have been the target of FCPA and other anti-corruption and similar

investigations, as well as of wide media attention, sometimes resulting in significant penalties, image and other costs for such companies.

Pricing and Reimbursement

Because the course of treatment for patients using our products is expensive, sales of our products depend, in significant part, on the availability and extent of coverage and reimbursement offered by third-party payers, including government payers and private insurance plans. Governments may regulate access to, prices of or reimbursement levels for our products to control costs or to affect levels of use of our products, and private insurers may be influenced by government reimbursement methodologies.

Third-party payers carefully review and increasingly challenge the prices charged for drugs, examine their medical necessity, and review their cost effectiveness. Reimbursement rates from private companies vary depending on the third-party payer, the insurance plan and other factors. One payer's determination to provide coverage for a product does not assure that other payers will also provide coverage for the product. Moreover, the process for determining whether a third-party payer will provide coverage for a product may be separate from the process for setting the price of a product or for establishing the reimbursement rate that such a payer will pay for the product. Obtaining coverage and adequate reimbursement for our products may be particularly difficult because of the higher prices often associated with drugs administered under the supervision of a physician. A payer's decision to provide coverage for a product does not imply that an adequate reimbursement rate will be approved. Adequate third-party reimbursement may not be available to enable us to maintain high enough price levels to realize sufficient revenues from our investment in product development. In addition, emphasis on managed care in the U.S. has increased and we expect will continue to increase the pressure on pharmaceutical pricing. Coverage policies and third-party reimbursement rates may change at any time. Even if favorable coverage and reimbursement status is attained for one or more products for which we or our collaborators receive regulatory approval, less favorable coverage policies and reimbursement rates may be implemented in the future.

Outside of the U.S. our products are paid for by a variety of payers, with governments being the primary source of payment. Reimbursement in the EU and many other territories must be negotiated on a country-by-country basis and in many countries the product cannot be commercially launched until pricing and/or reimbursement is approved. In many countries the government closely regulates drug pricing and reimbursement and often has a significant discretion in determining whether a product will be reimbursed at all and, if it is, how much will be paid. Negotiating prices with governmental authorities can delay commercialization of our products. Payers in many countries use a variety of cost-containment measures that can include referencing prices in other countries and using those reference prices to set their own price, mandatory price cuts and rebates. This international patchwork of price regulation has led to different prices across countries and some cross-border trade in our products from markets with lower prices. Even after a price is negotiated, countries frequently request or require adjustments to the price and other concessions over time.

Government Pricing and Reimbursement Programs for Marketed Drugs in the U.S.

Medicaid, the 340B Drug Pricing Program, and Medicare

Federal law requires that a pharmaceutical manufacturer, as a condition of having its products receive federal reimbursement under Medicaid and Medicare Part B, must pay rebates to state Medicaid programs for all units of its covered outpatient drugs dispensed to Medicaid beneficiaries and paid for by a state Medicaid program under either a fee-for-service arrangement or through a managed care organization. This federal requirement is effectuated through a Medicaid drug rebate agreement between the manufacturer and the Secretary of Health and Human Services. CMS administers the Medicaid drug rebate agreements, which provide, among other things, that the drug manufacturer will pay rebates to each state Medicaid agency on a quarterly basis and report certain price information on a monthly and quarterly basis. The rebates are based on prices reported to CMS by manufacturers for their covered outpatient drugs. For non-innovator products, generally generic drugs marketed under ANDAs, the rebate amount is 13% of the average manufacturer price (AMP) for the quarter. The AMP is the weighted average of prices paid to the manufacturer (1) directly by retail community pharmacies and (2) by wholesalers for drugs distributed to retail community pharmacies. For innovator products (i.e., drugs that are marketed under NDAs or BLAs), the rebate amount is the greater of 23.1% of the AMP for the quarter or the difference between such AMP and the best price for that same quarter. The best price is essentially the lowest price available to non-governmental entities. Innovator products may also be subject to an additional rebate that is based on the amount, if any, by which the product's AMP for a given quarter exceeds the inflation-adjusted baseline AMP, which for most drugs is the AMP for the first full quarter after launch. Since 2017, non-innovator products are also subject to an additional rebate. To date, the rebate amount for a drug has been capped at 100% of the AMP; however, effective January 1, 2024, this cap will be eliminated, which means that a manufacturer could pay a rebate amount on a unit of the drug that is greater than the average price the manufacturer receives for the drug.

The terms of participation in the Medicaid drug rebate program impose an obligation to correct the prices reported in previous quarters, as may be necessary. Any such corrections could result in additional or lesser rebate liability, depending on the direction of the correction. In addition to retroactive rebates, if a manufacturer were found to have knowingly submitted false information to the government, federal law provides for civil monetary penalties for failing to provide required information, late submission of required information, and false information.

A manufacturer must also participate in a federal program known as the 340B drug pricing program in order for federal funds to be available to pay for the manufacturer's drugs under Medicaid and Medicare Part B. Under this program, the participating manufacturer agrees to charge certain safety net healthcare providers no more than an established discounted price for its covered outpatient drugs. The formula for determining the discounted price is defined by statute and is based on the AMP and the unit rebate amount as calculated under the Medicaid drug rebate program, discussed above. Manufacturers are required to report pricing information to the Health Resources and Services Administration (HRSA) on a quarterly basis. HRSA has also issued regulations relating to the calculation of the ceiling price as well as imposition of civil monetary penalties for each instance of knowingly and intentionally overcharging a 340B covered entity.

Federal law also requires that manufacturers report data on a quarterly basis to CMS regarding the pricing of drugs that are separately reimbursable under Medicare Part B. These are generally drugs, such as injectable products, that are administered "incident to" a physician service and are not generally self-administered. The pricing information submitted by manufacturers is the basis for reimbursement to physicians and suppliers for drugs covered under Medicare Part B. As with the Medicaid drug rebate program, federal law provides for civil monetary penalties for failing to provide required information, late submission of required information, and false information.

Medicare Part D provides prescription drug benefits for seniors and people with disabilities. Medicare Part D beneficiaries have a gap in their coverage (between the initial coverage limit and the point at which catastrophic coverage begins) where Medicare does not cover their prescription drug costs, known as the coverage gap. However, starting in 2020, Medicare Part D beneficiaries pay 25% of drug costs after they reach the initial coverage limit - the same percentage they were responsible for before they reached that limit - thereby closing the coverage gap. The cost of closing the coverage gap is being borne by innovator companies and the government through subsidies. Each manufacturer of drugs approved under NDAs or BLAs is required to enter into a Medicare Part D coverage gap discount agreement and provide a 70% discount on those drugs dispensed to Medicare beneficiaries in the coverage gap, in order for its drugs to be reimbursed by Medicare Part D.

U.S. Federal Contracting and Pricing Requirements

Manufacturers are also required to make their covered drugs, which are generally drugs approved under NDAs or BLAs, available to authorized users of the Federal Supply Schedule (FSS) of the General Services Administration. The law also requires manufacturers to offer deeply discounted FSS contract pricing for purchases of their covered drugs by the Department of Veterans Affairs, the Department of Defense, the Coast Guard, and the Public Health Service (including the Indian Health Service) in order for federal funding to be available for reimbursement or purchase of the manufacturer's drugs under certain federal programs. FSS pricing to those four federal agencies for covered drugs must be no more than the Federal Ceiling Price (FCP), which is at least 24% below the Non-Federal Average Manufacturer Price (Non-FAMP) for the prior year. The Non-FAMP is the average price for covered drugs sold to wholesalers or other middlemen, net of any price reductions.

The accuracy of a manufacturer's reported Non-FAMPs, FCPs, or FSS contract prices may be audited by the government. Among the remedies available to the government for inaccuracies is recoupment of any overcharges to the four specified federal agencies based on those inaccuracies. If a manufacturer were found to have knowingly reported false prices, in addition to other penalties available to the government, the law provides for significant civil monetary penalties per incorrect item. Finally, manufacturers are required to disclose in FSS contract proposals all commercial pricing that is equal to or less than the proposed FSS pricing, and subsequent to award of an FSS contract, manufacturers are required to monitor certain commercial price reductions and extend commensurate price reductions to the government, under the terms of the FSS contract Price Reductions Clause. Among the remedies available to the government for any failure to properly disclose commercial pricing and/or to extend FSS contract price reductions is recoupment of any FSS overcharges that may result from such omissions.

Disclosure of Clinical Trial Information

Sponsors of clinical trials of FDA-regulated products, including drugs and biologics, are required to register and disclose certain clinical trial information. Information related to the product, patient population, phase of investigation, study sites and investigators, and other aspects of the clinical trial are then made public as part of the registration. Sponsors are also obligated to discuss the results of their clinical trials after completion. In certain circumstances, disclosure of the results of these trials can be delayed for up to two years after the date of completion of the trial. Competitors may use this publicly available information to gain knowledge regarding the progress of development programs. In the EU there is an increasing trend requiring public disclosure of development data, in particular clinical trial data. These data were traditionally regarded as Confidential Commercial Information (CCI); however, under policies adopted in the EU, clinical study data submitted to the EMA in MAAs, including preclinical data, and patient level data, may be subject to public disclosure. This is confirmed in the CTR, the new EU legislation on clinical trials, according to which clinical trial applications and all the related documentation are uploaded and stored in the Clinical Trials Information System (CTIS) which is managed by the EMA. Confirming the transparency principle, the CTR provides that the information stored in such system is publicly accessible unless confidentiality is justified on the basis of a limited set of exceptions. These exceptions, which - as such - are to be interpreted narrowly in the EU, include the protection of CCI, in particular through taking into account the status of the MA for the applicable product; however, CCI is overridden in those cases where the authorities conclude that there is an overriding public interest in disclosure. Case law of the Court of Justice of the European Union has also

confirmed the absence of a general presumption of confidentiality over documents containing clinical and preclinical data provided to the EMA in support of a MAA.

Pediatric Indications

In the U.S., under the Pediatric Research Equity Act of 2007 (PREA), NDAs or BLAs or supplements to NDAs or BLAs must contain data to assess the safety and effectiveness of the drug for the claimed indication(s) in all relevant pediatric subpopulations and to support dosing and administration for each pediatric subpopulation for which the drug is safe and effective. The FDA may grant deferrals for submission of data or full or partial waivers. Unless otherwise required by statute or regulation, PREA does not apply to any drug for an indication for which orphan drug designation has been granted. The Best Pharmaceuticals for Children Act (BPCA) provides sponsors of NDAs with an additional six-month period of market exclusivity for all unexpired patent or non-patent exclusivity on all forms of the drug containing the active moiety if the sponsor submits results of pediatric studies specifically requested by the FDA under BPCA within required timeframes. The BPCIA provides sponsors of BLAs an additional six-month extension for all unexpired non-patent market exclusivity on all forms of the biological containing the active moiety pursuant to the BPCA if the conditions under the BPCA are met.

In the EU, companies developing a new medicinal product must agree to a PIP with the EMA and must conduct pediatric clinical trials in accordance with that PIP, unless a deferral or waiver is granted by the EMA on request by the applicant (e.g., because the relevant disease or condition occurs only in adults). The PIP requirement also applies when a MA holder intends to add a new indication, pharmaceutical form or route of administration for a medicinal product that has already been authorized. The MAA for the product must include the results of pediatric clinical trials conducted in accordance with the PIP, unless a waiver applies, or a deferral has been granted, in which case the pediatric clinical trials must be completed at a later date. Once all the studies and measures agreed have been conducted in accordance with the PIP, products are eligible for a six-month extension of the protection under a supplementary protection certificate (if any is in effect at the time of approval) or, in the case of orphan medicinal products, a two-year extension of the orphan market exclusivity. This pediatric reward is granted subject to specific conditions. These conditions include that the applicant demonstrates having complied with all the measures contained in the PIP, that the summary of product characteristics, and if appropriate the package leaflet, reflects the results of studies conducted in compliance with such PIP, and that the product is authorized in all Member States. The rewards for conducting studies in the pediatric population can be granted irrespective of the fact that the information generated in compliance with the agreed PIP fails to lead to the authorization of a pediatric indication.

Privacy and Security Legislation

We are subject to various laws and regulations globally regarding privacy and data protection. These laws and regulations involve the collection, storage, handling, use, disclosure, transfer and security of personal data. The legislative and regulatory environments regarding privacy and data protection are continually evolving and developing, as these issues are the subjects of increasing amounts of attention in countries globally. For example, we are subject to the EU's General Data Protection Regulation GDPR, which became effective on May 25, 2018. The GDPR requires that personal data is only collected for specified, explicit and legal purposes as set out in the GDPR or local laws, and the data may then only be processed in a manner consistent with those purposes. The personal data collected and processed must be adequate, relevant and not excessive in relation to the purposes for which it is collected and processed, it must be held securely, not transferred outside of the EEA (unless certain steps are taken to ensure an adequate level of protection), and must not be retained for longer than necessary for the purposes for which it was collected. The GDPR also requires companies processing personal data to implement adequate technical measures in order to ensure the most appropriate level of security which may vary depending on different factors such as the categories of processed personal data, the state of the art, the costs of implementation and the nature, scope, context and purposes of processing as well as the risk of varying likelihood and severity for the rights and freedoms of natural persons. In addition, the GDPR requires companies processing personal data to take certain organizational steps to ensure that they have adequate records, policies, security, training and governance frameworks in place to ensure the protection of data subject rights, including as required to respond to complaints and requests from data subjects. For example, the GDPR requires us to make more detailed disclosures to data subjects, requires disclosure of the legal basis on which we can process personal data, provides for conditions under which a valid consent for processing can be obtained, requires the appointment of a data protection officer where sensitive personal data (i.e., health data) is processed on a large scale, imposes mandatory data breach notification throughout the EEA and imposes additional obligations when contracting with service providers or partners. In addition, to the extent a company processes, controls or otherwise uses "special category" of personal data (including patients' health or medical information, genetic information and biometric information), more stringent rules apply, further limiting the circumstances and the manner in which a company is legally permitted to process that data.

We are also subject to the California Consumer Privacy Act of 2018, which became effective on January 1, 2020. Other jurisdictions where we operate have enacted or proposed similar legislation and/or regulations. Failure to comply with these laws could result in significant penalties, including, under GDPR, fines of up to 20 million Euro or 4% of the total worldwide annual turnover of the preceding financial year, whichever is higher.

Human Capital

As of December 31, 2021, we had 3,045 full-time employees worldwide, of whom 1,336 were in operations, 692 were in research and development, 516 were in sales and marketing and 501 were in administration. Of the 3,045 full-time employees as of December 31, 2021, 2,105 employees were in the U.S. and Canada, and 940 employees were in other non-U.S. countries, including 756 in Europe and the Middle East, 120 in Latin America and 64 in Asia Pacific. We also leverage temporary workers to fill short-term positions for our business and manufacturing needs. Since the start of the COVID-19 pandemic, a significant portion of our global workforce has worked remotely, with some employees recently returning to our offices on a voluntary basis. A portion of our employee base in the U.S. and Ireland continues to work onsite supporting manufacturing and laboratory operations.

Diversity, Equity and Inclusion

At BioMarin, prejudice, racism and intolerance are unacceptable. We are committed to diversity, equity and inclusion (DEI) across all aspects of our organization, including hiring, promotion and development practices. As of December 31, 2021, racial and ethnic minorities represented 45% of our employees in the U.S. Globally, 50% of our workforce were women and 46% of our positions at director-level and above were held by women. We are committed to continuing our ongoing efforts to ensure diversity in all positions, including leadership.

We remain steadfast in our commitment to fostering a community that reflects equality and inclusiveness and working towards making BioMarin a place where every employee feels heard, respected and valued. This commitment is a cultural value, and we believe incorporating and encouraging different perspectives from employees of varied backgrounds and experiences helps us better achieve our business goals and objectives. In 2020, we formed a DEI Employee Advisory Committee to help us define our DEI roadmap and ensure that perspectives from employees of different age, tenure, gender, sexual orientation, race, ethnicity, level and location are considered in how we build the most inclusive environment. We also continue to support and increase the number of our employee resource groups that build community for employees from underrepresented groups.

We are honored to be recognized as a company of choice. In January 2022, we were recognized for the second year in a row as a Best Place to Work for lesbian, gay, bisexual, transgender and queer (LGBTQ) equality by the Human Rights Campaign, scoring 100% on their Corporate Equality Index, one of the foremost benchmarking surveys and reports in the U.S. measuring corporate policies and practices related to LGBTQ workplace equality.

Compensation, Benefits and Well-being

We offer competitive compensation and benefits in order to attract and retain excellent people and support our employees' overall well-being. Our total rewards compensation package includes market-competitive salary, the potential to earn bonuses or sales commissions, equity, healthcare benefits, retirement savings plans, paid time off and family leave, fitness and wellness programs, free flu vaccinations and an Employee Assistance Program and other mental health services.

In response to the COVID-19 pandemic, we developed a comprehensive global plan that established clear and standardized COVID-19 policies, safety protocols and communications for all employees. We implemented significant changes that we determined were in the best interest of our employees as well as the communities in which we operate. These include having the majority of our employees work from home, while implementing additional safety measures for employees continuing critical onsite work and those who have recently returned to our offices on a voluntary basis. We also instituted a policy restricting domestic and international non-essential travel for our employees. As part of our response to the changes implemented due to the COVID-19 pandemic, we established additional employee support programs to support the transition to remote working and to provide financial support and time-off for working parents. In addition, policies and programs were established to help support our employees, including safety screening, onsite COVID-19 testing and financial support for those who incurred additional expenses related to higher commuting costs, fitness facility closures, personal purchase of supplies and equipment, and increased childcare demands.

We believe people should be paid for the value of their work, regardless of race, ethnicity, gender or other protected characteristics. To this end, we benchmark and tie compensation to market data as well as to an employee's experience, function, and performance. We regularly review our workforce compensation practices and strive for equity. Specifically, we partner with independent, third-party experts to conduct a regular and detailed pay equity assessment to determine whether gender and race/ethnicity have a significant impact on pay levels across the organization. This pay equity analysis is conducted on an employee's total compensation, including base pay, bonus, and equity. If we identify any pay gap across the organization, we typically make adjustments to mitigate such gaps. Our managers also receive training in how to recognize and prevent discrimination in hiring, performance management and compensation decisions.

Professional Growth and Development

We help our employees develop the skills and capabilities to support BioMarin's growth and innovation. We continually invest in our employees' career growth and provide them with a wide range of development opportunities, including face-to-face, virtual and self-directed learning, mentoring, mobile coaching and external development. We offer our employees career-specific

training and resources and support development opportunities through company sponsored programs in addition to our tuition reimbursement program. We also provide our high-potential employees with a variety of leadership coaching and management programs.

Patient and Community Connections

We are striving to support our local communities around the world by developing programs that inspire and enrich both our patient populations and the areas where we live and work. We actively engage with underrepresented populations through a variety of outreach and programs. We have collaborated with Biotech Partners, a non-profit organization in the San Francisco Bay Area focused on helping students underrepresented in the biotechnology field to gain experience through classroom instruction and paid internships. In addition, we have a partnership with Health Career Connection, a national non-profit that prepares the next generation of diverse, transformational health, equity, and racial justice leaders, by providing promising undergraduate college students from underrepresented backgrounds and under resourced communities with paid internship programs, health equity scholars programs and alumni professional development initiatives. Through our Rare Scholars program, we award annual scholarships to students living with rare disease.

Other Information

We were incorporated in Delaware in October 1996. Our principal executive offices are located at 770 Lindero Street, San Rafael, California 94901 and our telephone number is (415) 506-6700. Our annual reports on Form 10-K, quarterly reports on Form 10-Q, proxy statements, current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended (the Exchange Act) are available free of charge at www.bmrn.com as soon as reasonably practicable after electronically filing such reports with the Security and Exchange Commission (the SEC). Such reports and other information may be accessed through the SEC's website at www.sec.gov. Information contained in our website is not part of this or any other report that we file with or furnish to the SEC.

Item 1A. Risk Factors

An investment in our securities involves a high degree of risk. We operate in a dynamic and rapidly changing industry that involves numerous risks and uncertainties. The risks and uncertainties described below are not the only ones we face. Other risks and uncertainties, including those that we do not currently consider material, may impair our business. If any of the risks discussed below actually occur, our business, financial condition, operating results or cash flows could be materially adversely affected. This could cause the value of our securities to decline, and you may lose all or part of your investment.

Business and Operational Risks

The COVID-19 pandemic could continue to materially adversely affect our business, results of operations, and financial condition.

The COVID-19 pandemic has resulted in travel restrictions, quarantines, “work-from-home” and “shelter-in-place” orders and extended shutdown of certain businesses around the world, including in many countries in which we operate. Our global revenue sources, mostly in the form of demand interruptions such as missed patient infusions and delayed treatment starts for new patients, and our overall business operations were impacted by the COVID-19 pandemic, and we expect that the pandemic will continue to adversely impact our financial results and our business generally in 2022. Ongoing and future effects of the COVID-19 pandemic (or any future pandemic) on all aspects of our business and operations, including revenues, expenses, reserves and allowances, manufacturing, clinical trials and research and development costs, and the duration of such effects, are highly uncertain and difficult to predict.

The COVID-19 pandemic has adversely affected and will likely continue to adversely impact our product development programs, including preclinical study and clinical trial operations. We have been, and will likely continue to be, unable to initiate or continue conducting clinical trials as originally planned due to the prioritization of hospital resources toward the pandemic, difficulty in recruiting and retaining healthcare providers and staff due to their diversion toward treating COVID-19 patients or their heightened exposure to COVID-19, potential unwillingness of patients to enroll or continue in trials for fear of exposure to COVID-19 at sites, or the inability of patients to comply with clinical trial protocols as quarantines or travel restrictions impede patient movement or otherwise interrupt healthcare services. For example, we experienced delays in certain clinical trials due to COVID-19 related complications and have had to reevaluate expected timelines for those trials. In addition, we rely on independent clinical investigators, contract research organizations (CROs) and other third-party service providers to assist us in managing, monitoring and otherwise carrying out our preclinical studies and clinical trials, and the pandemic has impacted, may continue to affect their ability to devote sufficient time and resources to our programs or to travel to sites to perform work for us. Additionally, the COVID-19 pandemic has delayed, and may continue to postpone, necessary regulatory inspections and other interactions with regulators regarding our product candidates, which could delay review or approval of our regulatory submissions.

COVID-19 has adversely affected and will likely continue to affect our ability to source materials and supplies and could adversely impact our ability to manufacture and distribute our product candidates and products. The pandemic has resulted and may continue to result in reduced operations of third-party suppliers of raw materials and supplies upon whom we rely or otherwise limit our ability to obtain sufficient materials and supplies necessary for production of our therapies. Our manufacturing facilities and those of our contract manufacturers are located in areas impacted by the COVID-19 pandemic, which may result in delays or disruptions in our ability to produce product candidates and products. If we or any third party in our supply or distribution chain are adversely impacted by the COVID-19 pandemic, including as a result of required closures, staffing shortages, production slowdowns and disruptions in delivery systems, our operations may be disrupted, limiting our ability to manufacture and distribute our product candidates for clinical trials and research and development operations and our products for commercial sales.

Our commercial operations have also been, and will likely continue to be, adversely impacted by the COVID-19 pandemic. Many of our products are administered via infusions in a clinic or hospital setting and/or by a healthcare professional. Treating COVID-19 patients has become the priority for many healthcare facilities and workers, so it has become, and may continue to be, difficult for some of our patients to receive our therapies that are administered by infusion. Although we are working with our patient community and healthcare providers to find alternative arrangements where necessary, such as providing infusions at home, the revenue from doses of our products that are missed by patients and the lost revenues from delayed treatment starts for new patients will never be recouped. Moreover, some patients may choose to skip infusions because they do not want to risk exposure to COVID-19 by having a healthcare provider administer the therapy at a healthcare facility or at home. The pandemic has also hindered our ability to find new patients and start treating these patients, and it has limited our sales force’s ability to promote our products to distributors, hospitals, clinics, doctors and pharmacies, which could adversely affect our revenues and results of operations. In addition, the COVID-19 pandemic could adversely affect our workforce and the employees of companies with which we do business, thereby disrupting our business operations. We have implemented work-from-home policies for employees whose jobs do not require them to be onsite. Increased reliance by us and the companies with which we do business on personnel working from home may negatively impact productivity, increase cyber security risk, create data accessibility issues, increase the risk for communication disruptions, or otherwise disrupt or delay normal business operations. For our employees whose jobs require them to be onsite, we have taken precautions to avoid the spread of COVID-19 among our employees, but we cannot guarantee our workforce will not face an outbreak that could adversely impact our operations.

While the long-term economic impact and the duration of the COVID-19 pandemic may be difficult to predict, the pandemic has resulted in, and may continue to result in, significant disruption of global financial markets, which could reduce our ability to access capital and could negatively affect our liquidity and the liquidity and stability of markets for our common stock and convertible notes. In addition, a recession, further market correction or depression resulting from the COVID-19 pandemic could materially adversely affect our business and the value of our common stock and convertible notes.

To the extent the COVID-19 pandemic continues to adversely affect our business and financial results, it may also have the effect of heightening many of the other risks described in this Risk Factors section, such as those relating to our conducting a significant amount of our sales and operations outside of the U.S., exposure to changes in foreign exchange rates, our substantial indebtedness, our need to generate sufficient cash flows to service our indebtedness and finance our operations, our ability to comply with the covenants contained in the agreements that govern our indebtedness and the volatility of our stock price.

Because the target patient populations for our products are small, we must achieve significant market share and maintain high per-patient prices for our products to achieve and maintain profitability.

All of our products target diseases with small patient populations. As a result, our per-patient prices must be relatively high in order to recover our development and manufacturing costs and achieve and maintain profitability. For Brineura, Naglazyme and Vimizim in particular, we must market worldwide to achieve significant market penetration of the product. In addition, because the number of potential patients in each disease population is small, it is not only important to find patients who begin therapy to achieve significant market penetration of the product, but we also need to be able to maintain these patients on therapy for an extended period of time. Due to the expected costs of treatment for our products, we may be unable to maintain or obtain sufficient market share at a price high enough to justify our product development efforts and manufacturing expenses.

If we fail to obtain and maintain an adequate level of coverage and reimbursement for our products by third-party payers, the sales of our products would be adversely affected or there may be no commercially viable markets for our products.

The course of treatment for patients using our products is expensive. We expect patients to need treatment for extended periods, and for some products throughout the lifetimes of the patients. We expect that most families of patients will not be capable of paying for this treatment themselves. There will be no commercially viable market for our products without coverage and reimbursement from third-party payers. Additionally, even if there is a commercially viable market, if the level of reimbursement is below our expectations, our revenues and gross margin will be adversely affected.

Third-party payers, such as government or private healthcare insurers, carefully review and increasingly challenge the prices charged for drugs. Reimbursement rates from private companies vary depending on the third-party payer, the insurance plan and other factors. Obtaining coverage and adequate reimbursement for our products may be particularly difficult because of the higher prices often associated with drugs administered under the supervision of a physician. Reimbursement systems in international markets vary significantly by country and by region, and reimbursement approvals must be obtained on a country-by-country basis.

Government authorities and other third-party payers are developing increasingly sophisticated methods of controlling healthcare costs, such as by limiting coverage and the amount of reimbursement for particular medications. Increasingly, third-party payers are requiring that drug companies provide them with predetermined discounts from list prices as a condition of coverage, are using restrictive formularies and preferred drug lists to leverage greater discounts in competitive classes, and are challenging the prices charged for medical products. Further, no uniform policy requirement for coverage and reimbursement for drug products exists among third-party payers in the U.S. Therefore, coverage and reimbursement for drug products can differ significantly from payer to payer. As a result, the coverage determination process is often a time-consuming and costly process that will require us to provide scientific and clinical support for the use of our products to each payer separately, with no assurance that coverage and adequate reimbursement will be applied consistently or obtained in the first instance.

We cannot be sure that coverage and reimbursement will be available for any product that we commercialize or will continue to be available for any product that we have commercialized and, if reimbursement is available, what the level of reimbursement will be. Even if favorable coverage and reimbursement status is attained for one or more products for which we receive regulatory approval, less favorable coverage policies and reimbursement rates may be implemented in the future. Coverage and reimbursement may impact the demand for, or the price of, any product candidate for which we obtain marketing approval. If coverage and reimbursement are not available or reimbursement is available only to limited levels, we may not successfully commercialize any product candidate for which we obtain marketing approval or continue to market any product that has already been commercialized.

Reimbursement in the European Union (EU) and many other territories must be negotiated on a country-by-country basis and in many countries the product cannot be commercially launched until pricing and/or reimbursement is approved. The timing to complete the negotiation process in each country is highly uncertain, and in some countries, we expect that it will exceed 12 months. Even after a price is negotiated, countries frequently request or require reductions to the price and other concessions over time.

For our future products, we will not know what the reimbursement rates will be until we are ready to market the product and we actually negotiate the rates. If we are unable to obtain sufficiently high reimbursement rates for our products, they may not be commercially viable or our future revenues and gross margin may be adversely affected.

If we fail to compete successfully with respect to product sales, we may be unable to generate sufficient sales to recover our expenses related to the development of a product program or to justify continued marketing of a product and our revenues could be adversely affected.

Our competitors may develop, manufacture and market products that are more effective or less expensive than ours. They may also obtain regulatory approvals for their products faster than we can obtain them (including those products with orphan drug designation, which may prevent us from marketing our product entirely) or commercialize their products before we do. With respect to valoctocogene roxaparovec, if the product candidate is approved, we will face a highly developed and competitive market for hemophilia A treatments. As we commercialize valoctocogene roxaparovec, if approved, we may face intense competition from large pharmaceutical companies with extensive resources and established relationships in the hemophilia A community. If we do not compete successfully, our revenues would be adversely affected, and we may be unable to generate sufficient sales to recover our expenses related to the development of a product program or to justify continued marketing of a product.

Changes in methods of treatment of disease could reduce demand for our products and adversely affect revenues.

Even if our product candidates are approved, if doctors elect a course of treatment which does not include our products, this decision would reduce demand for our products and adversely affect revenues. For example, if gene therapy becomes widely used as a treatment of genetic diseases, the use of enzyme replacement therapy, such as Aldurazyme, Naglazyme, and Vimizim in MPS diseases, could be greatly reduced. Moreover, if we obtain regulatory approval for valoctocogene roxaparovec, the commercial success of valoctocogene roxaparovec will still depend, in part, on the acceptance of physicians, patients and healthcare payers of gene therapy products in general, and our product candidate in particular, as medically necessary, cost effective and safe. Changes in treatment method can be caused by the introduction of other companies' products or the development of new technologies or surgical procedures which may not directly compete with ours, but which have the effect of changing how doctors decide to treat a disease.

If we fail to develop new products and product candidates or compete successfully with respect to acquisitions, joint ventures, licenses or other collaboration opportunities, our ability to continue to expand our product pipeline and our growth and development would be impaired.

Our future growth and development depend in part on our ability to successfully develop new products from our research and development activities. The development of biopharmaceutical products is very expensive and time intensive and involves a great degree of risk. The outcomes of research and development programs, especially for innovative biopharmaceuticals, are inherently uncertain and may not result in the commercialization of any products.

Our competitors compete with us to attract organizations for acquisitions, joint ventures, licensing arrangements or other collaborations. To date, several of our former and current product programs have been acquired through acquisitions and several of our former and current product programs have been developed through licensing or collaborative arrangements, such as Aldurazyme, Kuvan and Naglazyme. These collaborations include licensing proprietary technology from, and other relationships with, academic research institutions. Our future success will depend, in part, on our ability to identify additional opportunities and to successfully enter into partnering or acquisition agreements for those opportunities. If our competitors successfully enter into partnering arrangements or license agreements with academic research institutions, we will then be precluded from pursuing those specific opportunities. Because each of these opportunities is unique, we may not be able to find a substitute. Several pharmaceutical and biotechnology companies have already established themselves in the field of genetic diseases. These companies have already begun many drug development programs, some of which may target diseases that we are also targeting, and have already entered into partnering and licensing arrangements with academic research institutions, reducing the pool of available opportunities.

Universities and public and private research institutions also compete with us. While these organizations primarily have educational or basic research objectives, they may develop proprietary technology and acquire patents that we may need for the development of our product candidates. We will attempt to license this proprietary technology, if available. These licenses may not be available to us on acceptable terms, if at all. If we are unable to compete successfully with respect to acquisitions, joint venture and other collaboration opportunities, we may be limited in our ability to develop new products and to continue to expand our product pipeline.

The sale of generic versions of Kuvan by generic manufacturers has adversely affected and will continue to adversely affect our revenues and may cause a decline in Kuvan revenues faster than expected.

Generic versions of Kuvan are available in several countries around the world, including multiple generic versions in the U.S. This generic competition has adversely affected and will continue to adversely affect our revenues from Kuvan, and we cannot

accurately predict the rate of decline of Kuvan revenues in these countries. We are also aware that manufacturers are challenging our patent portfolio related to Kuvan in several jurisdictions, and one generic version of Kuvan has been approved by the European Medicines Agency (EMA), although it is not yet commercially available. If these patent challenges are successful, or if a manufacturer chooses to offer a generic version of Kuvan, notwithstanding our existing patents, our revenues may decline faster than expected.

If we do not achieve our projected development goals in the timeframes we announce and expect, the commercialization of our product candidates may be delayed and the credibility of our management may be adversely affected and, as a result, our stock price may 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 trials 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 these milestones can vary dramatically compared to our estimates, in many cases for reasons beyond our control. If we do not meet these milestones as publicly announced, the commercialization of our products may be delayed and the credibility of our management may be adversely affected and, as a result, our stock price may decline.

We have in the past and may in the future enter into licensing arrangements, and we may not realize the benefits of such licensing arrangements.

We have in the past and may in the future enter into licensing arrangements with third parties. It is possible that we may not achieve financial or strategic benefits that justify a specific license, or we may otherwise not realize the benefits of such licensing arrangement. Further, licensing arrangements impose various diligence, milestone and royalty payment and other obligations on us. If we fail to comply with our obligations under any current or future licenses, our licensors may have the right to terminate these license agreements, which could harm our business prospects, financial condition and results of operations. Further, counterparties to our license agreements have in the past and may in the future allege that we have breached a license agreement, which can result in litigation or other disputes that can divert management's attention away from our business and require us to expend resources, as well as potentially having to negotiate new or reinstated licenses with less favorable terms. Any such situation could adversely affect our business, financial condition, and results of operations.

Regulatory Risks

If we fail to obtain regulatory approval to commercially market and sell our product candidates, or if approval of our product candidates is delayed, we will be unable to generate revenues from the sale of these product candidates, our potential for generating positive cash flow will be diminished, and the capital necessary to fund our operations will increase.

We must obtain regulatory approval to market and sell our product candidates. For example, in the U.S., we must obtain Food and Drug Administration (FDA) approval for each product candidate that we intend to commercialize, and in the EU we must obtain approval from the European Commission (EC), based on the opinion of the Committee for Medicinal Products for Human Use of the EMA. The FDA and EC approval processes are typically lengthy and expensive, and approval is never certain. To obtain regulatory approval, we must first show that our product candidates are safe and effective for target indications through preclinical studies and clinical trials. Preclinical studies and clinical development are long, expensive and uncertain processes. Completion of clinical trials may take several years, and failure may occur at any stage of development. The length of time required varies substantially according to the type, complexity, novelty and intended use of a product candidate. Interim results of a preclinical test or clinical trial do not necessarily predict final results, and acceptable results in early clinical trials may not be repeated in later clinical trials. Accordingly, there are no assurances that we will obtain regulatory approval for any of our product candidates. Furthermore, there can be no assurance that approval of one of our product candidates by one regulatory authority will mean that other authorities will also approve the same product candidate. Similarly, regulatory authorities may approve a product candidate for fewer or more limited indications than requested. In addition, regulatory authorities may not approve the labeling claims that are necessary or desirable for the successful commercialization of our product candidates.

We have had fewer interactions with regulatory authorities outside the U.S. and the EU as compared to our interactions with the FDA and EMA. The approval procedures vary among countries and can involve additional clinical testing, and the time required to obtain approval may differ from that required to obtain FDA or EC approval. Moreover, clinical trials conducted in one country may not be accepted by regulatory authorities in other countries. Approval by the FDA or EC does not ensure approval by regulatory authorities in other countries, and approval by one or more non-U.S. regulatory authorities does not ensure approval by regulatory authorities in other non-U.S. countries or by the FDA or EC. However, a failure or delay in obtaining regulatory approval in one country may have a negative effect on the regulatory process in others. The non-U.S. regulatory approval process may include all of the risks associated with obtaining FDA or EC approval. We may not obtain non-U.S. regulatory approvals on a timely basis, if at all. We may not be able to file for regulatory approvals and even if we file, we may not receive necessary approvals to commercialize our product candidates in any market.

We also rely on independent third-party CROs to file some of our non-U.S. marketing applications, and while we keep a close oversight on the activities we delegate to CROs, important aspects of the services performed for us by the CROs are out of our direct control. If we fail to adequately manage our CROs, if the CRO elects to prioritize work on our projects below other projects or if there is any dispute or disruption in our relationship with our CROs, the filing of our applications may be delayed.

Although the FDA and the EMA have programs to facilitate expedited development and accelerated approval processes, the timelines agreed under legislative goals or mandated by regulations are subject to the possibility of substantial delays. Accordingly, even if any of our applications receives a designation to facilitate expedited development and accelerated approval processes, these designations may not result in faster review or approval for our product candidates compared to product candidates considered for approval under conventional procedures and, in any event, do not assure ultimate approval of our product candidates by regulatory authorities. In addition, the FDA, the EMA and other comparable international regulatory authorities have substantial discretion over the approval process for pharmaceutical products. These regulatory agencies may not agree that we have demonstrated the requisite level of product safety and efficacy to grant approval and may require additional data. If we fail to obtain regulatory approval for our product candidates, we will be unable to market and sell those product candidates, which would have a negative effect on our business and financial condition.

We may experience challenges specific to gene therapy that cause significant delays or unanticipated costs, or that cannot be solved. Although numerous companies are currently advancing gene therapy product candidates through clinical trials, the FDA has only approved a very small number of vector-based gene therapy products thus far. Moreover, there are very few approved gene therapy products outside the U.S. As a result, it is difficult to determine how long it will take or how much it will cost to obtain regulatory approvals for our gene therapy product candidates in any jurisdiction. Regulatory requirements governing gene and cell therapy products are still evolving and may continue to change in the future. For example, in October 2020, it was reported that the Director of the Center for Biologics Evaluation and Research, the center of the FDA responsible for reviewing marketing applications for gene therapies, stated that the FDA will assess the importance of durability of effect differently for a gene therapy that treats a disease that has no other available therapies versus a condition for which there are multiple approved treatments. Additionally, in September 2021, the FDA held a Cellular, Tissue, and Gene Therapies Advisory Committee (CTGTAC) to discuss toxicity risks of adeno-associated virus (AAV) vectors for gene therapy and to seek the CTGTAC's insight into strategies to evaluate and mitigate risks in the context of AAV vector-based product design and quality, preclinical studies, and clinical trials. Valoctocogene roxaparvovec and BMN 307 are AAV vector-based product candidates.

Regulatory agencies and the new requirements and guidelines they promulgate may lengthen the regulatory review process, require us to perform additional or larger studies, increase our development costs, lead to changes in regulatory positions and interpretations, delay or prevent approval and commercialization of our treatment candidate or lead to significant post-approval studies, limitations or restrictions. For example, on August 18, 2020, the FDA issued a Complete Response Letter (CRL) to our BLA for valoctocogene roxaparvovec for the treatment of adults with severe hemophilia A. In the CRL, the FDA introduced a new request for two-year follow-up safety and efficacy data on all study participants from our ongoing Phase 3 study of valoctocogene roxaparvovec. In January 2022, we announced results from the requested two-year data analysis from our Phase 3 study. We are planning to meet with the FDA to discuss resubmission of our BLA, including this two-year data analysis. The BLA resubmission is targeted for the second quarter of 2022. If the FDA deems our resubmission to be a complete response to the CRL, we expect the resubmission will be followed by a six-month review procedure by the FDA. With respect to BMN 307, in September 2021, the FDA placed a clinical hold on our PHEarless study. The hold was based on pre-clinical study findings from a model designed to understand the durability of BMN 307 activity in mice bearing two germline mutations, one rendering the mice immunodeficient. Of 63 animals treated, six of seven animals administered BMN 307 at the highest dose group (2e14 Vg/kg) had tumors on liver necropsy 52 weeks after dosing with evidence for integration of portions of AAV vector into the genome. No lesions were observed in any mice at 24 weeks. The clinical significance of these findings is being evaluated to assure safe and appropriate use of BMN 307. To date, we have seen no evidence from our studies or scientific literature indicating these findings are translatable to humans, species other than mice or other gene therapy vectors. The durability study was one of multiple pre-clinical studies we conducted and was not designed to test safety. However, we promptly notified the FDA upon availability of the integration site analysis results. The FDA initiated a clinical hold shortly after being notified, and we announced the hold before the next business day after we were informed of the FDA's decision. In February 2022, the FDA requested data from additional non-clinical studies to assess the theoretical oncogenic risk to human study participants, which is expected to take several quarters. We will communicate next steps for the program when available. Continued delay or failure to obtain, or unexpected costs in obtaining, the regulatory approval necessary to bring our gene therapy product candidates to market could have a negative effect on our business and financial condition. Even if we do obtain regulatory approval, ethical, social and legal concerns about gene therapy arising in the future could result in additional regulations restricting or prohibiting sale of our products.

In addition, some of our product candidates are intended to be used in combination with a medical device, such as an injector or other delivery system or companion diagnostic. Such products may be regulated as "combination products" in the U.S and the EU, which are generally defined as products consisting of components from two or more regulatory categories (e.g., drug/device, device/biologic, drug/biologic). In the U.S., each component of a combination product is subject to the requirements established by the FDA for that type of component, whether a new drug, biologic or device. In order to facilitate pre-market review of combination products, the FDA designates one of its centers to have primary jurisdiction for the pre-market review and regulation of the overall product based upon a determination by the FDA of the primary mode of action of the combination product. The determination whether a product is a combination product or two separately regulated products is made by the FDA on a case-by-

case basis. In the EU, if a device intended to administer a medicinal product is sold together with such medicinal product in such a way that they form a single integral product which is intended exclusively for use in the given combination and which is not reusable, that single integral product is regulated as a medicinal product. In addition, the relevant general safety and performance requirements established for medical devices by EU medical devices legislation apply to the device component of such combination products. Our product candidates intended for use with separately regulated devices, or expanded indications that we may seek for our products used with such devices, may not be approved or may be substantially delayed in receiving approval if the devices do not gain and/or maintain their own regulatory approvals or clearances. Where approval of the drug or biologic product and device is sought under a single application, the increased complexity of the review process may delay approval. The FDA review process and criteria are not well-established areas, which could also lead to delays in the approval process. In addition, because these devices are provided by unaffiliated third-party companies, we are dependent on the sustained cooperation and effort of those third-party companies both to obtain regulatory approval and to maintain their own regulatory compliance. Failure of third-party companies to assist in the approval process or to maintain their own regulatory compliance could delay or prevent approval of our product candidates, or limit our ability to sell a product once it is approved.

From time to time during the development and regulatory approval process for our products and product candidates, we engage in discussions with the FDA, the EMA and other comparable international regulatory authorities regarding our development programs, including discussions about the regulatory requirements for approval. As part of these discussions, we sometimes seek advice in the design of our clinical programs from various regulatory agencies globally, but we do not always follow such guidance. This increases the chance of adverse regulatory actions, but we try to always provide appropriate scientific evidence to support approval. Moreover, sometimes different regulatory agencies provide different or conflicting advice. While we attempt to harmonize the advice we receive from multiple regulatory authorities, it is not always practical to do so. Also, we may choose not to harmonize conflicting advice when harmonization would significantly delay clinical trial data or is otherwise inappropriate. If we are unable to effectively and efficiently resolve and comply with the inquiries and requests of the FDA, the EMA and other comparable international regulatory authorities, the approval of our product candidates may be delayed and their value may be reduced.

Any product for which we have obtained regulatory approval, or for which we obtain approval in the future, is subject to, or will be subject to, extensive ongoing regulatory requirements by the FDA, the EMA and other comparable international regulatory authorities, and if we fail to comply with regulatory requirements or if we experience unanticipated problems with our products, we may be subject to penalties, we will be unable to generate revenues from the sale of such products, our potential for generating positive cash flow will be diminished, and the capital necessary to fund our operations will be increased.

Aldurazyme, Brineura, Kuvan, Naglazyme and Vimizim have received regulatory approval to be commercially marketed and sold in the U.S., the EU and certain other countries. Palynziq has received regulatory approval to be commercially marketed in the U.S., the EU, and Australia. Voxzogo has received regulatory approval to be commercially marketed in the U.S., the EU, and Brazil. Any product for which we have obtained regulatory approval, or for which we obtain regulatory approval in the future, along with the manufacturing processes and practices, post-approval clinical research, product labeling, advertising and promotional activities for such product, are subject to continual requirements of, and review by, the FDA, the EMA and other comparable international regulatory authorities. These requirements include submissions of safety and other post-marketing information and reports, registration and listing requirements, current good manufacturing practices (cGMP) requirements relating to manufacturing, quality control, quality assurance and corresponding maintenance of records and documents, import and export requirements and record keeping.

An example of the ongoing regulatory requirements our products are subject to is the Palynziq Risk Evaluation and Mitigation Strategy (REMS) program. In the U.S., Palynziq is only available through the REMS program, which is required by the FDA to mitigate the risk of anaphylaxis while using the product. Notable requirements of our REMS program include the following:

- prescribers must be certified by enrolling in the REMS program and completing training;
- prescribers must prescribe auto-injectable epinephrine with Palynziq;
- pharmacies must be certified with the REMS program and must dispense Palynziq only to patients who are authorized to receive it;
- patients must enroll in the REMS program and be educated about the risk of anaphylaxis by a certified prescriber to ensure they understand the risks and benefits of treatment with Palynziq; and
- patients must have auto-injectable epinephrine available at all times while taking Palynziq.

Failure of prescribers, pharmacies or patients to enroll in our REMS program or to successfully complete and comply with its requirements may result in regulatory action from the FDA or decreased sales of Palynziq. The restrictions and requirements under our REMS program, as well as potential changes to these restrictions and requirements in the future, subject us to increased risks and uncertainties, any of which could harm our business. The requirement for a REMS program can materially affect the potential market for and profitability of a drug. We cannot predict whether the FDA will request, seek to require or ultimately require modifications to, or impose additional requirements on, the Palynziq REMS program, or whether the FDA will permit modifications to the Palynziq REMS program that we consider warranted. Any modifications required or rejected by the FDA could make it more

difficult or expensive for us to distribute Palynziq in the U.S., impair the safety profile of Palynziq, disrupt continuity of care for Palynziq patients and/or negatively affect sales of Palynziq.

Moreover, promotional communications with respect to prescription drugs, including biologics, are subject to a variety of legal and regulatory restrictions and must be consistent with the information in the product's approved labeling. In particular, a product may not be promoted for uses that are not approved by the FDA or the EC as reflected in the product's approved labeling. Although the FDA and other comparable international regulatory authorities do not regulate a physician's choice of drug treatment made in the physician's independent medical judgment, they do restrict promotional communications from companies or their sales force with respect to off-label uses of products for which marketing clearance has not been issued. The FDA and other national competent authorities or international regulatory agencies actively enforce the laws and regulations prohibiting the promotion of off-label uses, and a company that is found to have improperly promoted off-label uses may be subject to significant civil, criminal and administrative penalties. Thus, we will not be able to promote any products we develop for indications or uses for which they are not approved. Additionally, in the EU, it is prohibited to promote prescription drugs to the general public and we are therefore limited to promote our products exclusively to healthcare professionals.

Moreover, if original FDA approval for one of our product candidates is granted via the accelerated approval pathway, we will be required to conduct a post-marketing confirmatory trial to verify and describe the clinical benefit in support of full approval. An unsuccessful post-marketing study or failure to complete such a study with due diligence could result in the withdrawal of the FDA's marketing approval for a product candidate. For example, Voxzogo is approved in the U.S. under accelerated approval based on an improvement in annualized growth velocity. Continued approval for this indication may be contingent upon verification and description of clinical benefit in confirmatory studies. To fulfill this post-marketing requirement, we intend to use our ongoing open-label extension studies compared to available natural history. In addition, the FDA and the EC often require post-marketing testing and surveillance to monitor the effects of products. The FDA, the EMA and other comparable international regulatory agencies may condition approval of our product candidates on the completion of such post-marketing clinical studies. These post-marketing studies may suggest that a product causes undesirable side effects or may present a risk to the patient.

Discovery after approval of previously unknown problems with any of our products, manufacturers or manufacturing processes, or failure to comply with regulatory requirements, may result in actions such as:

- restrictions on our ability to conduct clinical trials, including full or partial clinical holds on ongoing or planned trials;
- restrictions on product manufacturing processes;
- restrictions on the marketing of a product;
- restrictions on product distribution;
- requirements to conduct post-marketing clinical trials;
- untitled or warning letters or other adverse publicity;
- withdrawal of the products from the market;
- refusal to approve pending applications or supplements to approved applications that we submit;
- recall of products;
- refusal to permit the import or export of our products;
- product seizure;
- fines, restitution or disgorgement of profits or revenue;
- injunctions; or
- imposition of civil or criminal penalties.

If such regulatory actions are taken, our value and our operating results will be adversely affected. Additionally, if the FDA, the EMA or any other comparable international regulatory authorities withdraws its approval of a product, we will be unable to generate revenues from the sale of that product in the relevant jurisdiction, our potential for generating positive cash flow will be diminished and the capital necessary to fund our operations will be increased. Accordingly, we continue to expend significant time, money and effort in all areas of regulatory compliance, including manufacturing, production, product surveillance, post-marketing studies and quality control.

To obtain regulatory approval to market our products, preclinical studies and costly and lengthy clinical trials are required and the results of the studies and trials are highly uncertain. Likewise, preliminary, initial or interim data from

clinical trials should be considered carefully and with caution because the final data may be materially different from the preliminary, initial or interim data, particularly as more patient data become available.

As part of the drug development process we must conduct, at our own expense, preclinical studies in the laboratory, including studies in animals, and clinical trials on humans for each product candidate. The number of preclinical studies and clinical trials that regulatory authorities require varies depending on the product candidate, the disease or condition the drug is being developed to address and regulations applicable to the particular drug. Generally, new drugs for diseases or conditions that affect larger patient populations, are less severe, or are treatable by alternative strategies must be validated through additional preclinical and clinical trials and/or clinical trials with higher enrollments. With respect to our early stage product candidates, we may need to perform multiple preclinical studies using various doses and formulations before we can begin clinical trials, which could result in delays to our development timeline. Furthermore, even if we obtain favorable results in preclinical studies, the results in humans may be significantly different. After we have conducted preclinical studies, we must demonstrate that our product candidates are safe and efficacious for use in the targeted human patients in order to receive regulatory approval for commercial sale. Clinical testing is expensive and can take many years to complete, and its outcome is inherently uncertain. Failure can occur at any time during the clinical trial process. The results of preclinical studies and early clinical trials of our product candidates may not be predictive of the results of later-stage clinical trials, and favorable data from interim analyses do not ensure the final results of a trial will be favorable. From time to time, we have and may in the future publish or report preliminary, initial or interim data from our clinical trials. Preliminary, initial or interim data from our clinical trials may not be indicative of the final results of the trial and are subject to the risk that one or more of the clinical outcomes may materially change as patient enrollment continues and/or more patient data become available. In this regard, such data may show initial evidence of clinical benefit, but as patients continue to be followed and more patient data become available, there is a risk that any therapeutic effects will not be durable in patients and/or will decrease over time or cease entirely. Preliminary, initial or interim data also remain subject to audit and verification procedures that may result in the final data being materially different from such preliminary, initial or interim data. As a result, preliminary, initial or interim data should be considered carefully and with caution until the final data are available.

Product candidates may fail to show the desired safety and efficacy traits despite having progressed through preclinical studies and initial clinical trials, or despite having favorable data in connection with an interim analysis. A number of companies in the biopharmaceutical industry have suffered significant setbacks in advanced clinical trials due to lack of efficacy or adverse safety profiles, notwithstanding promising results in earlier trials. Also, as noted above, we do not always follow the advice of regulatory authorities or comply with all of their requests regarding the design of our clinical programs. In those cases, we may choose a development program that is inconsistent with the advice of regulatory authorities, which may limit the jurisdictions where we conduct clinical trials and/or adversely affect our ability to obtain approval in those jurisdictions where we do not follow the regulatory advice.

Adverse or inconclusive clinical results could stop us from obtaining regulatory approval of our product candidates. Additional factors that can cause delay or termination of our clinical trials include:

- slow or insufficient patient enrollment;
- slow recruitment of, and completion of necessary institutional approvals at, clinical sites;
- budgetary constraints or prohibitively high clinical trial costs;
- longer treatment time required to demonstrate efficacy;
- lack of sufficient supplies of the product candidate;
- adverse medical events or side effects in treated patients, including immune reactions;
- lack of effectiveness of the product candidate being tested;
- availability of competitive therapies to treat the same indication as our product candidates;
- regulatory requests for additional clinical trials or preclinical studies;
- deviations in standards for Good Clinical Practice (GCP); and
- disputes with or disruptions in our relationships with clinical trial partners, including CROs, clinical laboratories, clinical sites, and principal investigators.

Moreover, principal investigators for our clinical trials may serve as scientific advisors or consultants to us from time to time and receive compensation in connection with such services reportable to the FDA or other regulatory authority. If the FDA or other regulatory authority concludes that a financial relationship between us and a principal investigator has created a conflict of interest, the FDA or other regulatory authority may question the integrity of the data generated at the applicable clinical trial site and the utility of the clinical trial itself may be jeopardized.

Similar rules governing clinical trials to those in place in the U.S. apply in the EU. Since January 31, 2022, a new Clinical Trials Regulation (CTR) is fully in force in the EU. The CTR was adopted with a view to introducing a more uniform set of the rules across the EU for the authorization of clinical trials. The relevant procedures have now been streamlined with a view to facilitating a

swifter and more seamless authorization and deployment of multi-center trials occurring in more than one EU Member State. However, such authorization still involves the national regulatory authorities and Ethics Committees of each of the EU Member States where the trial is to be conducted. The CTD will continue to apply in parallel to the CTR for a transitional period. This means that clinical trials in the EU can currently be conducted in accordance with the requirements of the CTD, as implemented in national law by each EU Member State, or the CTR, as applicable, as well as applicable good clinical practice standards.

Government price controls or other changes in pricing regulation could restrict the amount that we are able to charge for our current and future products, which would adversely affect our revenues and results of operations.

We expect that coverage and reimbursement may be increasingly restricted in all the markets in which we sell our products. The escalating cost of healthcare has led to increased pressure on the healthcare industry to reduce costs. In particular, drug pricing by pharmaceutical companies has recently come under increased scrutiny and continues to be subject to intense political and public debate in the U.S. and abroad. Governmental and private third-party payers have proposed healthcare reforms and cost reductions. A number of federal and state proposals to control the cost of healthcare, including the cost of drug treatments, have been made in the U.S. Specifically, there have been several recent U.S. congressional inquiries and proposed bills and enacted legislation designed to, among other things, bring more transparency to drug pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drugs. Further, Congress and the executive branch have each indicated that they will continue to seek new legislative and/or administrative measures to control drug costs. In some international markets, the government controls the pricing, which can affect the profitability of drugs. Current government regulations and possible future legislation regarding healthcare may affect coverage and reimbursement for medical treatment by third-party payers, which may render our products not commercially viable or may adversely affect our future revenues and gross margins.

International operations are also generally subject to extensive price and market regulations, and there are many proposals for additional cost-containment measures, including proposals that would directly or indirectly impose additional price controls or mandatory price cuts or reduce the value of our intellectual property portfolio. As part of these cost containment measures, some countries have imposed and continue to propose revenue caps limiting the annual volume of sales of our products. Some of these caps are significantly below the actual demand in certain countries, and if the trend regarding revenue caps continues, our future revenues and gross margins may be adversely affected. For example, in the EU, governments influence the price of medicinal products through their pricing and reimbursement rules and control of national healthcare systems that fund a large part of the cost of those products to consumers. EU Member States are free 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. Some jurisdictions operate positive and negative list systems under which products may only be marketed once a reimbursement price has been agreed to by the government. An EU 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, including volume-based arrangements, caps and reference pricing mechanisms. Other EU Member States allow companies to fix their own prices for medicines but monitor and control company profits. The downward pressure on healthcare costs in general, particularly prescription medicines, has become very intense. Pharmaceutical products may face competition from lower-priced products in foreign countries that have placed price controls on pharmaceutical products and may also compete with imported foreign products. Furthermore, there is no assurance that a product will be considered medically reasonable and necessary for a specific indication, will be considered cost-effective by third-party payors, that an adequate level of reimbursement will be established even if coverage is available or that the third-party payors' reimbursement policies will not adversely affect our business.

We cannot predict the extent to which our business may be affected by these or other potential future legislative or regulatory developments. However, future price controls or other changes in pricing regulation or negative publicity related to our product pricing or the pricing of pharmaceutical drugs generally could restrict the amount that we are able to charge for our current and future products or our sales volume, which would adversely affect our revenues and results of operations.

Government healthcare reform could increase our costs and adversely affect our revenues and results of operations.

Our industry is highly regulated and changes in law may adversely impact our business, operations or financial results. In the U.S., there have been and continue to be a number of legislative initiatives to contain healthcare costs. For example, the Patient Protection and Affordable Care Act of 2010, as amended by the Health Care and Education Reconciliation Act of 2010 (collectively, the PPACA) is a sweeping measure intended to, among other things, expand healthcare coverage within the U.S., primarily through the imposition of health insurance mandates on employers and individuals and expansion of the Medicaid program. Several provisions of the law have affected us and increased certain of our costs. Since its enactment, there have been executive, judicial and congressional challenges to certain aspects of the PPACA. Although the PPACA has generally been upheld thus far, it is unclear how continued challenges to the law may impact the PPACA and our business. In addition, other legislative changes have been adopted since the PPACA was enacted. Some of these changes have resulted in additional reductions in Medicare and other healthcare funding, which could have a material adverse effect on our customers and, accordingly, our financial operations.

We anticipate that the PPACA, as well as other healthcare reform measures that may be adopted in the future in the U.S. or abroad, may result in more rigorous coverage criteria and an additional downward pressure on the reimbursement our customers may receive for our products. Recently there has been heightened governmental scrutiny in countries worldwide over the manner in which manufacturers set prices for their marketed products.

In the U.S., there have been several recent congressional inquiries, proposed and enacted federal and state legislation, and executive action designed to, among other things, bring more transparency to drug pricing, review the relationship between pricing and manufacturer patient programs, reduce the cost of drugs under Medicare, and reform government program reimbursement methodologies for drug products. Any reduction in reimbursement from Medicare and other government programs may result in a similar reduction in payments from private payers. In addition, individual states in the U.S. have also increasingly passed legislation and implemented regulations designed to control pharmaceutical product pricing, including price or patient reimbursement constraints, price disclosure and reporting requirements, 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. Moreover, regional healthcare authorities and individual hospitals are increasingly using bidding procedures to determine what pharmaceutical products and which suppliers will be included in their prescription drug and other healthcare programs. Further, it is possible that additional governmental action is taken in response to the COVID-19 pandemic.

Likewise, in many EU Member States, legislators and other policymakers continue to propose and implement healthcare cost-containing measures in response to the increased attention being paid to healthcare costs in the EU. Certain of these changes could impose limitations on the prices we will be able to charge for our products and any approved product candidates or the amounts of reimbursement available for these products from governmental and private third-party payers, may increase the tax obligations on pharmaceutical companies or may facilitate the introduction of generic competition with respect to our products. Further, an increasing number of EU Member States and other non-U.S. countries use prices for medicinal products established in other countries as "reference prices" to help determine the price of the product in their own territory. If the price of one of our products decreases substantially in a reference price country, it could impact the price for that product in other countries. Consequently, a downward trend in prices of our products in some countries could contribute to similar downward trends elsewhere, which would have a material adverse effect on our revenues and results of operations. Moreover, in order to obtain reimbursement for our products in some countries, we may be required to conduct clinical trials that compare the cost-effectiveness of our products to other available therapies.

Legally mandated price controls on payment amounts by governmental and private third-party payers or other restrictions could harm our business, results of operations, financial condition and prospects. 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 fail to obtain or maintain orphan drug exclusivity for some of our products, our competitors may obtain approval to sell the same drugs to treat the same conditions and our revenues will be reduced.

As part of our business strategy, we have developed and may in the future develop some drugs that may be eligible for FDA and EU orphan drug designation. Under the Orphan Drug Act, the FDA may designate a product as an orphan drug if it is intended to treat a rare disease or condition, defined as a patient population of fewer than 200,000 in the U.S. In the EU, pursuant to the Orphan Regulation, orphan drug designation is available if a sponsor can establish that: (1) the medicine is intended for the diagnosis, prevention or treatment of a life-threatening or chronically debilitating condition affecting no more than five in 10,000 people in the EU at the time the application is made, or, (2) that it is intended for the diagnosis, prevention or treatment of a life-threatening, seriously debilitating or serious and chronic condition in the EU and that without incentives derived from the orphan status, it is unlikely that the marketing of the medicine in the EU would generate sufficient return to justify the necessary investment. In both cases, the applicant must demonstrate that there exists no satisfactory method of diagnosis, prevention or treatment of the condition in question that has been authorized in the EU or, if such method exists, the medicine will be of significant benefit to those affected by that condition.

In the U.S., the company that first obtains FDA approval for a designated orphan drug for a given rare disease receives marketing exclusivity for use of that drug for the stated condition for a period of seven years. Orphan drug exclusive marketing rights may be lost if the FDA later determines that the request for designation was materially defective or if the manufacturer is unable to assure sufficient quantity of the drug. In addition, the FDA may approve another drug during a period of orphan drug exclusivity if the second drug is found to be clinically superior to the first drug. In the EU, a ten-year period of market exclusivity (extendable to twelve years for orphan drugs that have complied with an agreed Pediatric Investigation Plan (PIP) pursuant to Regulation 1901/2006), during which similar medicines for the same indication cannot be placed on the market, is granted. MAs may also be granted to a similar medicinal product with the same orphan indication if: (i) the applicant can establish that the second medicinal product, although similar to the orphan medicinal product already authorized is safer, more effective or otherwise clinically superior to the orphan medicinal product already authorized; (ii) the MA holder for the first orphan medicinal product grants its consent; or (iii) if the MA holder of the orphan medicinal product is unable to supply sufficient quantities. The period of market exclusivity may, in addition, be reduced to six years if, at the end of the fifth year, it can be demonstrated on the basis of available evidence that the criteria for its designation as an orphan medicine are no longer satisfied, for example if the original orphan medicinal product has become sufficiently profitable not to justify maintenance of market exclusivity. Because the extent

and scope of patent protection for some of our products is limited, orphan drug designation is especially important for our products that are eligible for orphan drug designation. For eligible products, we plan to rely on the exclusivity period under the Orphan Drug Act and/or the Orphan Regulation, as applicable, to maintain a competitive position. If we do not obtain orphan drug exclusivity for our products that do not have broad patent protection, our competitors may then sell the same drug to treat the same condition and our revenues will be reduced.

Even though we have obtained orphan drug designation for certain of our product candidates and even if we obtain orphan drug designation for our future product candidates, due to the uncertainties associated with developing biopharmaceutical products, we may not be the first to obtain marketing approval for any particular orphan indication, which means that we may not obtain orphan drug exclusivity and could also potentially be blocked from approval of certain product candidates until the competitor product's orphan drug exclusivity period expires. Moreover, with respect to certain biologics and gene therapies, there may be some uncertainty regarding how similarity between product candidates designed to treat the same rare disease or condition may affect such product candidates' orphan drug exclusivities. For biologics and gene therapies, the FDA's determination of whether a drug is the same drug or a different drug will be based on the principal molecular structural features of the products. For gene therapy products, the FDA has stated in guidance that it generally intends to consider certain key features such as transgenes and vectors used in gene therapy products to be principal molecular structural features. Further, even if we obtain orphan drug exclusivity for a product, that exclusivity may not effectively protect the product from competition because different drugs can be approved for the same condition and the same drug can be approved for different conditions and potentially used off-label in the orphan indication. Even after an orphan drug is approved and granted orphan drug exclusivity, the FDA can subsequently approve the same drug for the same condition if the FDA concludes that the later drug is safer or more effective or makes a major contribution to patient care. Orphan drug designation neither shortens the development time or regulatory review time of a drug, nor gives the drug any advantage in the regulatory review or approval process.

We may face competition from biosimilars approved through an abbreviated regulatory pathway.

Our Aldurazyme, Brineura, Naglazyme, Palynziq and Vimizim products are regulated by the FDA as biologics under the Federal Food, Drug, and Cosmetic Act and the Public Health Service Act (the PHS Act). Biologics require the submission of a BLA and approval by the FDA prior to being marketed in the U.S. The Biologics Price Competition and Innovation Act of 2009 (BPCIA) created a regulatory pathway under the PHS Act for the abbreviated approval of biological products that are demonstrated to be "biosimilar" or "interchangeable" with an FDA-approved biological product. A similar abridged MA process is available to biosimilar products in the EU. In particular, applicants for MAs of biosimilars are required to demonstrate through comprehensive comparability studies with the reference biological medicine that: a) their biological medicine is highly similar to the reference medicine, notwithstanding natural variability inherent to all biological medicines; and b) there are no clinically meaningful differences between the biosimilar and the reference medicine in terms of safety, quality and efficacy.

In the U.S., in order to meet the standard of interchangeability, a sponsor must demonstrate that the biosimilar product can be expected to produce the same clinical result as the reference product, and for a product that is administered more than once, that the risk of switching between the reference product and biosimilar product is not greater than the risk of maintaining the patient on the reference product. The BPCIA establishes a period of 12 years of exclusivity for reference products. In the EU, a medicinal product containing a new active substance benefits from eight years of data exclusivity, during which biosimilar applications referring to the data of that product may not be accepted by the regulatory authorities, and a further two years of market exclusivity, during which such biosimilar products may not be placed on the market. The two-year period may be extended to three years if during the first eight years a new therapeutic indication with significant clinical benefit over existing therapies is approved. Our products approved under BLAs in the U.S. or as a result of Marketing Authorization Applications (MAAs) in the EU, as well as our product candidates that may be approved in the future, could be reference products for biosimilar marketing applications.

Changes in funding for the FDA, the EMA, other comparable international regulatory authorities and other government agencies or government shutdowns could hinder the ability of such agencies to hire and retain key leadership and other personnel or otherwise prevent those agencies from performing normal functions on which the operation of our business may rely, which could negatively impact our business.

Changes in funding levels of government agencies can affect their ability to hire and retain key personnel and carry out their normal functions that support our business. For example, the ability of the FDA or the EMA to timely review and approve INDs or MAAs for our product candidates may be hindered by a lack of resources and qualified personnel. In addition, funding of other government agencies on which our operations rely, including those that fund research and development activities, is subject to the political budget process, which is inherently fluid and unpredictable.

Government shutdowns could also impact the ability of government agencies to function normally and support our operations. For example, the U.S. federal government has shut down repeatedly since 1980, including for a period of 35 days beginning on December 22, 2018. During a shutdown, certain regulatory agencies, such as the FDA, have had to furlough key personnel 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.

Risks Related to Valoctocogene Roxaparovec

Our valoctocogene roxaparovec program is based on a gene therapy approach, which, as a novel technology, presents additional development and treatment risks in relation to our other, more traditional drug development programs.

In addition to the risks set forth in this Risk Factors section associated with developing more traditional pharmaceutical drugs, there are additional, unique development and treatment risks associated with gene therapy products like our product candidate valoctocogene roxaparovec. The goal of gene therapy is to be able to correct an inborn genetic defect through administration of therapeutic genetic material containing non-defective gene copies. The gene copies are designed to reside permanently in a patient, allowing the patient to produce an essential protein or ribonucleic acid (RNA) molecule that a healthy person would normally produce. There is a risk, however, that the new gene copies will produce too little or too much of the desired protein or RNA. Although administration of a gene therapy product like our product candidate valoctocogene roxaparovec is intended to correct an inborn genetic defect for at least several years, there is a risk that the therapeutic effect will not be durable and production of the desired protein or RNA will decrease more quickly or cease entirely earlier than expected. If the therapeutic effect decreases significantly or ceases entirely, it is uncertain whether redosing is possible or would be effective. Furthermore, because gene therapy treatment is irreversible, there may be challenges in managing side effects, particularly those caused by potential overproduction of the desired protein. Adverse effects would not be able to be reversed or relieved by stopping dosing, and we may have to develop additional clinical safety procedures. Furthermore, because the new gene copies are designed to reside permanently in a patient, there is a risk that they will disrupt other normal biological molecules and processes, including other healthy genes, and we may not learn the nature and magnitude of these side effects until long after clinical trials have been completed.

As compared to our other, more traditional products, our gene therapy product candidate valoctocogene roxaparovec, if approved, may present additional problems with respect to the pricing, coverage, and reimbursement and acceptance of the product candidate.

In addition to the risks set forth in this Risk Factors section associated with commercializing more traditional pharmaceutical drugs, there are additional, unique commercial risks associated with gene therapy products like our product candidate valoctocogene roxaparovec. Due to the relative novelty of gene therapy and the potential to provide extended duration therapeutic treatment with a one-time administration, we face uncertainty with respect to the pricing, coverage and reimbursement of valoctocogene roxaparovec, if approved. In order to recover our research and development costs and commercialize this one-time treatment on a profitable basis, we expect the cost of a single administration of valoctocogene roxaparovec to be substantial. Therefore, we expect that coverage and reimbursement by governments and other third-party payers will be essential for the vast majority of patients to be able to afford valoctocogene roxaparovec. Accordingly, sales of valoctocogene roxaparovec, if approved, will depend substantially, both domestically and internationally, on the extent to which its cost will be paid by third-party payers. Even if coverage is provided, the reimbursement amounts approved by third-party payers may not be high enough to allow us to realize sufficient revenues from our investment in the development of valoctocogene roxaparovec.

We also face uncertainty as to whether gene therapy will gain the acceptance of the public or the medical community. Even if we obtain regulatory approval for valoctocogene roxaparovec, the commercial success of valoctocogene roxaparovec will depend, in part, on the acceptance of physicians, patients and third-party payers of gene therapy products in general, and our product candidate in particular, as medically necessary, cost-effective and safe. In particular, our success will depend upon physicians prescribing our product candidate in lieu of existing treatments they are already familiar with and for which greater clinical data may be available. Moreover, physicians and patients may delay acceptance of valoctocogene roxaparovec until the product candidate has been on the market for a certain amount of time. Negative public opinion or more restrictive government regulations could have a negative effect on our business and financial condition and may delay or impair the successful commercialization of, and demand for, valoctocogene roxaparovec.

We have implemented data access plans for our main clinical trials of valoctocogene roxaparovec, which restrict our management's review of emerging key efficacy data from these trials. Without access to this ongoing data, management does not have the ability to adjust the trials based on such emerging data, which could adversely impact the ultimate outcome of these trials.

In order to preserve the scientific integrity of our main valoctocogene roxaparovec clinical trials and to allow us to only report on data at intervals that we believe will be meaningful to investors, we have implemented data access plans related to these ongoing open label trials, which is designed to significantly mirror blinded trials. Pursuant to the plans, the ongoing emerging data for key endpoints are generally not accessed by us, with the exception that certain specific data points are reviewed by a small group of medical personnel monitoring and managing the trials, and then, only to the extent necessary to allow them to perform their monitoring responsibilities. As we disclose and publicly discuss prior data from one of these trials, such discussions do not incorporate any of the currently emerging data that are being collected and reviewed by personnel monitoring the trial and, accordingly, this prior data may differ significantly from more recent data that are only available to such personnel. Further, because our management does not have access to any of the ongoing key efficacy data and does not have the ability to adjust the trials based on such emerging data, the data access plans could adversely impact the ultimate outcome of the trials.

Financial and Financing Risks

If we continue to incur operating losses or are unable to sustain positive cash flows for a period longer than anticipated, we may be unable to continue our operations at planned levels and be forced to reduce our operations.

Since we began operations in March 1997, we have been engaged in substantial research and development and capital investments, and we have operated at a net loss for each year since our inception, with the exception of 2008, 2010 and 2020. Our future profitability and cash flows depend on our marketing and selling of our products, the receipt of regulatory approval of our product candidates, our ability to successfully manufacture and market any products, either by ourselves or jointly with others, our spending on our development programs, the impact of any possible future business development transactions and other risks set forth in this Risk Factors section. The extent of our future losses and the timing of profitability and positive cash flows are highly uncertain. If we fail to become profitable or are unable to sustain profitability and positive cash flows on a continuing basis, then we may be unable to continue our operations at planned levels and be forced to reduce our operations.

If we fail to obtain the capital necessary to fund our operations, our financial results and financial condition will be adversely affected and we will have to delay or terminate some or all of our product development programs.

As of December 31, 2021, we had cash, cash equivalents and investments totaling \$1.5 billion and debt obligations of \$1.1 billion (undiscounted), which consisted of our 0.599% senior subordinated convertible notes due in 2024 (the 2024 Notes) and our 1.25% senior subordinated convertible notes due in 2027 (the 2027 Notes). The 2024 Notes and the 2027 Notes (collectively, the Notes), if not converted, will be required to be repaid in cash at maturity in August 2024 and May 2027, respectively. We will need cash not only to pay the ongoing interest due on the Notes during their term, but also to repay the principal amount of the Notes if not converted.

In January 2016, we terminated our License and Commercialization Agreement with Ares Trading, S.A. (Merck Serono). Pursuant to the Termination and Transition Agreement related to Kuvan and the Termination Agreement related to Palynziq, we are obligated to make certain payments to Merck Serono if sales and development milestones are achieved. The remaining milestone payments that may become payable include up to a maximum of €60 million, in cash, if future sales milestones are met with respect to Kuvan and Palynziq.

We may require additional financing to fund the repayment of the Notes, future milestone payments and our future operations, including the commercialization of our products and product candidates currently under development, preclinical studies and clinical trials, and potential licenses and acquisitions. We may be unable to raise additional financing due to a variety of factors, including our financial condition, the status of our product programs, and the general condition of the financial markets. If we fail to raise any necessary additional financing we may have to delay or terminate some or all of our product development programs and our financial condition and operating results will be adversely affected.

We expect to continue to spend substantial amounts of capital for our operations for the foreseeable future. The amount of capital we will need depends on many factors, including:

- our ability to successfully market and sell our products;
- the time and cost necessary to develop commercial manufacturing processes, including quality systems, and to build or acquire manufacturing capabilities the progress and success of our preclinical studies and clinical trials (including studies and the manufacture of materials);
- the timing, number, size and scope of our preclinical studies and clinical trials;
- the time and cost necessary to obtain regulatory approvals and the costs of post-marketing studies which may be required by regulatory authorities;
- the progress of research programs carried out by us;
- our possible achievement of development and commercial milestones under agreements with third parties, such as the Kuvan and Palynziq milestones under the termination agreements with Merck Serono;
- any changes made to, or new developments in, our existing collaborative, licensing and other commercial relationships or any new collaborative, licensing and other commercial relationships that we may establish;
- Sanofi's (formerly referred to as Sanofi Genzyme) ability to continue to successfully commercialize Aldurazyme; and
- whether our convertible debt is converted to common stock in the future.

Moreover, our fixed expenses such as rent, license payments, interest expense and other contractual commitments are substantial and may increase in the future. These fixed expenses may increase because we may enter into:

- additional licenses and collaborative agreements;
- additional contracts for product manufacturing; and
- additional financing facilities or arrangements.

We will need to raise additional funds from equity or debt securities, loans or collaborative agreements if we are unable to satisfy our liquidity requirements. The sale of additional equity and/or equity-linked securities will result in additional dilution to our stockholders. Furthermore, additional financing may not be available in amounts or on terms satisfactory to us or at all. This could result in the delay, reduction or termination of our research, which could harm our business.

We have incurred substantial indebtedness that may decrease our business flexibility, access to capital, and/or increase our borrowing costs, which may adversely affect our operations and financial results.

As of December 31, 2021, we had \$1.1 billion (undiscounted) principal amount of indebtedness, including \$495.0 million (undiscounted) principal amount of indebtedness under the 2024 Notes and \$600.0 million (undiscounted) principal amount of indebtedness under the 2027 Notes. In October 2018, we also entered into an unsecured credit agreement (the 2018 Credit Facility) with Bank of America, N.A., as the administrative agent, swingline lender and a lender, Citibank, N.A. as letter of credit issuer and each of Merrill Lynch, Pierce, Fenner & Smith Incorporated, Citibank, N.A. and Wells Fargo Securities, LLC as joint lead arrangers and joint bookrunners, providing up to \$200.0 million in revolving loan commitments. In May 2021, we amended the 2018 Credit Agreement to, among other things, extend the maturity date of the revolving credit facility from October 18, 2021 to May 28, 2024. Our indebtedness may:

- limit our ability to borrow additional funds for working capital, capital expenditures, acquisitions or other general business purposes;
- limit our ability to use our cash flow or obtain additional financing for future working capital, capital expenditures, acquisitions or other general business purposes;
- require us to use a substantial portion of our cash flow from operations to make debt service payments;
- limit our flexibility to plan for, or react to, changes in our business and industry;
- place us at a competitive disadvantage compared to our less leveraged competitors; and
- increase our vulnerability to the impact of adverse economic and industry conditions.

In addition, the 2018 Credit Facility contains, and any future indebtedness that we may incur may contain, financial and other restrictive covenants that limit our ability to operate our business, raise capital or make payments under our other indebtedness. If we fail to comply with these covenants or to make payments under our indebtedness when due, then we would be in default under that indebtedness, which could, in turn, result in that and our other indebtedness becoming immediately payable in full. If we default under the 2018 Credit Facility, the outstanding borrowings thereunder could become immediately due and payable, the 2018 Credit Facility lenders could refuse to permit additional borrowings under the facility, or it could lead to defaults under agreements governing our current or future indebtedness, including the indentures governing the Notes. If we default under any of the Notes, such Notes could become immediately due and payable and it could lead to defaults under the other Notes and/or the 2018 Credit Facility.

In addition, our ability to refinance our indebtedness will depend on the capital markets and our financial condition at such time.

Our outstanding indebtedness consists primarily of the 2024 Notes and 2027 Notes, which, if not converted, will be required to be repaid in cash at maturity in August 2024 and May 2027, respectively. While we could seek to obtain additional third-party financing to pay for any amounts due in cash upon maturity of the Notes, we cannot be sure that such third-party financing will be available on commercially reasonable terms, if at all.

In addition, we also may borrow up to \$200.0 million in revolving loans under the 2018 Credit Facility, which would be required to be repaid in cash at maturity on May 28, 2024.

Manufacturing Risks

If we fail to comply with manufacturing regulations, our financial results and financial condition will be adversely affected.

Before we can begin commercial manufacture of our products, regulatory authorities must approve marketing applications that identify manufacturing facilities operated by us or our contract manufacturers that have passed regulatory inspection and manufacturing processes that are acceptable to the regulatory authorities. In addition, our pharmaceutical manufacturing facilities are continuously subject to scheduled and unannounced inspection by the FDA, and other comparable EU and other international regulatory authorities, before and after product approval, to monitor and ensure compliance with cGMP and other regulations. Our manufacturing facility in the U.S. has been approved by the FDA and the EC for the manufacture of Palynziq, and it has been approved by the FDA, the EC, and health agencies in other countries for the manufacture of Aldurazyme, Brineura, Naglazyme, Vimizim and Voxzogo. Our manufacturing facility in Shanbally, Cork, Ireland has been approved by the FDA, the EC, and health agencies in other countries for the manufacture of Vimizim and Brineura. In addition, our third-party manufacturers' facilities involved with the manufacture of our products have also been inspected and approved by various regulatory authorities. Although we are not involved in the day-to-day operations of our contract manufacturers, we are ultimately responsible for ensuring that our products are manufactured in accordance with cGMP regulations.

Due to the complexity of the processes used to manufacture our products and product candidates, we may be unable to continue to pass or initially pass federal or international regulatory inspections in a cost-effective manner. For the same reason, any potential third-party manufacturer of our products or our product candidates may be unable to comply with cGMP regulations in a cost-effective manner and may be unable to initially or continue to pass a federal or international regulatory inspection.

If we, or third-party manufacturers with whom we contract, are unable to comply with manufacturing regulations, we may be subject to delay of approval of our product candidates, warning or untitled letters, fines, unanticipated compliance expenses, recall or seizure of our products, total or partial suspension of production and/or enforcement actions, including injunctions, and criminal or civil prosecution. These possible sanctions would adversely affect our financial results and financial condition.

If we are unable to successfully develop and maintain manufacturing processes for our product candidates to produce sufficient quantities at acceptable costs, we may be unable to support a clinical trial or be forced to terminate a program, or if we are unable to produce sufficient quantities of our products at acceptable costs, we may be unable to meet commercial demand, lose potential revenue, have reduced margins or be forced to terminate a program.

Due to the complexity of manufacturing our product candidates and products, we may not be able to manufacture sufficient quantities. Our inability to produce enough of our product candidate at acceptable costs may result in the delay or termination of development programs. With respect to our commercial portfolio, we may not be able to manufacture our products successfully with a commercially viable process or at a scale large enough to support their respective commercial markets or at acceptable margins.

The development of commercially viable manufacturing processes typically is very difficult to achieve and is often very expensive and may require extended periods of time. Changes in manufacturing processes (including manufacturing cell lines), equipment or facilities (including moving manufacturing from one of our facilities to another one of our facilities or a third-party facility, or from a third-party facility to one of our facilities) may require us to complete clinical trials to receive regulatory approval of any manufacturing modifications.

With respect to valoctocogene roxaparvovec, gene therapy products are relatively novel and complex and have only in limited cases been manufactured at scales sufficient for pivotal trials and commercialization. Few pharmaceutical contract manufacturers specialize in gene therapy products and those that do are still developing appropriate processes and facilities for large-scale production. We invested a considerable amount of capital building our own commercial gene therapy manufacturing facility, which may be subject to significant impairment if our gene therapy programs are unsuccessful. As we develop, seek to optimize and operate the valoctocogene roxaparvovec manufacturing process, we will likely face technical and scientific challenges, considerable capital costs, and potential difficulty in recruiting and hiring experienced, qualified personnel. There may also be unexpected technical or operational issues during clinical or commercial manufacturing campaigns. As a result, we could experience manufacturing delays that prevent us from completing our clinical studies in a timely manner, if at all, or commercializing valoctocogene roxaparvovec on a profitable basis, if at all.

Also, we may be required to demonstrate product comparability between a biological product made after a manufacturing change and the product made before implementation of the change through additional types of analytical and functional testing or may have to complete additional clinical studies. If we contract for manufacturing services with an unproven process, our contractor is subject to the same uncertainties, high standards and regulatory controls, and may therefore experience difficulty if further process development is necessary.

Even a developed manufacturing process can encounter difficulties. Problems may arise during manufacturing for a variety of reasons, including human error, mechanical breakdowns, problems with raw materials and cell banks, malfunctions of

internal information technology systems, and other events that cannot always be prevented or anticipated. Many of the processes include biological systems, which add significant complexity, as compared to chemical synthesis. We expect that, from time to time, consistent with biotechnology industry expectations, certain production lots will fail to produce product that meets our quality control release acceptance criteria. To date, our historical failure rates for all of our product programs have been within our expectations, which are based on industry norms. If the failure rate increased substantially, we could experience increased costs, lost revenue, damage to customer relations, time and expense investigating the cause and, depending upon the cause, similar losses with respect to other lots or products. If problems are not discovered before the product is released to the market, recall and product liability costs may also be incurred.

In order to produce product within our time and cost parameters, we must continue to produce product within our expected success rate and yield expectations. Because of the complexity of our manufacturing processes, it may be difficult or impossible for us to determine the cause of any particular lot failure and we must effectively take corrective action in response to any failure in a timely manner.

We currently rely on third parties for portions of the manufacture of each of our commercial products. If those manufacturers are unwilling or unable to fulfill their contractual obligations or satisfy demand outside of or in excess of the contractual obligations, we may be unable to meet demand for these products or sell these products at all and we may lose potential revenue. Further, the availability of suitable contract manufacturing capacity at scheduled or optimum times is not certain.

In addition, our manufacturing processes subject us to a variety of federal, state and local laws and regulations governing the use, generation, manufacture, storage, handling and disposal of hazardous materials and wastes resulting from their use. We incur significant costs in complying with these laws and regulations.

Supply interruptions may disrupt our inventory levels and the availability of our products and product candidates and cause delays in obtaining regulatory approval for our product candidates, or harm our business by reducing our revenues.

We depend on single-source suppliers for critical raw materials and a limited number of manufacturing facilities to manufacture our finished products and product candidates. Numerous factors could cause interruptions in the supply or manufacture of our products and product candidates, including:

- timing, scheduling and prioritization of production by our contract manufacturers or a breach of our agreements by our contract manufacturers;
- labor interruptions;
- changes in our sources for manufacturing;
- the timing and delivery of shipments;
- our failure to locate and obtain replacement suppliers and manufacturers as needed on a timely basis; and
- conditions affecting the cost and availability of raw materials.

If one of our suppliers or manufacturers fails or refuses to supply us with necessary raw materials or finished products or product candidates on a timely basis or at all, it would take a significant amount of time and expense to qualify a new supplier or manufacturer. We may not be able to obtain active ingredients or finished products from new suppliers or manufacturers on acceptable terms and at reasonable prices, or at all.

Any interruption in the supply of finished products could hinder our ability to distribute finished products to meet commercial demand and adversely affect our financial results and financial condition.

With respect to our product candidates, production of product is necessary to perform clinical trials and successful registration batches are necessary to file for approval to commercially market and sell product candidates. Delays in obtaining clinical material or registration batches could adversely impact our clinical trials and delay regulatory approval for our product candidates.

If our Manufacturing, Marketing and Sales Agreement with Sanofi were terminated, we could be prevented from continuing to commercialize Aldurazyme or our ability to successfully commercialize Aldurazyme would be delayed or diminished.

Either party may terminate the Manufacturing, Marketing and Sales Agreement (the MMS Agreement) between Sanofi and us related to Aldurazyme for specified reasons, including if the other party is in material breach of the MMS Agreement, has experienced a change of control, as such term is defined in the MMS Agreement, or has declared bankruptcy and also is in breach

of the MMS Agreement. Although we are not currently in breach of the MMS Agreement, there is a risk that either party could breach the MMS Agreement in the future. Either party may also terminate the MMS Agreement upon one-year prior written notice for any reason.

If the MMS Agreement is terminated for breach, the breaching party will transfer its interest in the BioMarin/Genzyme LLC to the non-breaching party, and the non-breaching party will pay a specified buyout amount for the breaching party's interest in Aldurazyme and in the BioMarin/Genzyme LLC. If we are the breaching party, we would lose our rights to Aldurazyme and the related intellectual property and regulatory approvals. If the MMS Agreement is terminated without cause, the non-terminating party would have the option, exercisable for one year, to buy out the terminating party's interest in Aldurazyme and in the BioMarin/Genzyme LLC at a specified buyout amount. If such option is not exercised, all rights to Aldurazyme will be sold and the BioMarin/Genzyme LLC will be dissolved. In the event of termination of the buyout option without exercise by the non-terminating party as described above, all right and title to Aldurazyme is to be sold to the highest bidder, with the proceeds to be split between Sanofi and us in accordance with our percentage interest in the BioMarin/Genzyme LLC.

If the MMS Agreement is terminated by either party because the other party declared bankruptcy, the terminating party would be obligated to buy out the other party and would obtain all rights to Aldurazyme exclusively. If the MMS Agreement is terminated by a party because the other party experienced a change of control, the terminating party shall notify the other party, the offeree, of its intent to buy out the offeree's interest in Aldurazyme and the BioMarin/Genzyme LLC for a stated amount set by the terminating party at its discretion. The offeree must then either accept this offer or agree to buy the terminating party's interest in Aldurazyme and the BioMarin/Genzyme LLC on those same terms. The party who buys out the other party would then have exclusive worldwide rights to Aldurazyme. The Amended and Restated Collaboration Agreement between us and Sanofi will automatically terminate upon the effective date of the termination of the MMS Agreement and may not be terminated independently from the MMS Agreement.

If we were obligated or given the option to buy out Sanofi's interest in Aldurazyme and the BioMarin/Genzyme LLC, and thereby gain exclusive rights to Aldurazyme, we may not have sufficient funds to do so and we may not be able to obtain the financing to do so. If we fail to buy out Sanofi's interest, we may be held in breach of the agreement and may lose any claim to the rights to Aldurazyme and the related intellectual property and regulatory approvals. We would then effectively be prohibited from developing and commercializing Aldurazyme. If this happened, not only would our product revenues decrease, but our share price would also decline.

Risks Related to International Operations

We conduct a significant amount of our sales and operations outside of the U.S., which subjects us to additional business risks that could adversely affect our revenues and results of operations.

A significant portion of the sales of Aldurazyme, Brineura, Kuvan, Naglazyme, Palynziq and Vimizim are generated from countries other than the U.S. Similarly, we expect a significant portion of the sales of Voxzogo to be generated from countries other than the U.S. We have operations in Canada and in several European, Middle Eastern, Asian, and Latin American countries. We expect that we will continue to expand our international operations in the future. International operations inherently subject us to a number of risks and uncertainties, including:

- the increased complexity and costs inherent in managing international operations;
- diverse regulatory and compliance requirements, and changes in those requirements that could restrict our ability to manufacture, market and sell our products;
- political and economic instability;
- diminished protection of intellectual property in some countries outside of the U.S.;
- trade protection measures and import or export licensing requirements;
- difficulty in staffing and managing international operations;
- differing labor regulations and business practices;
- potentially negative consequences from changes in or interpretations of tax laws;
- changes in international medical reimbursement policies and programs;
- financial risks such as longer payment cycles, difficulty collecting accounts receivable, exposure to fluctuations in foreign currency exchange rates and potential currency controls imposed by non-U.S. governments;

- regulatory and compliance risks that relate to maintaining accurate information and control over sales and distributors' and service providers' activities that may fall within the purview of the Foreign Corrupt Practices Act (the FCPA); and
- rapidly evolving global laws and regulations relating to data protection and the privacy and security of commercial and personal information.

Any of these factors may, individually or as a group, have a material adverse effect on our business and results of operations.

As we continue to expand our existing international operations, we may encounter new risks. For example, as we focus on building our international sales and distribution networks in new geographic regions, we must continue to develop relationships with qualified local distributors and trading companies. If we are not successful in developing and maintaining these relationships, we may not be able to grow sales in these geographic regions. These or other similar risks could adversely affect our revenues and profitability.

A significant portion of our international sales are made based on special access programs, and changes to these programs could adversely affect our product sales and revenues in these countries.

We make a significant portion of our international sales of Brineura, Naglazyme and Vimizim through early access, special access or "named patient sales" programs in markets where we are not required to obtain regulatory approval, and we expect a significant portion of our international sales of Voxzogo will also be through such programs. The specifics of the programs vary from country to country. Generally, special approval must be obtained to initiate such programs, and in some cases, special approval must be obtained for each patient. The approval normally requires an application or a lawsuit accompanied by evidence of medical need.

These programs are not well defined in some countries and are subject to changes in requirements, funding levels, unmet medical need and classification of the disease treated by our product. Any change to these programs could adversely affect our ability to sell our products in those countries and delay sales. If the programs are not funded by the respective government, there could be insufficient funds to pay for all patients. Further, governments have and may continue to undertake unofficial measures to limit purchases of our products, including initially denying coverage for purchasers, delaying orders, requiring additional in-country testing and denying or taking excessively long to approve customs clearance. Any such actions could materially delay or reduce our revenues from such countries.

Without the special access programs, we would need to seek full product approval or official reimbursement to commercially market and sell our products in certain jurisdictions. This can be an expensive and time-consuming process and may subject our products to additional price controls. Because the number of patients is so small in some countries, it may not be economically feasible to seek, obtain and maintain a full product approval or official reimbursement, and therefore the sales in such country would be permanently reduced or eliminated. For all of these reasons, if the special access programs that we are currently using are eliminated or restricted, our revenues could be adversely affected.

U.S. export control and economic sanctions may adversely affect our business, financial condition and operating results. Moreover, compliance with such regulatory requirements may increase our costs and negatively impact our ability to sell our products and collect cash from customers.

Our products are subject to U.S. export control laws and regulations, including the U.S. Export Administration Regulations and various economic and trade sanctions regulations administered by the U.S. Treasury Department's Office of Foreign Assets Control (OFAC). Exports of our products and solutions must be made in compliance with these laws and regulations. Changes to these laws and regulations, or to the countries, governments, persons or activities targeted by such laws, could result in decreased use of our products, or hinder our ability to export or sell our products to existing or potential customers, which would likely adversely affect our results of operations, financial condition or strategic objectives. If we fail to comply with these laws and regulations, we could be subject to substantial civil or criminal penalties, including the possible loss of export or import privileges and fines.

We rely on a general license from OFAC to sell our medicines for eventual use by hospital and clinic end-users in Iran. The use of this OFAC general license requires us to observe strict conditions with respect to products sold, end-user limitations and payment requirements. Although we believe we have maintained compliance with the general license requirements, there can be no assurance that the general license will not be revoked, the general license will be renewed in the future or we will remain in compliance with the general license. A violation of the OFAC general license could result in substantial fines, sanctions, civil or criminal penalties, competitive or reputational harm, litigation or regulatory action and other consequences that might adversely affect our results of operations, financial condition or strategic objectives.

Moreover, U.S. export control and economic sanctions may make operating in certain countries more difficult and expensive. For example, we may be unable to find distributors or financial institutions willing to facilitate the sale of our products and collection of cash from such sales in a cost-effective manner, if at all.

Failure to comply with applicable anti-corruption legislation could result in fines, criminal penalties and materially adversely affect our business, financial condition and results of operations.

We are required to comply with anti-corruption and anti-bribery laws in the jurisdictions in which we operate, including the FCPA in the U.S. and other similar laws in other countries in which we do business. We operate in a number of countries that are recognized to have a reputation for corruption and pose an increased risk of corrupt practices. We also regularly interact with government regulators in many countries, including those that are considered higher risk for corruption, in order to secure regulatory approval to manufacture and distribute our products. The anti-corruption and anti-bribery laws to which we are subject generally prohibit companies and their intermediaries from making improper payments to non-U.S. government officials or other persons for the purposes of influencing official decisions or obtaining or retaining business and/or other benefits. These laws also require us to make and keep books and records that accurately and fairly reflect our transactions and to devise and maintain an adequate system of internal accounting controls. As part of our business, we deal with state-owned business enterprises, the employees and representatives of which may be considered non-U.S. government officials for purposes of applicable anti-corruption laws.

Although we have adopted policies and procedures designed to ensure that we, our employees and third-party agents will comply with such laws, there can be no assurance that such policies or procedures will work effectively at all times or protect us against liability under these or other laws for actions taken by our employees, partners and other third parties with respect to our business. If we are not in compliance with anti-corruption laws and other laws governing the conduct of business with government entities and/or officials (including local laws), we may be subject to criminal and civil penalties and other remedial measures, which could harm our business, financial condition, results of operations, cash flows and prospects. Investigations of any actual or alleged violations of such laws or policies related to us could harm our business, financial condition, results of operations, cash flows and prospects.

Moreover, there has been enhanced scrutiny of company-sponsored patient assistance programs, including insurance premium and co-pay assistance programs and donations to third-party independent charities that provide such assistance. There has also been enhanced scrutiny by governments on reimbursement support offerings, clinical education programs and promotional speaker programs. If we, our third-party agents or donation recipients are deemed to have failed to comply with laws, regulations or government guidance in any of these areas, we could be subject to criminal or civil sanctions. Any similar violations by our competitors could also negatively impact our industry reputation and increase scrutiny over our business and our products.

Our international operations pose currency risks, which may adversely affect our operating results and net income.

A significant and growing portion of our revenues and earnings, as well as our substantial international net assets, are exposed to changes in foreign exchange rates. As we operate in multiple foreign currencies, including the Euro, the Brazilian Real, the Great British Pound, the Canadian Dollar and several other currencies, changes in those currencies relative to the U.S. Dollar (USD) will impact our revenues and expenses. If the USD were to weaken against another currency, assuming all other variables remained constant, our revenues would increase, having a positive impact on earnings, and our overall expenses would increase, having a negative impact on earnings. Conversely, if the USD were to strengthen against another currency, assuming all other variables remained constant, our revenues would decrease, having a negative impact on earnings, and our overall expenses would decrease, having a positive impact on earnings. In addition, because our financial statements are reported in USD, changes in currency exchange rates between the USD and other currencies have had, and will continue to have, an impact on our results of operations. Therefore, significant changes in foreign exchange rates can impact our results and our financial guidance.

We implement currency hedges intended to reduce our exposure to changes in certain foreign currency exchange rates. However, our hedging strategies may not be successful, and any of our unhedged foreign exchange exposures will continue to be subject to market fluctuations. These risks could cause a material adverse effect on our business, financial position and results of operations and could cause the market value of our common stock to decline.

We face credit risks from government-owned or sponsored customers outside of the U.S. that may adversely affect our results of operations.

Our product sales to government-owned or supported customers in various countries outside of the U.S. are subject to significant payment delays due to government funding and reimbursement practices. This has resulted and may continue to result in an increase in days sales outstanding due to the average length of time that we have accounts receivable outstanding. If significant changes were to occur in the reimbursement practices of these governments or if government funding becomes unavailable, we may not be able to collect on amounts due to us from these customers and our results of operations would be adversely affected.

Intellectual Property Risks

If we are unable to protect our intellectual property, we may not be able to compete effectively or preserve our market shares.

Where appropriate, we seek patent protection for certain aspects of our technology. Patent protection may not be available for some of the products we are developing. If we must spend significant time and money protecting or enforcing our patents, designing around patents held by others or licensing, potentially for large fees, patents or other proprietary rights held by others, our business and financial prospects may be harmed.

The patent positions of biopharmaceutical products are complex and uncertain. The scope and extent of patent protection for some of our products and product candidates are particularly uncertain because key information on some of our product candidates has existed in the public domain for many years. The composition and genetic sequences of animal and/or human versions of Aldurazyme, Naglazyme and many of our product candidates have been published and are believed to be in the public domain. The chemical structure of 6R-BH4 (the active ingredient in Kuvan) has also been published. Publication of this information may prevent us from obtaining or enforcing patents relating to our products and product candidates, including without limitation composition-of-matter patents, which are generally believed to offer the strongest patent protection.

We own or have licensed patents and patent applications related to our products. However, these patents and patent applications do not ensure the protection of our intellectual property for a number of reasons, including without limitation the following:

- With respect to pending patent applications, unless and until actually issued, the protective value of these applications is impossible to determine. We do not know whether our patent applications will result in issued patents.
- Patents have limited duration and expire.
- Enforcing patents is expensive and may absorb significant time of our management. Management would spend less time and resources on developing products, which could increase our operating expenses and delay product programs.
- Receipt of a patent may not provide much, if any, practical protection. For example, if we receive a patent with a narrow scope, then it will be easier for competitors to design products that do not infringe on our patent.
- The Leahy-Smith America Invents Act of 2011, which reformed certain patent laws in the U.S., may create additional uncertainty. Among the significant changes are switching from a “first-to-invent” system to a “first-to-file” system, and the implementation of new procedures that permit competitors to challenge our patents in the U.S. Patent and Trademark Office after grant.

It is also unclear whether our trade secrets are adequately protected. Our current and former employees, consultants or contractors may unintentionally or willfully disclose trade secrets to competitors. Enforcing a claim that someone else illegally obtained and is using our trade secrets, as with patent litigation, is expensive and time consuming, requires significant resources and has an unpredictable outcome. In addition, courts outside of the U.S. are sometimes less willing to protect trade secrets. Furthermore, our competitors may independently develop equivalent knowledge, methods and know-how, in which case we would not be able to enforce our trade secret rights against such competitors.

In the EU, clinical trial data submitted to the EMA in MAAs that were traditionally regarded as confidential commercial information are now subject to public disclosure. Subject to our ability to review and redact a narrow sub-set of confidential commercial information, the EU policies have resulted and will continue to result in the EMA’s public disclosure of certain of our clinical study reports, clinical trial data summaries and clinical overviews for recently completed and future MAA submissions. The move toward public disclosure of development data could adversely affect our business in many ways, including, for example, resulting in the disclosure of our confidential methodologies for development of our products, preventing us from obtaining intellectual property right protection for innovations, requiring us to allocate significant resources to prevent other companies from violating our intellectual property rights, adding even more complexity to processing health data from clinical trials consistent with applicable data privacy regulations, and enabling competitors to use our data to gain approvals for their own products.

Competitors may interfere with our patent process in a variety of ways. Competitors may claim that they invented the claimed invention prior to us or that they filed their application for a patent on a claimed invention before we did. Competitors may also claim that we are infringing on their patents and therefore we cannot practice our technology. Competitors may also contest our patents by showing the patent examiner or a court that the invention was not original, was not novel or was obvious, for example. In litigation, a competitor could claim that our issued patents are not valid or are unenforceable for a number of reasons.

If a court agrees, we would not be able to enforce that patent. Moreover, generic manufacturers may use litigation and regulatory means to obtain approval for generic versions of our products notwithstanding our filed patents or patent applications.

If we are unable to protect our intellectual property, third parties could develop competing products, which could adversely affect our revenues and financial results generally.

Competitors and other third parties may have developed intellectual property that could limit our ability to market and commercialize our products and product candidates, if approved.

Similar to us, competitors continually seek intellectual property protection for their technology. Several of our development programs, such as valoctocogene roxaparvovec, focus on therapeutic areas that have been the subject of extensive research and development by third parties for many years. Due to the amount of intellectual property in our field of technology, we cannot be certain that we do not infringe intellectual property rights of competitors or that we will not infringe intellectual property rights of competitors granted or created in the future. For example, if a patent holder believes our product infringes its patent, the patent holder may sue us even if we have received patent protection for our technology. If someone else claims we infringe its intellectual property, we would face a number of issues, including the following:

- Defending a lawsuit takes significant executive resources and can be very expensive.
- If a court decides that our product infringes a competitor's intellectual property, we may have to pay substantial damages.
- With respect to patents, in addition to requiring us to pay substantial damages, a court may prohibit us from making, selling, offering to sell, importing or using our product unless the patent holder licenses the patent to us. The patent holder is not required to grant us a license. If a license is available, it may not be available on commercially reasonable terms. For example, we may have to pay substantial royalties or grant cross licenses to our patents and patent applications.
- We may need to redesign our product so it does not infringe the intellectual property rights of others.
- Redesigning our product so it does not infringe the intellectual property rights of competitors may not be possible or could require substantial funds and time.

We may also support and collaborate in research conducted by government organizations, hospitals, universities or other educational institutions. These research partners may be unwilling to grant us any exclusive rights to technology or products derived from these collaborations.

If we do not obtain required licenses or rights, we could encounter delays in our product development efforts while we attempt to design around other patents or may be prohibited from making, using, importing, offering to sell or selling products requiring these licenses or rights. There is also a risk that disputes may arise as to the rights to technology or products developed in collaboration with other parties. If we are not able to resolve such disputes and obtain the licenses or rights we need, we may not be able to develop or market our products.

Risks Related to Ownership of Our Securities

Our stock price has been and may in the future be volatile, and an investment in our stock could suffer a decline in value.

Our stock price has been and may in the future be volatile. Our valuation and stock price may have no meaningful relationship to current or historical earnings, asset values, book value or many other criteria based on conventional measures of stock value. The market price of our common stock will fluctuate due to factors including:

- product sales and profitability of our products;
- manufacturing, supply or distribution of our product candidates and commercial products;
- progress of our product candidates through the regulatory process and our ability to successfully commercialize any such products that receive regulatory approval;
- results of clinical trials, announcements of technological innovations or new products by us or our competitors;

- generic competition to Kuvan tablets and powder relating to our settlements with the two pharmaceutical companies described above in this Risk Factors section or potential generic competition from future competitors;
- government regulatory action affecting our product candidates, our products or our competitors' product candidates and products in both the U.S. and non-U.S. countries;
- developments or disputes concerning patent or proprietary rights;
- general market conditions and fluctuations for the emerging growth and pharmaceutical market sectors;
- economic conditions in the U.S. or abroad;
- negative publicity about us or the pharmaceutical industry;
- changes in the structure of healthcare payment systems;
- cybersecurity incidents experienced by us or others in our industry;
- broad market fluctuations in the U.S., the EU or in other parts of the world;
- actual or anticipated fluctuations in our operating results, including due to timing of large periodic orders for our products by governments in certain countries;
- changes in company assessments or financial estimates by securities analysts;
- acquisitions of products, businesses, or other assets; and
- sales of our shares of stock by us, our significant stockholders, or members of our management or Board of Directors.

Furthermore, the stock markets have recently experienced extreme price and volume fluctuations that have affected and continue to affect the market prices of equity securities of many companies. In some cases, these fluctuations have been unrelated or disproportionate to the operating performance of those companies. In the past, companies that have experienced volatility in the market price of their stock have been subject to securities class action litigation. For example, in September 2020, after a substantial drop in our stock price that followed an announcement providing a regulatory update regarding valoctocogene roxaparvovec, we and certain of our officers were sued in a putative class action lawsuit alleging violations of the federal securities laws for allegedly making materially false or misleading statements. In addition, in October 2021, after a drop in our stock price that followed an announcement providing a regulatory update regarding BMN 307, we and certain of our current and former officers were sued in a putative class action lawsuit alleging violations of the federal securities laws for allegedly making materially false or misleading statements. We may be the target of additional litigation of this type in the future as well. Securities litigation against us could result in substantial costs and divert our management's time and attention from other business concerns, which could harm our business.

In addition, our stock price can be materially adversely affected by factors beyond our control, such as disruptions in global financial markets or negative trends in the biotechnology sector of the economy, even if our business is operating well.

Conversion of the Notes will dilute the ownership interest of existing stockholders, including holders who had previously converted their Notes, or may otherwise depress the price of our common stock.

The conversion of some or all of the Notes will dilute the ownership interests of existing stockholders. Any sales in the public market of the common stock issuable upon such conversion could adversely affect prevailing market prices of our common stock. In addition, the existence of the Notes may encourage short selling by market participants because the conversion of the Notes could be used to satisfy short positions, or anticipated conversion of the Notes into shares of our common stock could depress the price of our common stock.

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

We are incorporated in Delaware. Certain anti-takeover provisions of Delaware law and our charter documents as currently in effect may make a change in control of us more difficult, even if a change in control would be beneficial to the stockholders. Our anti-takeover provisions include provisions in our restated certificate of incorporation and amended and restated bylaws providing that stockholders' meetings may only be called by our Chairman, the lead independent director or the majority of

our Board of Directors and that the stockholders may not take action by written consent and requiring that stockholders that desire to nominate any person for election to our Board of Directors or to make any proposal with respect to business to be conducted at a meeting of our stockholders be submitted in appropriate form to our Secretary within a specified period of time in advance of any such meeting. Additionally, our Board of Directors has the authority to issue shares of preferred stock and to determine the terms of those shares of stock without any further action by our stockholders. The rights of holders of our common stock are subject to the rights of the holders of any preferred stock that may be issued. The issuance of preferred stock could make it more difficult for a third party to acquire a majority of our outstanding voting stock. Delaware law also prohibits corporations from engaging in a business combination with any holders of 15% or more of their capital stock until the holder has held the stock for three years unless, among other possibilities, our Board of Directors approves the transaction. Our Board of Directors may use these provisions to prevent changes in the management and control of us. Also, under applicable Delaware law, our Board of Directors may adopt additional anti-takeover measures in the future.

The fundamental change repurchase feature of the Notes may delay or prevent an otherwise beneficial attempt to take us over.

The terms of the Notes require us to repurchase the Notes in the event of a fundamental change. A takeover of us would trigger options by the respective holders of the applicable Notes to require us to repurchase such Notes. This may have the effect of delaying or preventing a takeover of us that would otherwise be beneficial to our stockholders or investors in the Notes.

Our amended and restated bylaws designate the Court of Chancery of the State of Delaware and the federal district courts of the U.S. as the exclusive forums for the adjudication of certain disputes, 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 the Court of Chancery of the State of Delaware is the sole and exclusive forum for the following types of actions or proceedings under Delaware statutory or common law:

- any derivative claim or cause of action brought on our behalf;
- any claim or cause of action for breach of a fiduciary duty owed by any director, officer or other employee of BioMarin to us or our stockholders;
- any claim or cause of action against us or any of our directors, officers or other employees arising pursuant to any provision of the General Corporation Law of the State of Delaware, our restated certificate of incorporation or our amended and restated bylaws; any claim or cause of action seeking to interpret, apply, enforce or determine the validity of our restated certificate of incorporation or our amended and restated bylaws;
- any claim or cause of action as to which the General Corporation Law of the State of Delaware confers jurisdiction to the Court of Chancery of the State of Delaware; and
- any claim or cause of action against us or any of our directors, officers or other employees that is governed by the internal affairs doctrine.

This exclusive-forum provision would not apply to suits brought to enforce a duty or liability created by the Securities Act of 1933, as amended, the Exchange Act or any other claim for which the U.S. federal courts have exclusive jurisdiction. In addition, our amended and restated bylaws provide that the federal district courts of the U.S. 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 of our exclusive forum provisions 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. Our amended and restated bylaws further provide that any person or entity that acquires any interest in shares of our capital stock will be deemed to have notice of and consented to the provisions of such provisions.

General Risk Factors

We depend upon our key personnel and our ability to attract and retain qualified employees.

Our future growth and success will depend in large part on our continued ability to attract, retain, manage and motivate our employees. The loss of the services of a significant portion of our workforce or any member of our senior management or the inability to hire or retain qualified personnel could adversely affect our ability to execute our business plan and harm our operating results.

Because of the specialized nature of our business, we rely heavily on our ability to attract and retain qualified scientific, technical and managerial personnel. In particular, the loss of one or more of our senior executive officers could be detrimental to us if we do not have an adequate succession plan or if we cannot recruit suitable replacements in a timely manner. While our senior executive officers are parties to employment agreements with us, these agreements do not guarantee that they will remain employed with us in the future. In addition, in many cases, these agreements do not restrict our senior executive officers' ability to compete with us after their employment is terminated.

The competition for qualified personnel in the pharmaceutical field is intense, and there is a limited pool of qualified potential employees to recruit. This competition has been exacerbated during the COVID-19 pandemic, and we have recently experienced increased employee turnover like many other employers in the U.S. during the "great resignation." Due to the intense competition for talent, we may be unable to continue to attract and retain qualified personnel necessary for the development of our business or to recruit suitable replacement personnel. If we are unsuccessful in our recruitment and retention efforts, our business may be harmed.

Our success depends on our ability to manage our growth.

Product candidates that we are currently developing or may license or acquire in the future may be intended for patient populations that are significantly larger than any of the patient populations we currently target. In order to continue development and marketing of these products, if approved, we will need to significantly expand our operations. To manage expansion effectively, we need to continue to develop and improve our research and development capabilities, manufacturing and quality capacities, sales and marketing capabilities, financial and administrative systems and standard processes for global operations. Our staff, financial resources, systems, procedures or controls may be inadequate to support our operations and may increase our exposure to regulatory and corruption risks and our management may be unable to manage successfully future market opportunities or our relationships with customers and other third parties.

New tax laws or regulations that are enacted or existing tax laws and regulations that are interpreted, modified or applied adversely to us or our customers may have a material adverse effect on our business and financial condition.

New tax laws or regulations could be enacted at any time, and existing tax laws or regulations could be interpreted, modified or applied in a manner that is adverse to us or our customers, which could adversely affect our business and financial condition. For example, legislation enacted in 2017, informally titled the Tax Cuts and Jobs Act (TCJA), as modified in 2020 by the Coronavirus Aid, Relief, and Economic Security Act, or the CARES Act, enacted many significant changes to the U.S. tax laws, including changes in corporate tax rates, the application of certain tax credits (including a reduction of tax credits under the Orphan Drug Act), the deductibility of expenses, the utilization of net operating losses and other deferred tax assets, and the taxation of non-U.S. earnings. Future guidance from the Internal Revenue Service and other tax authorities with respect to the TCJA, the CARES Act or other existing or future laws may affect us, and certain aspects of existing laws could be repealed or modified in future legislation that is proposed or implemented by the current or a future U.S. presidential administration, Congress or other governmental authorities. In addition, it is uncertain if and to what extent various states will conform to the TCJA, the CARES Act, or any newly enacted tax legislation. The impact of changes under the TCJA, the CARES Act, or future legislation could increase our future U.S. tax expense and could have a material adverse impact on our business and financial condition.

Moreover, changes in the tax laws of non-U.S. jurisdictions could arise, including as a result of the base erosion and profit shifting (BEPS) project that was undertaken by the Organization for Economic Co-operation and Development (OECD), or other initiatives led by the OECD or the EC. The OECD, which represents a coalition of member countries including the U.S. and other countries in which we have operations, made several recommendations with the aim of addressing tax avoidance and ensuring that profits are taxed where economic activities generating the profits are performed and where value is created. The OECD is also working on proposals, commonly referred to as "BEPS 2.0", which, if implemented, would fundamentally change the international tax system. These changes, as adopted by countries, may increase tax uncertainty and may adversely affect our provision for income taxes, results of operations and cash flows. It is not uncommon for taxing authorities in different countries to have conflicting views, for instance, with respect to, among other things, the manner in which the arm's length standard is applied for transfer pricing purposes, or with respect to the valuation of intellectual property. If tax authorities successfully challenge our transfer prices as not reflecting arm's length transactions, they could require us to adjust our transfer prices and thereby reallocate our income to reflect these revised transfer prices, resulting in a higher tax liability. In addition, if a country from which income is reallocated does not agree with the reallocation, both that country and the other country to which the income was allocated could tax the same income, potentially resulting in double taxation. If tax authorities were to allocate income to a higher tax jurisdiction,

subject our income to double taxation or assess interest and penalties, it would increase our consolidated tax liability, which could adversely affect our business, financial condition, results of operations and cash flows.

If we are found in violation of healthcare laws or privacy and data protection laws, we may be required to pay penalties, be subjected to scrutiny by regulators or governmental entities, or be suspended from participation in government healthcare programs, which may adversely affect our business, reputation, financial condition and results of operations.

We are subject to various healthcare laws and regulations in the U.S. and internationally, including anti-kickback laws, false claims laws, data privacy and security laws, and laws related to ensuring compliance. In the U.S., the federal Anti-Kickback Statute makes it illegal for any person or entity, including a pharmaceutical company, to knowingly and willfully offer, solicit, pay or receive any remuneration, directly or indirectly, in exchange for or to induce the referral of business, including the purchase, order or prescription of a particular drug, for which payment may be made under federal healthcare programs, such as Medicare and Medicaid. Under the federal Anti-Kickback Statute and related regulations, certain arrangements are deemed not to violate the federal Anti-Kickback Statute if they fit within a statutory exception or regulatory safe harbor. However, the exceptions and safe harbors are drawn narrowly, and practices that involve remuneration not intended to induce prescribing, purchases or recommendations may be subject to scrutiny if they do not qualify for an exception or safe harbor. Our practices may not in all cases meet all of the criteria for safe harbor protection from Anti-Kickback liability, although we seek to comply with these safe harbors. Many states have adopted laws similar to the federal Anti-Kickback Statute, some of which apply to referral of patients for healthcare services reimbursed by any source, not just governmental payers.

Federal and state false claims laws, including the civil False Claims Act and the Civil Monetary Penalties Law, prohibit any person or entity from knowingly presenting, or causing to be presented, a false claim for payment to the federal government, or knowingly making, or causing to be made, a false statement to have a false claim paid, or knowingly making, using, or causing to be made or used, a false record or statement to avoid, decrease or conceal an obligation to pay money to the federal government. In addition, certain marketing practices, including off-label promotion, may also violate false claims laws.

Under the Health Insurance Portability and Accountability Act of 1996 (HIPAA), we also are prohibited from, among other things, knowingly and willfully executing a scheme to defraud any healthcare benefit program, including private payers, or knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false, fictitious or fraudulent statement in connection with the delivery of or payment for healthcare benefits, items or services.

In addition, recent healthcare reform legislation has strengthened these laws in the U.S. For example, the PPACA, among other things, amends the intent requirement of the federal Anti-Kickback Statute and criminal healthcare fraud statutes. A person or entity no longer needs to have actual knowledge of these statutes or specific intent to violate them in order to commit a violation. Moreover, the PPACA provides that the government may assert that a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the civil False Claims Act.

HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act and its implementing regulations, also imposes obligations, including mandatory contractual terms, on certain types of individuals and entities, with respect to safeguarding the privacy, integrity, availability, security and transmission of individually identifiable health information. Many state and non-U.S. laws also govern the privacy and security of health information. They often differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts. The global data protection landscape is rapidly evolving, and implementation standards and enforcement practices are likely to remain uncertain for the foreseeable future. In the U.S., California recently enacted the California Consumer Privacy Act (CCPA), which took effect on January 1, 2020. The CCPA gives California consumers expanded rights to access and delete their personal information, opt out of certain personal information sales, and receive detailed information about how their personal information is used. The CCPA provides for civil penalties for violations, as well as a private right of action for data breaches that is expected to increase data breach litigation. The CCPA will be expanded substantially on January 1, 2023 when the California Privacy Rights Act of 2020 (CPRA), becomes fully operative. The CPRA will, among other things, give consumers the ability to limit use of information deemed to be sensitive, increase the maximum penalties for violations concerning consumers under age 16, expand an individual's private right of action and establish the California Privacy Protection Agency to implement and enforce the new law and impose administrative fines. In addition to California, other U.S. states have recently adopted consumer data protection and privacy laws, and more U.S. states may do so in the future. Aspects of the CCPA, CPRA and similar laws in other states and their interpretation and enforcement remain uncertain. The potential effects of these laws are far-reaching and may require us to modify our data processing practices and policies and to incur substantial costs and expenses in an effort to comply. Complying with these or other similar laws, regulations, amendments to or re-interpretations of existing laws and regulations, and contractual or other obligations relating to privacy, data protection, data transfers, data localization, or information security may require us to make changes to our services to enable us or our customers to meet new legal requirements, incur substantial operational costs, modify our data practices and policies, and restrict our business operations. Any actual or perceived failure by us to comply with these laws, regulations, or other obligations may lead to significant fines, penalties, regulatory investigations, lawsuits, significant costs for remediation, damage to our reputation, or other liabilities.

The European Regulation 2016/679, known as the General Data Protection Regulation (GDPR), as well as EEA Member State legislations supplementing such regulation, apply to the processing of personal data of individuals located in the EEA, including health-related information, by companies located in the EEA, or in certain circumstances, by companies located outside of the EEA. These laws impose strict obligations on the ability to collect, record, store, disclose, use and transmit personal data, including health-related information. These include several requirements relating to (i) obtaining, in some situations, the informed consent of the individuals to whom the personal data relates, (ii) the information provided to the individuals about how their personal information is used, (iii) ensuring the security and confidentiality of the personal data, (iv) the obligation to notify regulatory authorities and affected individuals of personal data breaches, (v) extensive internal privacy governance obligations, and (vi) obligations to honor rights of individuals in relation to their personal data (for example, the right to access, correct and delete their data). Switzerland has adopted similar restrictions.

The GDPR and other European data protection laws generally restrict the transfer of personal information from Europe, including the EEA and Switzerland, to the U.S. and most other countries unless the parties to the transfer have implemented specific safeguards to protect the transferred personal information. One of the primary safeguards allowing U.S. companies to import personal information from the EEA has been the EC's Standard Contractual Clauses (SCCs). However, the Court of Justice of the EU (CJEU) issued a decision that called into question whether the SCCs can lawfully be used for transfers of personal information from Europe to the United States or most other countries. At present, there are few, if any, viable alternatives to the SCCs, on which we have relied for personal information transfers from Europe to the United States and other "third countries." After the mentioned CJEU judgment, new sets of SCCs were published on June 4, 2021. Entities having entered into the old SCCs before September 27, 2021 will be able to rely on them for a transition period ending December 27, 2022. Most importantly, the use of SCCs does not any longer automatically ensure compliance with the GDPR. Instead, companies remain required to conduct a data transfer impact assessment for each transfer, which adds a compliance burden.

Potential pecuniary fines for noncompliance with the GDPR may be up to the greater of €20 million or 4% of annual global revenue. The GDPR has increased our responsibility and liability in relation to personal data that we process and has increased our compliance costs.

Substantial new laws and regulations affecting compliance have also been adopted in the U.S. and certain non-U.S. countries, which may require us to modify our business practices with healthcare practitioners. For example, in the U.S., the PPACA, through the Physician Payments Sunshine Act, requires certain drug, biologicals and medical supply manufacturers to collect and report to CMS information on payments or transfers of value to physicians (defined to include doctors, dentists, optometrists, podiatrists and chiropractors), other health care professionals (such as physicians assistants and nurse practitioners), and teaching hospitals, as well as investment and ownership interests held by such physicians and their immediate family members during the preceding calendar year. In addition, there has been a recent trend of increased state regulation of payments made to physicians. Certain states and/or local jurisdictions mandate implementation of compliance programs, compliance with the Office of Inspector General Compliance Program Guidance for Pharmaceutical Manufacturers and the Pharmaceutical Research and Manufacturers of America (PhRMA) Code on Interactions with Healthcare Professionals, the registration of pharmaceutical sales representatives and/or the tracking and reporting of gifts, compensation and other remuneration to physicians, marketing expenditures, and drug pricing. Likewise, in many non-U.S. countries there is an increasing focus on the relationship between drug companies and healthcare practitioners. Recently enacted non-U.S. legislation creates reporting obligations on payments, gifts and benefits made to these professionals; however, implementing regulations enacting such laws are still pending and subject to varying interpretations by courts and government agencies. The shifting regulatory environment and the need to implement systems to comply with multiple jurisdictions with different compliance and/or reporting requirements increases the costs of maintaining compliance and the possibility that we may violate one or more of the requirements and be subject to fines or sanctions.

Due to the breadth of the healthcare and privacy and data protection laws described above, the narrowness of available statutory and regulatory exceptions and safe harbors and the increased focus by law enforcement agencies in enforcing such laws, our business activities could be subject to challenge under one or more of such laws. If we are found in violation of one of these laws, we may be subject to significant criminal, civil or administrative sanctions, including damages, fines, disgorgement, imprisonment, contractual damages, reputational harm, diminished profits and future earnings, additional reporting requirements and oversight if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws, curtailment of our operations, and debarment, suspension or exclusion from participation in government healthcare programs, any of which could adversely affect our business, financial condition and results of operations.

If product liability lawsuits are successfully brought against us, we may incur substantial liabilities.

We are exposed to the potential product liability risks inherent in the testing, manufacturing and marketing of human pharmaceuticals. We currently maintain insurance against product liability lawsuits for the commercial sale of our products and for the clinical trials of our product candidates. Pharmaceutical companies must balance the cost of insurance with the level of coverage based on estimates of potential liability. Historically, the potential liability associated with product liability lawsuits for pharmaceutical products has been unpredictable. Although we believe that our current insurance is a reasonable estimate of our potential liability and represents a commercially reasonable balancing of the level of coverage as compared to the cost of the insurance, we may be subject to claims in connection with our clinical trials and commercial use of our products and product

candidates for which our insurance coverage may not be adequate and we may be unable to avoid significant liability if any product liability lawsuit is brought against us. If we are the subject of a successful product liability claim that exceeds the limits of any insurance coverage we obtain, we may incur substantial charges that would adversely affect our earnings and require the commitment of capital resources that might otherwise be available for the development and commercialization of our product programs.

We rely significantly on information technology systems and any failure, inadequacy, interruption or security lapse of that technology, including any cybersecurity incidents, could harm our ability to operate our business effectively and have a material adverse effect on our business, reputation, financial condition, and results of operations.

We rely significantly on our information technology systems to effectively manage and maintain our operations, inventory and internal reports, to manufacture and ship products to customers and to timely invoice them. Any failure, inadequacy or interruption of that infrastructure or security lapse (whether intentional or inadvertent) of that technology, including cybersecurity incidents or attacks, could harm our ability to operate our business effectively. Our ability to manage and maintain our operations, inventory and internal reports, to manufacture and ship our products to customers and timely invoice them depends significantly on our enterprise resource planning, production management and other information systems. Our technology systems, including our cloud technologies, continue to increase in multitude and complexity, making them potentially vulnerable to breakdown, cyberattack and other disruptions. Potential problems and interruptions associated with the implementation of new or upgraded technology systems or with maintenance or adequate support of existing systems could disrupt or reduce the efficiency of our operations and expose us to greater risk of security breaches. Cybersecurity incidents, including phishing attacks and attempts to misappropriate or compromise confidential or proprietary information or sabotage enterprise IT systems are becoming increasingly frequent and more sophisticated. Cybersecurity incidents resulting in the failure of our enterprise resource planning system, production management or other systems to operate effectively or to integrate with other systems, or a breach in security or other unauthorized access or unavailability of these systems, have occurred in the past and may affect our ability in the future to manage and maintain our operations, inventory and internal reports, and result in delays in product fulfillment and reduced efficiency of our operations.

As part of our business, we collect, store and transmit large amounts of confidential information, proprietary data, intellectual property and personal data. The information and data processed and stored in our technology systems, and those of our research collaborators, CROs, contract manufacturers, suppliers, distributors, or other third parties for which we depend to operate our business, may be vulnerable to loss, damage, denial-of-service, unauthorized access or misappropriation. Data security breaches may be the result of unauthorized or unintended activity (or lack of activity) by our employees or contractors or malware, hacking, business email compromise, phishing, ransomware or other cyberattacks directed by third parties. Third parties for which we depend on to operate our business have experienced and may continue to experience cybersecurity incidents. While we have implemented measures to protect our information and data stored in our technology systems and those of the third parties that we rely on, our efforts may not be successful.

We have experienced and may continue to experience cybersecurity incidents. Although to our knowledge we have not experienced any material incident or interruption to date, if such an event were to occur it could result in a material disruption of our development programs and commercial operations, including due to a loss, corruption or unauthorized disclosure of our trade secrets, personal data or other proprietary or sensitive information. Further, these cybersecurity incidents can lead to the public disclosure of personal information (including sensitive personal information) of our employees, clinical trial patients and others and result in demands for ransom or other forms of blackmail. Such attacks are of ever-increasing levels of sophistication and are made by groups and individuals with a wide range of motives (including industrial espionage) and expertise, including by organized criminal groups, "hacktivists", nation states and others. Moreover, the costs to us to investigate and mitigate cybersecurity incidents could be significant. For example, the loss of clinical trial data could result in delays in our product development or regulatory approval efforts and significantly increase our costs to recover or reproduce the data. Any security breach that results in the unauthorized access, use or disclosure of personal data may require us to notify individuals, governmental authorities, credit reporting agencies, or other parties pursuant to privacy and security laws and regulations or other obligations. Such a security compromise could harm our reputation, erode confidence in our information security measures, and lead to regulatory scrutiny. To the extent that any disruption or security breach resulted in a loss of, or damage to, our data or systems, or inappropriate disclosure of confidential, proprietary or personal information, we could be exposed to a risk of loss, enforcement measures, penalties, fines, indemnification claims, litigation and potential civil or criminal liability, which could materially adversely affect our business, financial condition and results of operations.

If a natural disaster, terrorist or criminal activity or other unforeseen event caused significant damage to our facilities or those of our third-party manufacturers and suppliers or significantly disrupted our operations or those of our third-party manufacturers and suppliers, we may be unable to meet demand for our products and lose potential revenue, have reduced margins, or be forced to terminate a program.

The occurrence of an earthquake or other catastrophic disaster could cause damage to our facility and equipment, or that of our third-party manufacturers or single-source suppliers, which could materially impair the ability for us or our third-party manufacturers to manufacture our products and product candidates. Our Galli Drive facility, located in Novato, California, is currently our only manufacturing facility for Aldurazyme, Naglazyme, Voxzogo and Palynziq and is one of two manufacturing

facilities for Brineura and Vimizim. Our gene therapy manufacturing facility is also located in Novato, California, and it is currently our only manufacturing facility to support valoctocogene roxaparvovec clinical development activities and the anticipated commercial demand for valoctocogene roxaparvovec, if approved. These facilities are located in the San Francisco Bay Area near known earthquake fault zones and are vulnerable to significant damage from earthquakes. We, the third-party manufacturers with whom we contract and our single-source suppliers of raw materials, which include many of our critical raw materials, are also vulnerable to damage from other types of disasters, including fires, explosions, floods, and similar events. If any disaster were to occur, or any terrorist or criminal activity caused significant damage to our facilities or the facilities of our third-party manufacturers and suppliers, our ability to manufacture our products, or to have our products manufactured, could be seriously, or potentially completely, impaired, and our commercialization efforts and revenues could be seriously impaired.

Moreover, other unforeseen events, such as power outages, could significantly disrupt our operations or those of our third-party manufacturers and suppliers, which could result in significant delays in the manufacture of our products and adversely impact our commercial operations and revenues. Pacific Gas and Electric Company, the electric utility in the San Francisco Bay Area where many of our facilities are located, commenced widespread blackouts during the fall of 2019 to avoid and contain wildfires sparked during strong wind events by downed power lines or equipment failures. While we have not experienced damage to our facilities or material disruption to our operations as a result of these power outages, ongoing blackouts, particularly if prolonged or frequent, could impact our business going forward. The insurance that we carry, the inventory that we maintain and our risk mitigation plans may not be adequate to cover our losses resulting from disasters or other business interruptions.

Our business is affected by macroeconomic conditions.

Various macroeconomic factors could adversely affect our business and the results of our operations and financial condition, including changes in inflation, interest rates and foreign currency exchange rates and overall economic conditions and uncertainties, including those resulting from the current and future conditions in the global financial markets. For instance, if inflation or other factors were to significantly increase our business costs, it may not be feasible to pass price increases on to our customers due to the process by which healthcare providers are reimbursed for our products by the government. Interest rates, the liquidity of the credit markets and the volatility of the capital markets could also affect the value of our investments and our ability to liquidate our investments in order to fund our operations. We purchase or enter into a variety of financial instruments and transactions, including investments in commercial paper, the extension of credit to corporations, institutions and governments and hedging contracts. If any of the issuers or counter parties to these instruments were to default on their obligations, it could materially reduce the value of the transaction and adversely affect our cash flows.

We sell our products in countries that face economic volatility and weakness. Although we have historically collected receivables from customers in those countries, sustained weakness or further deterioration of the local economies and currencies may cause customers in those countries to be unable to pay for our products. Additionally, if one or more of these countries were unable to purchase our products, our revenues would be adversely affected.

Interest rates and the ability to access credit markets could also adversely affect the ability of our customers/distributors to purchase, pay for and effectively distribute our products. Similarly, these macroeconomic factors could affect the ability of our contract manufacturers, sole-source or single-source suppliers to remain in business or otherwise manufacture or supply product. Failure by any of them to remain a going concern could affect our ability to manufacture products.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

The following table contains information about our significant owned and leased properties as of December 31, 2021:

Location	Approximate Square Feet	Use	Lease Expiration Date
San Rafael facility, San Rafael, California	407,300	office	Owned property
Several facilities in Novato, California	293,300	laboratory and office	Owned property
Several leased facilities in Novato, California	164,000	Office and warehouse	2023
Shanbally facility, Cork, Ireland	260,700	Manufacturing, laboratory and office	Owned property

We expect that these properties, together with our other smaller leased office facilities in various countries, will be adequate for our operations for the foreseeable future.

Item 3. Legal Proceedings

On September 25, 2020, a purported shareholder class action lawsuit was filed against us, our Chief Executive Officer, our President of Worldwide Research and Development and our Chief Financial Officer in the United States District Court in the Northern District of California, alleging violations under Sections 10(b) and 20(a) of the Securities Exchange Act of 1934 as amended (the Exchange Act). The complaint alleges that we made materially false or misleading statements regarding the clinical trials and Biologics License Application (BLA) for valoctocogene roxaparvec by purportedly failing to disclose that differences between the Company's Phase 1/2 and Phase 3 clinical studies limited the ability of the Phase 1/2 study to support valoctocogene roxaparvec's durability of effect and, as a result, that it was foreseeable that the FDA would not approve the BLA without additional data. The complaint seeks an unspecified amount of damages, prejudgment and post-judgment interest, attorneys' fees, expert fees, and other costs. The lead plaintiff filed an amended complaint in February 2021, dropping our Chief Financial Officer as a defendant, and asserting that the Company misled investors about the progress of the FDA's review of our BLA for valoctocogene roxaparvec. On April 22, 2021, we moved to dismiss the amended complaint. On January 6, 2022, the court denied our motion to dismiss. We answered the amended complaint on February 15, 2022. We believe that the claims have no merit and we intend to vigorously defend this action.

On October 22, 2021, a purported securities class action lawsuit was filed against us, our Chief Executive Officer, our current and prior Chief Financial Officers, and our President of Worldwide Research & Development in the United States District Court for the Northern District of California, alleging violations under Sections 10(b) and 20(a) of the Exchange Act. The complaint alleges that we made materially false or misleading statements regarding BMN 307 by purportedly failing to disclose information about BMN 307's safety profile, and by purportedly overstating BMN 307's clinical and commercial prospects. The complaint seeks an unspecified amount of damages, pre-judgment and post-judgment interest, attorneys' fees, expert fees, and other costs. The Court appointed lead plaintiffs and lead counsel on January 10, 2022. The deadline for lead plaintiffs to file an amended complaint is March 25, 2022. We believe that the claims have no merit and we intend to vigorously defend this action.

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

Our common stock is listed under the symbol "BMRN" on the Nasdaq Global Select Market.

We have never paid any cash dividends on our common stock and we do not anticipate paying cash dividends in the foreseeable future.

Recent Sales of Unregistered Securities

We did not sell any unregistered securities during the year ended December 31, 2021 that were not previously disclosed in a Quarterly Report on Form 10-Q or in a Current Report on Form 8-K.

Issuer Purchases of Equity Securities

None.

Holders

As of February 22, 2022, there were 38 holders of record of 184,032,162 outstanding shares of our common stock.

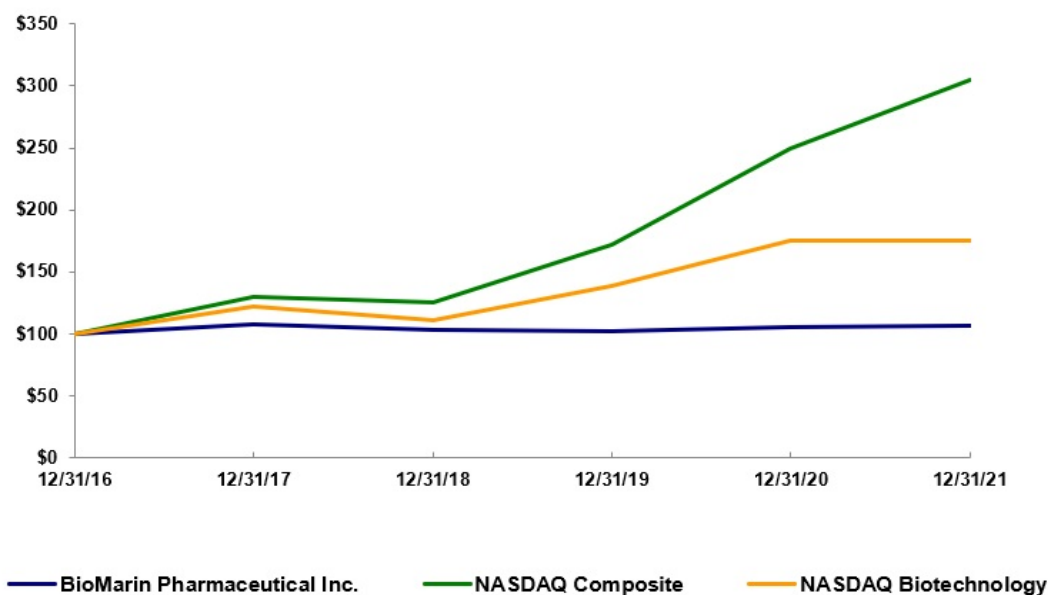
Performance Graph

The following is not deemed “filed” with the Securities and Exchange Commission and is not to be incorporated by reference into any filing we make under the Securities Act of 1933, as amended, whether made before or after the date hereof and irrespective of any general incorporation by reference language in such filing.

The following graph shows the value of an investment in BioMarin common stock, the Nasdaq Composite Index and the Nasdaq Biotechnology Index, assuming the investment of \$100.00 at the beginning of the period and the reinvestment of dividends, if any. Our common stock is traded on the Nasdaq Global Select Market and is a component of both the Nasdaq Composite Index and the Nasdaq Biotechnology Index. The comparisons shown in the graph are based upon historical data and we caution that the stock price performance shown in the graph is not indicative of, nor intended to forecast, the potential future performance of our stock.

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*

Among BioMarin Pharmaceutical Inc., the NASDAQ Composite Index and the NASDAQ Biotechnology Index



* \$100 invested on December 31, 2016 in stock or index, including reinvestment of dividends

	2016	2017	2018	2019	2020	2021
BioMarin Pharmaceutical Inc.	\$ 100.00	\$ 107.64	\$ 102.79	\$ 102.06	\$ 105.85	\$ 106.65
Nasdaq Composite Index	\$ 100.00	\$ 129.64	\$ 125.96	\$ 172.17	\$ 249.51	\$ 304.85
Nasdaq Biotechnology	\$ 100.00	\$ 121.63	\$ 110.85	\$ 138.69	\$ 175.33	\$ 175.37

Item 6. [Reserved]

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

The following Management's Discussion and Analysis of Financial Condition and Results of Operations (MD&A) is intended to help the reader understand our results of operations and financial condition. MD&A is provided as a supplement to, and should be read in conjunction with, our audited Consolidated Financial Statements and the accompanying notes to the Consolidated Financial Statements and other disclosures included in this Annual Report on Form 10-K, including the disclosures under "Risk Factors" in Part I, Item 1A of this Annual Report on Form 10-K. In particular, we encourage you to review the risk factor related to the impact of the coronavirus pandemic, "The COVID-19 pandemic could continue to materially adversely affect our business, results of operations and financial condition." These risks and uncertainties could cause actual results to differ significantly from those projected in forward-looking statements contained in this report or implied by past results and trends. Forward-looking statements are statements that attempt to forecast or anticipate future developments in our business, financial condition or results of operations. See the section titled "Forward-Looking Statements" that appears at the beginning of this Annual Report on Form 10-K. These statements, like all statements in this report, speak only as of the date of this Annual Report on Form 10-K (unless another date is indicated), and, except as required by law, we undertake no obligation to update or revise these statements in light of future developments. Our Consolidated Financial Statements have been prepared in accordance with United States (U.S.) generally accepted accounting principles (GAAP) and are presented in U.S. Dollars (USD).

Overview

We are a global biotechnology company that develops and commercializes innovative therapies for people with serious and life-threatening rare diseases and medical conditions. We select product candidates for diseases and conditions that represent a significant unmet medical need, have well-understood biology and provide an opportunity to be first-to-market or offer a significant benefit over existing products.

Our portfolio consists of seven commercial products and multiple clinical and preclinical product candidates for the treatment of various diseases. A summary of our commercial products, as of December 31, 2021, is provided below:

Commercial Products	Indication
Vimizim (elosulfase alpha)	MPS IVA ⁽¹⁾
Naglzyme (galsulfase)	MPS VI ⁽²⁾
Kuvan (sapropterin dihydrochloride)	PKU ⁽³⁾
Palynziq (pegvaliase-pqpz)	PKU ⁽⁴⁾
Brineura (cerliponase alfa)	CLN2 ⁽⁵⁾
Voxzogo (vosoritide)	Achondroplasia
Aldurazyme (laronidase)	MPS I ⁽⁶⁾

- (1) For the treatment of Mucopolysaccharidosis IV Type A
- (2) For the treatment of Mucopolysaccharidosis VI
- (3) For the treatment of phenylketonuria
- (4) For adult patients with PKU
- (5) For the treatment of late infantile neuronal ceroid lipofuscinosis type 2
- (6) For the treatment of Mucopolysaccharidosis I

A summary of our on-going clinical development programs as of December 31, 2021, is provided below:

Clinical Development Programs	Target Indication	Stage
Valoctocogene roxaparvovec	Severe Hemophilia A	Clinical Phase 3
BMN 307	PKU	Clinical Phase 1/2
BMN 255	Primary hyperoxaluria	Clinical Phase 1/2

Management's Discussion and Analysis of Financial Condition and Results of Operations (continued)
(In millions of U.S. Dollars, except as otherwise disclosed)

2021 Financial Highlights

Key components of our results of operations include the following:

	Years Ended December 31,		
	2021	2020	2019
Total revenues	\$ 1,846.3	\$ 1,860.5	\$ 1,704.0
Cost of sales	\$ 470.5	\$ 524.3	\$ 359.5
Research and Development (R&D) expense	\$ 628.8	\$ 628.1	\$ 715.0
Selling, general and administrative (SG&A) expense	\$ 759.4	\$ 737.7	\$ 680.9
Gain on sale of nonfinancial assets	\$ —	\$ (59.5)	\$ (25.0)
Benefit from income taxes	\$ (11.3)	\$ (901.4)	\$ (71.0)
Net income (loss)	\$ (64.1)	\$ 859.1	\$ (23.8)

See "Results of Operations" below for discussion of our results for the periods presented.

Uncertainty Relating to the COVID-19 Pandemic

The COVID-19 pandemic continues to affect economies and business around the world. Our global revenue sources, mostly in the form of demand interruptions such as missed patient infusions and delayed treatment starts for new patients, and our overall business operations were impacted by COVID-19 during the years ended December 31, 2021 and 2020 and we anticipate a continued impact on our financial results in 2022. The extent and duration of such effects remain uncertain and difficult to predict, particularly as virus variants continue to spread. We are actively monitoring and managing our response and assessing actual and potential impacts to our operating results and financial condition, as well as developments in our business, which could further impact the developments, trends and expectations described below. See the risk factor related to the impact of the COVID-19 pandemic, "The COVID-19 pandemic could continue to materially adversely affect our business, results of operations and financial condition." described in "Risk Factors" in Part I, Item 1A of this Annual Report on Form 10-K.

Business Developments

We continued to grow our commercial business and advance our product candidate pipeline during 2021. We believe that the combination of our internal research programs, acquisitions and partnerships will allow us to continue to develop and commercialize innovative therapies for people with serious and life-threatening rare diseases and medical conditions. Below is a summary of key business developments:

Continued Emphasis on Research and Development

Late-stage Regulatory Portfolio

- **Voxzogo:** In August 2021, the European Commission approved Voxzogo for the treatment of children, ages two years and older. Regulatory approvals were also received in Brazil and in the U.S. in November 2021, for children ages five and older with open growth plates. The launch is actively underway, with market access and reimbursement progressing as anticipated. At the end of 2021, there were seven active markets contributing to Voxzogo sales.

Voxzogo marketing authorization reviews in Japan and Australia are in process, with potential approvals in those countries in 2022.

In February 2022, we announced an update from the Phase 2 randomized, double-blind, placebo-controlled Voxzogo study in infants and young children up to five years of age with achondroplasia. Results at 52 weeks trended in favor of Voxzogo compared to placebo on height (adjusted for age and gender) and annualized growth velocity, with no worsening in proportionality in the overall study population. The safety profile was generally consistent with older children from the Phase 3 study and product label population. We intend to initiate discussions with regulatory health authorities to discuss next steps regarding efforts to expand access to Voxzogo treatment for this younger age group.
- **Valoctocogene roxaparvovec:** The European Medicines Agency (EMA) validated our Marketing Authorization Application (MAA) for valoctocogene roxaparvovec resulting in an anticipated Committee for Medicinal Products for Human Use opinion in the second quarter of 2022. We have provided the EMA with two-year follow-up safety and efficacy data from the GENER8-1 study.

Management's Discussion and Analysis of Financial Condition and Results of Operations (continued) (In millions of U.S. Dollars, except as otherwise disclosed)

Based on the favorable results from the two-year follow-up safety and efficacy data from the GENE8-1 study, we are targeting a Biologics License Application (BLA) resubmission for valoctocogene roxaparvovec in the second quarter of 2022. If the resubmission satisfies Food and Drug Administration's (FDA) response to the Complete Response Letter received in August 2020, we expect resubmission will be followed by a six-month review procedure by the FDA.

Select Earlier-stage Development Portfolio

- BMN 307 gene therapy product candidate for PKU: In September 2021, the FDA placed a clinical hold on PHEarless, the Phase 1/2 study evaluating BMN 307, an investigational AAV5-phenylalanine hydroxylase (PAH) gene therapy, on adults with PKU. The hold was based on pre-clinical study findings from a model designed to understand the durability of BMN 307 activity in mice bearing two germline mutations, one rendering the mice immunodeficient. The durability study was one of multiple pre-clinical studies we conducted and was not designed to test safety. However, we promptly notified the FDA upon availability of the integration site analysis results. The FDA initiated a clinical hold shortly after being notified and we announced the hold before the next business day after informing the FDA. In February 2022, the FDA requested data from additional non-clinical studies to assess theoretical oncogenic risk to human study participants, which is expected to take several quarters. We will communicate next steps for the program when available.
- BMN 255 for primary hyperoxaluria type 1, a subset of chronic renal disease: The Investigational New Drug application (IND) for BMN 255 is active and we are dosing subjects with dose selection for advanced studies expected in the second half of 2022. We believe the availability of a potent, orally bioavailable, small molecule like BMN 255 may be able to significantly reduce disease and treatment burden in certain people with chronic renal disease.

2022 Outlook

We expect that our product pipeline investments and expanding commercial infrastructure will enable us to execute on our 2022 operating objectives. In 2022, we will continue to focus on our key operating objectives which include continued progression of our product pipeline and continued global expansion of our commercial products. From an R&D perspective, we expect to continue to invest in our various ongoing clinical studies which support both our commercial products and research and early development pipeline. We expect to move forward on our late and early-stage clinical studies for new product candidates, including the resubmission of the BLA for valoctocogene roxaparvovec as noted above. From a commercial perspective, we expect to continue to support our global business as it grows, including support of the commercialization of Voxzogo and pre-commercialization activities related to valoctocogene roxaparvovec.

We expect to continue to experience significant declines in Kuvan revenues in the U.S. due to the October 2020 loss of market exclusivity. We anticipated and prepared for this loss of exclusivity and the reduction in our market share, as well as the adverse effect on our revenues and results of operations. We expect to experience growth in Net Product Revenues with respect to our new and other existing commercial products. We continue to monitor conditions in the macroeconomic environment that could affect our ability to achieve our goals, such as the continuing impact of the COVID-19 pandemic on all aspects of our business, changes in the reimbursement and payer landscape, changes in economic conditions in certain key markets, particularly in Europe and Latin America, market competition and the launch of generic competitors, international government pricing pressures and the potential volatility in foreign currency exchange rates. We will adjust our business processes, as appropriate, to attempt to mitigate these risks to our business.

Critical Accounting Estimates

In preparing our Consolidated Financial Statements in accordance with U.S. GAAP and pursuant to the rules and regulations promulgated by the Securities and Exchange Commission (the SEC), we make assumptions, judgments and estimates that can have a significant impact on our net income/loss and affect the reported amounts of certain assets, liabilities, revenue and expenses, and related disclosures. On an ongoing basis, we evaluate our estimates and discuss our critical accounting policies and estimates with the Audit Committee of our Board of Directors. We base our estimates on historical experience and various other assumptions that we believe to be reasonable under the circumstances. Actual results could differ materially from these estimates under different assumptions or conditions. Historically, our assumptions, judgments and estimates relative to our critical accounting policies have not differed materially from actual results.

The full extent to which the ongoing COVID-19 pandemic could continue to directly or indirectly impact our business, results of operations and financial condition, including revenues, expenses, reserves and allowances, manufacturing, clinical trials and research and development costs will depend on future developments that continue to remain highly uncertain at this time,

Management's Discussion and Analysis of Financial Condition and Results of Operations (continued)
(In millions of U.S. Dollars, except as otherwise disclosed)

particularly as virus variants continue to spread. As events continue to evolve and additional information becomes available, our estimates may change materially in future periods.

Our significant accounting policies are described in Note 1 to our accompanying Consolidated Financial Statements included in this Annual Report on Form 10-K. We believe the critical accounting policies below reflect the most critical judgments and estimates used in the preparation of our Consolidated Financial Statements.

Revenue Recognition and Related Allowances

Net Product Revenues – We recognize revenue when the customer obtains control of promised goods or services, in an amount that reflects the consideration which we expect to receive in exchange for those goods or services. For Aldurazyme revenues, we receive a payment ranging from 39.5% to 50% on worldwide net Aldurazyme sales by Sanofi (formerly referred to as Sanofi Genzyme) depending on sales volume, which is included in Net Product Revenues in our Consolidated Statements of Operations. We recognize our best estimate of the entire revenue that we expect to receive when the product is released and control is transferred to Sanofi. We record Aldurazyme net product revenues based on the estimated variable consideration payable when the product is sold through by Sanofi. Differences between the estimated variable consideration to be received from Sanofi and actual payments received are not expected to be material. If actual results vary from our estimates, we will make adjustments, which would affect Net Product Revenues and earnings in the period such variances become known.

Gross-to-Net Sales Adjustments – We record product sales net of estimated mandatory and supplemental discounts to government payers, in addition to discounts to private payers, and other related charges. Rebates, cash discounts and distributor fees represent the majority of our gross-to-net deductions and are recorded in the same period the related sales occur. Rebates include amounts paid to Medicaid, other government programs, certain managed care providers, as well as foreign government rebates. Rebates, branded co-pay assistance programs, cash discounts and distributor fees are estimates based on contractual arrangements or statutory obligations, which may vary by product and payer. Estimation requires evaluation of our historical experience, customer mix, current contractual and statutory obligations, specific known market events and trends and industry data. We evaluate our customer mix to estimate which sales will be subject to these revenue dilutive items and consider changes to government program guidelines that would impact the actual rebates and/or our estimates of which sales qualify for such rebates.

We update our estimates and assumptions each quarter based on actual historical experience, current contractual and statutory requirements, specific known market events and trends and forecasted customer buying and payment patterns and record any necessary adjustments to our reserves to reflect current information. We believe the methodologies that we use to estimate allowances are reasonable and appropriate given the facts and circumstances. However, actual results may differ significantly from our estimates.

The following table summarizes the consolidated activities and ending balances of all our gross-to-net sales adjustments:

		Balance at Beginning of Year	Provision for Current Period Sales	Payments	Balance at End of Year
2021	Year ended December 31,	\$ 104.4	\$ 252.9	\$ (271.7)	\$ 85.6
2020	Year ended December 31,	\$ 114.4	\$ 239.9	\$ (249.9)	\$ 104.4
2019	Year ended December 31,	\$ 80.7	\$ 198.1	\$ (164.4)	\$ 114.4

Inventory Produced Prior to Regulatory Approval

When future commercialization for a product candidate is considered probable and management believes that material uncertainties related to the ultimate regulatory approval have been significantly reduced and we expect to realize economic benefit in the future, we capitalize pre-launch or pre-qualification manufacturing costs prior to regulatory approval. For inventories that are capitalized in preparation of product launch, management considers a number of factors based on the information available at the time, including the product candidate's current status in the drug development and regulatory approval process, results from the related pivotal clinical trial, results from meetings with relevant regulatory agencies prior to the filing of regulatory applications, historical experience, as well as potential impediments to the approval process such as product safety or efficacy, as well as commercialization and market trends.

In applying the lower of cost or net realizable value to pre-launch inventory, we estimate a range of likely commercial prices based on our comparable commercial products and consider the product candidate's stability data for all of the pre-approval production to date to determine whether there is adequate expected shelf life for the capitalized pre-launch production costs. If additional requirements are subsequently presented by the regulatory authorities prior to their final decision, thus extending anticipated regulatory approval timelines resulting in expiration of the product prior to revised demand forecasts, as occurred in the

Management's Discussion and Analysis of Financial Condition and Results of Operations (continued)
(In millions of U.S. Dollars, except as otherwise disclosed)

third quarter of 2020 with valoctocogene roxaparovec, the pre-launch inventory costs are expensed to Cost of Sales. If the marketing application is ultimately rejected by the applicable regulators and the pre-launch inventory cannot be sold for commercial use, the pre-launch inventory costs are expensed to R&D. As of December 31, 2021, there were no pre-launch inventory costs on our Consolidated Balance Sheets.

Income Taxes

We calculate and provide for income taxes in each of the tax jurisdictions in which we operate. Our Consolidated Balance Sheets reflect net deferred tax assets and liabilities, which are measured using enacted tax rates. The net deferred tax assets primarily represent the tax benefit of tax credits and timing differences between book and tax recognition of certain revenue and expense items, net of a valuation allowance. When it is more likely than not that all or some portion of deferred tax assets may not be realized, we establish a valuation allowance for the amount that may not be realized. We utilize financial projections to support our net deferred tax assets, which contain significant assumptions and estimates of future operations. If such assumptions were to differ significantly, it may have a material impact on our ability to realize our deferred tax assets. Changes in our valuation allowance will result in a change to tax expense.

We establish liabilities or reduce assets for certain tax positions when we believe those certain tax positions are not more likely than not to be sustained if challenged. Each quarter, we evaluate these uncertain tax positions and adjust the related tax assets and liabilities in light of changing facts and circumstances.

We are subject to income taxes in the U.S. and various foreign jurisdictions, including Ireland. Due to economic and political conditions, various countries are actively considering changes to existing tax laws. We cannot predict the form or timing of potential legislative changes that could have a material adverse impact on our results of operations. Management is not aware of any potential changes that would have a material effect on our Consolidated Financial Statements. See Note 15 to our accompanying Consolidated Financial Statements for additional discussion.

Recent Accounting Pronouncements

See Note 1 to our accompanying Consolidated Financial Statements for a full description of recent accounting pronouncements and our expectation of their impact, if any, on our results of operations and financial condition.

Management's Discussion and Analysis of Financial Condition and Results of Operations (continued)
(In millions of U.S. Dollars, except as otherwise disclosed)

Results of Operations
Net Income (Loss)

Net Income (Loss) consisted of the following:

	Years Ended December 31,			2021 vs. 2020	2020 vs. 2019
	2021	2020	2019		
Total revenues	\$ 1,846.3	\$ 1,860.5	\$ 1,704.0	\$ (14.2)	\$ 156.5
Cost of sales	470.5	524.3	359.5	(53.8)	164.8
R&D expense	628.8	628.1	715.0	0.7	(86.9)
SG&A expense	759.4	737.7	680.9	21.7	56.8
Intangible asset amortization and contingent consideration	69.9	66.7	74.1	3.2	(7.4)
Gain on sale of nonfinancial assets	—	(59.5)	(25.0)	59.5	(34.5)
Other income (expense), net	7.0	(5.5)	5.7	12.5	(11.2)
Benefit from income taxes	(11.3)	(901.4)	(71.0)	890.1	(830.4)
Net income (loss)	<u>\$ (64.1)</u>	<u>\$ 859.1</u>	<u>\$ (23.8)</u>	<u>\$ (923.2)</u>	<u>\$ 882.9</u>

2021 compared to 2020

The increase in Net Loss for the year ended December 31, 2021 as compared to 2020 was primarily attributed to the following:

- decreased benefit from income taxes of \$890.1 million, primarily due to the completion of an intra-entity transfer of certain IP rights to an Irish subsidiary where our Ex-U.S. regional headquarters are located and we have significant manufacturing and commercial operations, to better align ownership of IP rights with how the business operates, which resulted in a tax benefit of \$835.1 million based on the fair value of the transferred IP rights in the third quarter of 2020. There was no similar transaction in 2021; and
- decreased gain on sale of nonfinancial assets of \$59.5 million due to the divestiture and sale of the Firdapse business in 2020. There was no similar transaction in 2021; partially offset by
- an increase in gross profit primarily driven by the absence of the \$81.2 million inventory charge related to pre-launch valoctocogene roxaparvec inventory reserves following regulatory responses received in the third quarter of 2020 requesting additional data extending the anticipated regulatory approval timelines.

Management's Discussion and Analysis of Financial Condition and Results of Operations (continued)
(In millions of U.S. Dollars, except as otherwise disclosed)

Net Product Revenues

Net Product Revenues consisted of the following:

	Years Ended December 31,			2021 vs. 2020	2020 vs. 2019
	2021	2020	2019		
Net product revenues by product:					
Vimizim	\$ 623.1	\$ 544.4	\$ 544.3	\$ 78.7	\$ 0.1
Naglazyme	380.4	391.3	374.3	(10.9)	17.0
Kuvan	285.8	457.7	463.4	(171.9)	(5.7)
Palynziq	237.5	171.0	86.9	66.5	84.1
Brineura	128.0	110.2	72.0	17.8	38.2
Voxzogo	5.9	—	—	5.9	—
Firdapse	—	1.2	22.3	(1.2)	(21.1)
Total net product revenues marketed by the Company	\$ 1,660.7	\$ 1,675.8	\$ 1,563.2	\$ (15.1)	\$ 112.6
Aldurazyme net product revenues marketed by Sanofi	122.8	130.1	97.8	(7.3)	32.3
Total net product revenues	\$ 1,783.5	\$ 1,805.9	\$ 1,661.0	\$ (22.4)	\$ 144.9

2021 compared to 2020

The decrease in Net Product Revenues for the year ended December 31, 2021 as compared to 2020 was primarily attributed to the following:

- Kuvan: the decrease was primarily attributed to generic competition as a result of the loss of exclusivity in the U.S. that occurred in October 2020. We anticipated and prepared for this loss of exclusivity and the reduction in our market share, as well as the adverse effect on our revenues and results of operations. We expect to continue to experience adverse effects on our market share and revenues in the future.
- Naglazyme: the decrease was primarily attributed to timing of orders from Latin America and the Middle East partially offset by higher sales in Europe;
- Aldurazyme: the decrease was attributed to higher volume of product fulfillment to Sanofi in 2020 as compared to 2021; partially offset by
- Palynziq: the increase was primarily attributed to a combination of revenue from more patients achieving maintenance dosing in the U.S. and new patients initiating therapy in the U.S.;
- Brineura: the increase was primarily attributed to new patients initiating therapy in Europe and North America; and
- Voxzogo: the increase was due to the commercial launch in 2021, following regulatory approvals in the EU and the U.S. in the third and fourth quarters of 2021, respectively.

In certain countries governments place large periodic orders for Naglazyme and Vimizim. We expect that the timing of these large government orders will continue to be inconsistent, which can create significant period to period variation in our revenues. We anticipate the COVID-19 pandemic will have a continued impact on 2022 Net Product Revenues as many of our products are administered via infusions in a clinic or hospital setting and/or by a healthcare professional. Although we continue to work with our patient community and health care providers to find alternative arrangements where necessary, such as providing infusions at home, the revenue from the doses of our products that are missed by patients and the lost revenue from delayed treatment starts for new patients will never be recouped.

See the risk factors "The sale of generic versions of Kuvan by generic manufacturers may adversely affect our revenues and results of operations" and "The COVID-19 pandemic could continue to materially adversely affect our business, results of operations and financial condition" in "Risk Factors" included in Part I, Item 1A of this Annual Report on Form 10-K for additional information.

Management's Discussion and Analysis of Financial Condition and Results of Operations (continued)
(In millions of U.S. Dollars, except as otherwise disclosed)

We face exposure to movements in foreign currency exchange rates, primarily the Euro. We use forward foreign currency exchange contracts to hedge a percentage of our foreign currency exposure. The following table shows our Net Product Revenues denominated in USD and foreign currencies:

	Years Ended December 31,				
	2021	2020	2019	2021 vs. 2020	2020 vs. 2019
Sales denominated in USD	\$ 961.1	\$ 1,063.2	\$ 932.6	\$ (102.1)	\$ 130.6
Sales denominated in foreign currencies	822.4	742.7	728.4	79.7	14.3
Total net product revenues	<u>\$ 1,783.5</u>	<u>\$ 1,805.9</u>	<u>\$ 1,661.0</u>	<u>\$ (22.4)</u>	<u>\$ 144.9</u>

	Years Ended December 31,				
	2021	2020	2019	2021 vs. 2020	2020 vs. 2019
Favorable (unfavorable) impact of foreign currency exchange rates on product sales denominated in currencies other than USD	\$ 2.3	\$ (23.3)	\$ (24.8)	\$ 25.6	\$ 1.5

Relative to the USD, the favorable impact in 2021 was primarily driven by a strengthening of the Euro and Great British Pound; partially offset by weakening of currencies in Latin American markets such as Brazil and Argentina.

See "Quantitative and Qualitative Disclosures about Market Risk" in Part II, Item 7A of this Annual Report on Form 10-K for information on currency exchange rate risk related to our Net Product Revenues.

Royalty and Other Revenues

Royalty and Other Revenues include royalties earned on net sales of products sold by third parties, up-front licensing fees, milestones achieved by licensees or sublicensees and rental income associated with the tenants in our facilities.

	Years Ended December 31,				
	2021	2020	2019	2021 vs. 2020	2020 vs. 2019
Royalty and other revenues	\$ 62.8	\$ 54.6	\$ 43.0	\$ 8.2	\$ 11.6

The increase in Royalty and Other Revenues in 2021 as compared to 2020 was primarily due a license payment received from a third party due to their achievement of a regulatory milestone in the first quarter of 2021 and the subsequent royalties earned on third party net sales of the approved product.

We expect to continue to earn royalties from third parties in the future.

Cost of Sales and Gross Margin

Cost of Sales includes raw materials, personnel and facility and other costs associated with manufacturing our commercial products. These costs include production materials, production costs at our manufacturing facilities, third-party manufacturing costs, and internal and external final formulation and packaging costs. Cost of Sales also includes royalties payable to third parties based on sales of our products and charges for inventory valuation reserves.

The following table summarizes our Cost of Sales and gross margin:

	Years Ended December 31,				
	2021	2020	2019	2021 vs. 2020	2020 vs. 2019
Total revenues	\$ 1,846.3	\$ 1,860.5	\$ 1,704.0	\$ (14.2)	\$ 156.5
Cost of sales	\$ 470.5	\$ 524.3	\$ 359.5	\$ (53.8)	\$ 164.8
Gross margin	74.5 %	71.8 %	78.9 %	2.7 %	(7.1)%

Cost of Sales decreased for 2021 compared to 2020 primarily due to the absence of the \$87.2 million pre-launch valoctocogene roxaparovec inventory charge following regulatory responses received in third quarter of 2020 requesting additional data extending the anticipated regulatory approval timelines. Gross margin for 2021 compared to 2020 increased

Management's Discussion and Analysis of Financial Condition and Results of Operations (continued)
(In millions of U.S. Dollars, except as otherwise disclosed)

primarily due to the pre-launch valoctocogene roxaparvovec inventory charge in the third quarter of 2020, partially offset by unfavorable impact of product mix as there were higher sales of lower margin products.

We expect gross margin to range between 75% and 77% over the next twelve months.

Research and Development

R&D expense includes costs associated with the research and development of product candidates and post-marketing research commitments related to our approved products. R&D expense primarily includes preclinical and clinical studies, personnel and raw materials costs associated with manufacturing clinical product, quality control and assurance, other R&D activities, facilities and regulatory costs.

We manage our R&D expense by identifying the R&D activities we anticipate will be performed during a given period and then prioritizing efforts based on scientific data, probability of successful development, market potential, available human and capital resources and other similar considerations. We continually review our product pipeline and the development status of product candidates and, as necessary, reallocate resources among the research and development portfolio that we believe will best support the future growth of our business.

We continuously evaluate the recoverability of costs associated with pre-launch or pre-qualification manufacturing activities, and capitalize the costs incurred related to those activities if it is determined that recoverability is highly likely and therefore future revenues are expected. When regulatory approval and the likelihood of future revenues for a product candidate are less certain, the related manufacturing costs are expensed as R&D expenses. We did not have any pre-launch or pre-qualification manufacturing activities capitalized as of December 31, 2021. See "Critical Accounting Estimates — Inventory Produced Prior to Regulatory Approval" above, and Note 5 to our accompanying Consolidated Financial Statements for additional information regarding our inventory.

R&D expense consisted of the following:

	Years Ended December 31,			2021 vs. 2020	2020 vs. 2019
	2021	2020	2019		
Research and early development	\$ 190.9	\$ 156.4	\$ 75.0	\$ 34.5	\$ 81.4
Voxzogo	129.3	130.8	120.9	(1.5)	9.9
Valoctocogene roxaparvovec	115.1	116.2	192.8	(1.1)	(76.6)
Other approved products	108.5	133.7	175.8	(25.2)	(42.1)
BMN 307	60.9	72.6	89.2	(11.7)	(16.6)
BMN 255	8.7	8.6	4.4	0.1	4.2
Other	15.4	9.8	56.9	5.6	(47.1)
Total R&D expense	<u>\$ 628.8</u>	<u>\$ 628.1</u>	<u>\$ 715.0</u>	<u>\$ 0.7</u>	<u>\$ (86.9)</u>

2021 compared to 2020

R&D expense was relatively flat but comprised the following offsetting components:

- higher spend in research and early development programs due to increased pre-clinical activities and a \$10.0 million development milestone earned by a third party in the third quarter of 2021; partially offset by
- a reduction in clinical activities related to approved products as various long-term post marketing studies were completed and
- lower BMN 307 program expense primarily due to decreased clinical manufacturing activities, as no clinical product was manufactured in 2021.

We expect R&D expense to increase in future periods compared to 2021, primarily due to increased spending on preclinical activities for our research and early development programs while we continue to develop our later stage programs.

Selling, General and Administrative

Sales and marketing (S&M) expense primarily consisted of employee-related expenses for our sales group, brand marketing, patient support groups and pre-commercialization expenses related to our product candidates. General and

Management's Discussion and Analysis of Financial Condition and Results of Operations (continued)
(In millions of U.S. Dollars, except as otherwise disclosed)

administrative (G&A) expense primarily consisted of corporate support and other administrative expenses, including employee-related expenses.

SG&A expenses consisted of the following:

	Years Ended December 31,			2021 vs. 2020	2020 vs. 2019
	2021	2020	2019		
S&M expense	\$ 405.1	\$ 403.4	\$ 382.2	\$ 1.7	\$ 21.2
G&A expense	354.3	334.3	298.7	20.0	35.6
Total SG&A expense	\$ 759.4	\$ 737.7	\$ 680.9	\$ 21.7	\$ 56.8

S&M expenses by product were as follows:

	Years Ended December 31,			2021 vs. 2020	2020 vs. 2019
	2021	2020	2019		
PKU Products (Kuvan and Palynziq)	\$ 124.6	\$ 127.5	\$ 137.2	\$ (2.9)	\$ (9.7)
MPS Products (Aldurazyme, Naglazyme and Vimizim)	102.9	108.1	119.2	(5.2)	(11.1)
Voxzogo	75.1	34.5	13.3	40.6	21.2
Valoctocogene roxaparovec	54.0	87.3	50.3	(33.3)	37.0
Brineura	36.2	37.8	45.4	(1.6)	(7.6)
Other	12.3	8.2	16.8	4.1	(8.6)
Total S&M expense	\$ 405.1	\$ 403.4	\$ 382.2	\$ 1.7	\$ 21.2

2021 compared to 2020

The increase in S&M expense was primarily a result of an increase in pre-commercial activities related to Voxzogo, partially offset by a reduction in valoctocogene roxaparovec activities, based on a change in anticipated timelines for potential approval following regulatory responses received in the third quarter of 2020 requesting additional data, and decreased activity related to our MPS Products.

The increase in G&A expense was primarily due to the idle plant time related to maintaining our valoctocogene roxaparovec manufacturing capabilities and higher employee-related expenses.

We expect SG&A expense to increase in future periods as a result of preparing to launch new products and support of our global business as it grows.

Intangible Asset Amortization and Contingent Consideration and Gain on Sale of Nonfinancial Assets

Changes during the periods presented for Intangible Asset Amortization and Contingent Consideration and Gain on Sale of Nonfinancial Assets were as follows:

	Years Ended December 31,			2021 vs. 2020	2020 vs. 2019
	2021	2020	2019		
Amortization of intangible assets	\$ 61.9	\$ 62.2	\$ 53.5	\$ (0.3)	\$ 8.7
Changes in the fair value of contingent consideration (gain) / loss	8.0	4.5	20.6	3.5	(16.1)
Total intangible asset amortization and contingent consideration	\$ 69.9	\$ 66.7	\$ 74.1	\$ 3.2	\$ (7.4)
Gain on sale of nonfinancial assets	\$ —	\$ 59.5	\$ 25.0	\$ (59.5)	\$ 34.5

Management's Discussion and Analysis of Financial Condition and Results of Operations (continued)
(In millions of U.S. Dollars, except as otherwise disclosed)

2021 compared to 2020

Fair value of contingent consideration: the 2021 increase in the change in the fair value of contingent consideration as compared to 2020 was due to changes in the estimated probability of achieving sales milestones related to our PKU products.

Amortization of intangible assets: the change in 2021 as compared to 2020 was relatively flat.

Gain on Sale of Nonfinancial Assets: the decrease in 2021 as compared to 2020 is due to the recognition of a \$59.5 million gain in 2020 related to the divestiture and sale of the Firdapse business. See Note 3 to our accompanying Consolidated Financial Statements for additional information.

Interest Income

We invest our cash equivalents and investments in U.S. government securities and other high credit quality debt securities in order to limit default and market risk.

	Years Ended December 31,			2021 vs. 2020	2020 vs. 2019
	2021	2020	2019		
Interest income	\$ 10.5	\$ 16.6	\$ 22.7	\$ (6.1)	\$ (6.1)

The decrease in Interest Income during 2021 compared to 2020 was primarily due to lower interest rates.

We expect Interest Income to be higher over the next 12 months due to anticipated higher interest rates and yields on our cash equivalents and investments.

Interest Expense

We incur Interest Expense primarily on our convertible debt. Interest Expense for the periods presented was as follows:

	Years Ended December 31,			2021 vs. 2020	2020 vs. 2019
	2021	2020	2019		
Interest expense	\$ 15.3	\$ 29.3	\$ 23.5	\$ (14.0)	\$ 5.8

The decrease in Interest Expense in 2021 compared to 2020 was primarily due to the maturity of our 1.50% senior subordinated convertible notes which matured and were settled in October 2020.

We do not expect Interest Expense to fluctuate significantly over the next 12 months. See Note 10 to our accompanying Consolidated Financial Statements for additional information regarding our debt.

Management's Discussion and Analysis of Financial Condition and Results of Operations (continued)
(In millions of U.S. Dollars, except as otherwise disclosed)

Other Income, Net

Other Income, Net for the periods presented was as follows:

	Years Ended December 31,			2021 vs. 2020	2020 vs. 2019
	2021	2020	2019		
Other income, net	\$ 11.8	\$ 7.1	\$ 6.4	\$ 4.7	\$ 0.7

Other Income, Net in 2021 increased compared to the same period in 2020 primarily due to the receipt of insurance proceeds in excess of direct costs incurred in the third quarter of 2021 partially offset by a decrease in grant income and the fair value of the assets held in our deferred compensation plan.

Benefit from Income Taxes

Benefit from Income Taxes for the periods presented was as follows:

	Years Ended December 31,			2021 vs. 2020	2020 vs. 2019
	2021	2020	2019		
Benefit from income taxes	\$ (11.3)	\$ (901.4)	\$ (71.0)	\$ 890.1	\$ (830.4)

Benefit from income taxes in 2021 decreased compared to the same period in 2020, primarily due to the 2020 intra-entity transfer of certain intellectual property rights to an Irish subsidiary for which there was no a similar transaction in 2021. Our Benefit from Income Taxes in 2021 and 2020 consisted of state, federal and foreign current tax expense which was offset by tax benefits related to stock option exercises and deferred tax benefits from federal orphan drug credits, federal R&D credits and California R&D credits. The Benefit from Income Taxes for the year ended December 31, 2021 was further impacted by the renegotiation of a license agreement in the fourth quarter of 2021. As a result of the renegotiated agreement, royalty projections for our Dutch subsidiary decreased through the remaining contractual life of the agreement. These royalties are the only source of income for our Dutch entity. The revised royalty projections required an increase to the valuation allowance on net operating loss deferred tax assets that are no longer expected to be realizable. See Note 15 to our accompanying Consolidated Financial Statements for additional information.

Results of Operations 2020 Compared to 2019

For a discussion of our results of operations pertaining to 2020 as compared to 2019 see Item 7, "Management's Discussion and Analysis of Results of Operations and Financial Condition" in our Annual Report on Form 10-K for the year ended December 31, 2020.

Financial Condition, Liquidity and Capital Resources

Our cash, cash equivalents, and investments as of December 31, 2021 and 2020 were as follows:

	2021	2020
Cash and cash equivalents	\$ 587.3	\$ 649.2
Short-term investments	426.6	416.2
Long-term investments	507.8	285.5
Total cash, cash equivalents and investments	<u>\$ 1,521.7</u>	<u>\$ 1,350.9</u>

We believe our cash generated from sales of our commercial products, in addition to our cash, cash equivalents and investments will be sufficient to satisfy our liquidity requirements for the next 12 months. We believe we will meet longer-term expected future cash requirements and obligations through a combination of cash flows from operating activities, available cash and investments balances and available revolving loan balances. We will need to raise additional funds from equity or debt securities, loans or collaborative agreements if we are unable to satisfy our liquidity requirements. For example, we may require additional financing to fund the repayment of our convertible debt, future milestone payments and our future operations, including the commercialization of our products and product candidates currently under development, preclinical studies and clinical trials, and potential licenses and acquisitions. The timing and mix of our funding options could change depending on many factors, including how much we elect to spend on our development programs, potential licenses and acquisitions of complementary

Management's Discussion and Analysis of Financial Condition and Results of Operations (continued)
(In millions of U.S. Dollars, except as otherwise disclosed)

technologies, products and companies or if we elect to settle all or a portion of our convertible debt in cash. Our ability to raise additional capital may also be adversely impacted by potential worsening global economic conditions and the recent disruptions to, and volatility in, financial markets in the U.S. and worldwide resulting from the ongoing COVID-19 pandemic.

We are mindful that conditions in the current macroeconomic environment could affect our ability to achieve our goals. We sell our products in countries that face economic volatility and weakness. Although we have historically collected receivables from customers in such countries, sustained weakness or further deterioration of the local economies and currencies and adverse effects of the impact of the ongoing COVID-19 pandemic may cause customers in those countries to be unable to pay for our products. We will continue to monitor these conditions and will attempt to adjust our business processes, as appropriate, to mitigate macroeconomic risks to our business.

Our cash flows for each of the years ended December 31, 2021 and 2020 were as follows:

	2021	2020	2021 vs. 2020
Net cash provided by operating activities	\$ 304.5	\$ 85.4	\$ 219.1
Net cash used in investing activities	\$ (366.3)	\$ (53.6)	\$ (312.7)
Net cash provided by financing activities	\$ —	\$ 181.1	\$ (181.1)

The increase in net cash provided by operating activities in 2021 compared to 2020 was primarily attributed to the timing of cash receipts from our customers and licensees, the timing of payments made to vendors and tax refund proceeds.

The increase in net cash used in investing activities in 2021 compared to 2020 was primarily attributable to higher net purchases of available-for-sale debt securities and the absence of the \$67.2 million in proceeds received from the divestiture and sale of Firdapse to a third party in the first quarter of 2020 partially offset by lower purchases of property, plant and equipment.

The decrease in net cash provided by financing activities in 2021 compared to 2020 was primarily attributed to the absence of net proceeds from the 1.25% senior subordinated convertible notes due in 2027 Notes (the 2027 Notes) issued in 2020 and lower exercises of awards under our equity incentive plans.

Financing and Credit Facilities

Our \$1.1 billion (undiscounted) of total convertible debt as of December 31, 2021 will impact our liquidity due to the semi-annual cash interest payments as well as the repayment of the principal amount, if not converted. As of December 31, 2021, our indebtedness consisted of the 2027 Notes and our 0.599% senior subordinated convertible notes due in 2024 (the 2024 Notes and together with the 2027 Notes, the Notes), which, if not converted, will be required to be repaid in cash at maturity in August 2024 and May 2027, respectively.

Our 2020 Notes matured on October 15, 2020 and were settled in cash for approximately \$375.0 million. No shares were issued in connection with the settlement as our share price did not exceed the conversion price of \$94.15, as measured over a 25-day averaging period, and the capped call transaction entered into concurrently with the issuance of the 2020 Notes was not triggered.

In October 2018, we entered into an unsecured revolving credit facility of up to \$200.0 million that included a letter of credit subfacility and a swingline loan subfacility. The credit facility is intended to finance ongoing working capital needs and for other general corporate purposes. In May 2021, we amended the credit facility agreement, extending the maturity date from October 19, 2021 to May 28, 2024, among other changes. The amended credit facility contains financial covenants including a maximum leverage ratio and a minimum interest coverage ratio. As of December 31, 2021, there were no outstanding amounts due on nor any usage of the credit facility and we were in compliance with all covenants.

See Note 10 to our accompanying Consolidated Financial Statements for additional discussion on our convertible debt and credit facility.

Other Material Sources of Cash

In February 2022, we entered into an agreement to sell our Rare Pediatric Disease Priority Review Voucher (PRV) received from the FDA in connection with the U.S. approval of Voxzogo. In exchange for the PRV, we will receive a lump sum payment of \$110.0 million. See Note 19 to our accompanying Consolidated Financial Statements for additional discussion.

Management's Discussion and Analysis of Financial Condition and Results of Operations (continued)
(In millions of U.S. Dollars, except as otherwise disclosed)

Material Cash Requirements

Funding Commitments

Our investment in our research and early development of product candidates and continued development of our existing commercial products has a major impact on our operating performance. Our R&D expenses for the period since inception as of December 31, 2021 for certain of our key programs were as follows:

	Since Program Inception
Valoctocogene roxaparvovec	\$ 825.1
Voxzogo	\$ 700.0
BMN 307	\$ 240.8
BMN 255	\$ 25.9
Other approved products	\$ 2,373.2

We cannot estimate with certainty the cost to complete any of our product development programs. We may need or elect to increase our spending above our current long-term plans to be able to achieve our long-term goals. This may increase our capital requirements, including: costs associated with the commercialization of our products; additional clinical trials; investments in the manufacturing of our commercial products; preclinical studies and clinical trials for our product candidates; potential licenses and other acquisitions of complementary technologies, products and companies; and general corporate purposes. Additionally, we cannot precisely estimate the time to complete any of our product development programs or when we expect to receive net cash inflows from any of our product development programs. Please see "Risk Factors" included in Part I, Item 1A of this Annual Report on Form 10-K, for a discussion of the reasons we are unable to estimate such information.

Purchase and Lease Obligations

As of December 31, 2021, we had obligations of approximately \$133.3 million, all of which was short term and primarily related to firm purchase commitments entered into in the normal course of business to procure active pharmaceutical ingredients, certain inventory-related items and certain third-party R&D services, production services and facility construction services.

As of December 31, 2021, we had lease payment obligations of \$51.5 million, of which \$12.6 million is payable within the next 12 months. See Note 9 to our accompanying Consolidated Financial Statements for details on our lease liabilities.

Contingent Obligations

As of December 31, 2021, we had \$63.4 million of acquisition-related contingent consideration on our Consolidated Balance Sheet, of which \$48.2 million was short-term.

As of December 31, 2021, we were subject to contingent payments deemed reasonably possible of incurring losses totaling approximately \$788.5 million upon achievement of certain development, regulatory and commercial sales milestones if they occur before certain dates in the future. Of this amount, we may pay \$37.7 million in 2022 if certain contingencies are met. See Note 18 to our accompanying Consolidated Financial Statements for additional discussion on our contingent obligations.

Unrecognized Tax Benefits

As of December 31, 2021, our liability for unrecognized tax benefits was \$205.1 million. Due to their nature, we cannot reasonably estimate the timing of future payments. See Note 15 to our accompanying Consolidated Financial Statements for a full discussion on our income taxes.

Item 7A. Quantitative and Qualitative Disclosure About Market Risk

We are exposed to market risks that may result from changes in foreign currency exchange rates, interest rates and credit risks. To reduce certain of these risks, we enter into foreign currency derivative hedging transactions, follow investment guidelines and monitor outstanding trade receivables as part of our risk management program.

Foreign Currency Exchange Rate Risk

Our operations include manufacturing activities in the U.S. and Ireland and sales activities in the U.S. as well as in regions outside the U.S., including Europe, Latin America and Asia Pacific. As a result, our financial results may be significantly affected by factors such as the impact of the ongoing worldwide COVID-19 pandemic, changes in foreign currency exchange rates or weak economic conditions in the foreign markets in which we sell our products. Our operating results are exposed to changes in foreign currency exchange rates between the U.S. Dollar (USD) and various foreign currencies, primarily the Euro. When the USD strengthens against these currencies, the relative value of the sales made in the respective foreign currency decreases. Conversely, when the USD weakens against these currencies, the relative value of such sales increases. Overall, we are a net receiver of foreign currencies and, therefore, benefit from a weaker USD and are adversely affected by a stronger USD relative to those foreign currencies in which we transact significant business.

During 2021, approximately 46% of our net product sales were denominated in foreign currencies and 21% of our operating expenses, excluding Cost of Sales, were denominated in foreign currencies. To partially mitigate the impact of changes in currency exchange rates on net cash flows from our foreign currency denominated sales and operating expenses, we may enter into foreign currency exchange forward contracts (forward contracts). We also hedge certain monetary assets and liabilities, primarily those denominated in Euros, using forward contracts, which reduces but does not eliminate our exposure to currency fluctuations between the date the transaction is recorded and the date the cash is collected or paid. Generally, the market risks of these contracts are offset by the corresponding gains and losses on the transactions being hedged.

We do not use derivative financial instruments for speculative trading purposes, nor do we hedge foreign currency exchange rate exposure in a manner that entirely offsets the effects of changes in foreign currency exchange rates. The counterparties to these forward contracts are creditworthy multinational commercial banks, which minimizes the risk of counterparty nonperformance. We regularly review our hedging program and may, as part of this review, make changes to the program.

As of December 31, 2021, we had open forward contracts with net notional amounts of \$639.6 million. A hypothetical 10% adverse movement in foreign currency exchange rates compared with the USD relative to exchange rates as of December 31, 2021 would have resulted in a reduction in the value received over the remaining life of these contracts by approximately \$62.6 million on this date and, if realized, would negatively affect earnings during the remaining life of the contracts. The estimated fair value change was determined by measuring the impact of the hypothetical exchange rate movement on outstanding forward contracts. This analysis does not consider the impact of the hypothetical changes in foreign currency rates would have on the forecasted transactions that these foreign currency sensitive instruments were designated to offset. Our use of this methodology to quantify the market risk of such instruments is subject to assumptions and actual impact could be significantly different.

Based on our overall foreign currency denominated exposures as of December 31, 2021, we believe that a near-term 10% fluctuation of the USD exchange rate could result in a potential change in the fair value of our net foreign currency denominated assets and liabilities, excluding our investments and open forward contracts, by approximately \$9.1 million. We expect to continue to enter into transactions based in foreign currencies that could be impacted by changes in exchange rates.

Interest Rate Market Risk

Our exposure to market risk for changes in interest rates relates primarily to our investment portfolio, which includes our cash equivalents and marketable debt securities. By policy, we place our investments with highly rated credit issuers and limit the amount of credit exposure to any one issuer. As stated in our investment policy, we seek to improve the safety and likelihood of preservation of our invested funds by limiting default risk and market risk.

We mitigate default risk by investing in high credit quality securities and by positioning our portfolio to respond appropriately to a significant reduction in a credit rating of any investment issuer or guarantor. The portfolio includes only marketable securities with active secondary or resale markets to ensure portfolio liquidity.

We have outstanding \$495.0 million (undiscounted) of the 2024 Notes and \$600.0 million (undiscounted) of the 2027 Notes. The interest rates on these notes are fixed and therefore they do not expose us to risk related to rising interest rates. As of December 31, 2021, the fair value of our convertible debt was \$1.1 billion.

As of December 31, 2021, our investment portfolio did not include any investments with significant exposure to countries that face economic volatility and weakness. Although not predictive in nature, we believe a hypothetical 100 basis point threshold reflects a reasonably possible near-term change in interest rates. Based on our investment portfolio and interest rates at December 31, 2021, period ending, we believe that a 100 basis point increase in interest rates could result in a potential loss in fair

value of our investment portfolio of approximately \$8.4 million. Changes in interest rates may affect the fair value of our investment portfolio. However, we will not recognize such gains or losses in our Consolidated Statements of Operations unless the investments are sold or we determine that the declines in the investment's fair values below the cost basis are a result of a credit loss, which, if any, are reported in Other Income, Net in the current period through an allowance for credit losses.

The table below summarizes the expected maturities and average interest rates of our interest-generating investments as of December 31, 2021 (in millions of U.S. Dollars):

	Expected Maturity						Total
	2022	2023	2024	2025	2026	Thereafter	
Available-for-sale debt securities	\$ 427.6	\$ 362.9	\$ 134.1	\$ 9.3	\$ —	\$ 1.5	\$ 935.4
Average interest rate	0.4 %	0.7 %	0.9 %	0.8 %	— %	1.1 %	0.6 %

Counterparty credit risks

Our financial instruments, including derivatives, are subject to counterparty credit risk that we consider as part of the overall fair value measurement. Our financial risk management policy limits derivative transactions by requiring transactions to be with institutions with minimum credit ratings of A- or equivalent by Standards & Poor's, Moody's or Fitch. In addition, we have an investment policy that limits investments to certain types of debt and money market instruments issued by institutions primarily with investment grade credit ratings and places restriction on maturities and concentrations by asset class and issuer.

Item 8. Financial Statements and Supplementary Data

The information required to be filed in this item appears under "Exhibits, Financial Statement Schedules" in Part IV, Item 15 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

An evaluation was carried out, under the supervision of and with the participation of our management, including our Chief Executive Officer and our Chief Financial Officer, of the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act) as of the end of the period covered by this report. Based on the evaluation, our Chief Executive Officer and our Chief Financial Officer have concluded that our disclosure controls and procedures were effective as of December 31, 2021.

Management's Annual Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining an adequate internal control structure and procedures for financial reporting. Under the supervision of and with the participation of our management, including our Chief Executive Officer and our Chief Financial Officer, our management has assessed the effectiveness of our internal control over financial reporting as defined in Rule 13a-15(f) under the Exchange Act as of December 31, 2021. Our management's assessment was based on criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO), Internal Control-Integrated Framework (2013).

Based on the COSO criteria, our management has concluded that our internal control over financial reporting as of December 31, 2021 was effective at the reasonable assurance level.

Our independent registered public accounting firm, KPMG LLP, has audited the financial statements included in this Annual Report on Form 10-K and has issued a report on the effectiveness of our internal control over financial reporting. The report of KPMG LLP is incorporated by reference to Item 8 of this Annual Report on Form 10-K.

Changes in Internal Control Over Financial Reporting

There were no changes in our internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act, during our most recently completed quarter that have materially affected or are reasonably likely to materially affect our internal control over financial reporting. We continue to utilize the Committee of Sponsoring Organizations of the Treadway Commission (COSO) 2013 Framework on internal control. We believe that our ability to maintain an effective internal control environment has not been impacted by the COVID-19 pandemic. We are continually monitoring and assessing the COVID-19 situation on our internal controls to minimize the impact on their design and operating effectiveness.

Scope of the Effectiveness of Controls

Our 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 GAAP. Our internal control over financial reporting includes those policies and procedures that:

- pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect our transactions and dispositions of our assets;
- provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with GAAP, and that our receipts and expenditures are being made only in accordance with authorizations of our management and our board of directors; and
- provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of our assets that could have a material effect on our 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.

Item 9B. Other Information

None.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections

Not applicable.

Part III

Item 10. Directors, Executive Officers and Corporate Governance

The information required by this Item regarding our directors, executive officers and corporate governance is incorporated into this section by reference to the sections captioned “Election of Directors” and “Executive Officers” in the proxy statement for our 2022 annual meeting of stockholders.

Item 11. Executive Compensation

The information required by this Item regarding executive compensation is incorporated into this section by reference to the section captioned “Executive Compensation” in the proxy statement for our 2022 annual meeting of stockholders.

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

The information required by this Item regarding security ownership of our beneficial owners, management and related stockholder matters is incorporated into this section by reference to the section captioned “Security Ownership of Certain Beneficial Owners and Management” in the proxy statement for our 2022 annual meeting of stockholders.

The information required by this Item regarding the securities authorized for issuance under our equity compensation plans is incorporated into this section by reference to the section captioned “Equity Compensation Plan Information” in the proxy statement for our 2022 annual meeting of stockholders.

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

The information required by this Item regarding certain relationships, related transactions and director independence is incorporated into this section by reference to the sections captioned “Other Board Governance Information — Transactions with Related Persons, Promoters and Certain Control Persons,” “Other Board Governance Information — Review, Approval and Ratification of Transactions with Related Parties” and “Director Independence” in the proxy statement for our 2022 annual meeting of stockholders.

Item 14. Principal Accountant Fees and Services

The information required by this Item regarding our principal accountant fees and services is incorporated into this section by reference to the section captioned “Independent Registered Public Accounting Firm” in the proxy statement for our 2022 annual meeting of stockholders.

Part IV

Item 15. Exhibits, Financial Statement Schedules

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Exhibit Index

Exhibit Number	Description
2.1	Amended and Restated Termination and Transition Agreement, dated as of December 23, 2015, between BioMarin Pharmaceutical Inc. and Ares Trading S.A., previously filed with the SEC on January 7, 2016 as Exhibit 2.1 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference. Portions of this exhibit (indicated by asterisks) have been omitted pursuant to a request for confidential treatment. Omitted portions have been filed separately with the SEC.
2.2	Termination and Transition Agreement, dated as of October 1, 2015, between BioMarin Pharmaceutical Inc. and Ares Trading S.A., previously filed with the SEC on January 7, 2016 as Exhibit 2.3 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference. Portions of this exhibit (indicated by asterisks) have been omitted pursuant to a request for confidential treatment. Omitted portions have been filed separately with the SEC.
2.3	First Amendment, dated as of December 12, 2016, to the Amended and Restated Termination and Transition Agreement, dated as of December 23, 2015 and effective as of October 1, 2015, between BioMarin Pharmaceutical Inc. and Ares Trading S.A., previously filed with the SEC on February 27, 2017 as Exhibit 2.6 to the Company's Annual Report on Form 10-K (File No. 000-26727), which is incorporated herein by reference. Portions of this exhibit (indicated by asterisks) have been omitted pursuant to a request for confidential treatment. Omitted portions have been filed separately with the SEC.
3.1	Restated Certificate of Incorporation of BioMarin Pharmaceutical Inc., previously filed with the SEC on June 12, 2017 as Exhibit 3.2 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference.
3.2	Amended and Restated Bylaws of BioMarin Pharmaceutical Inc., previously filed with the SEC on December 18, 2020 as Exhibit 3.1 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference.
4.1	Base Indenture, dated August 11, 2017, between the Company and Wilmington Trust, National Association, as Trustee, previously filed with the SEC on August 11, 2017 as Exhibit 4.1 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference.
4.2	First Supplemental Indenture, dated August 11, 2017, between the Company and Wilmington Trust, National Association, as Trustee (including the form of 0.599% Senior Subordinated Convertible Note due 2024), previously filed with the SEC on August 11, 2017 as Exhibit 4.2 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference.
4.3	Indenture, dated as of May 14, 2020, between BioMarin Pharmaceutical Inc. and U.S. Bank National Association, as trustee, including the Form of Global Note representing BioMarin Pharmaceutical, Inc.'s 1.25% Senior Subordinated Convertible Notes due 2027 as Exhibit A thereto, previously filed with the SEC on May 14, 2020 as Exhibit 4.1 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference.
4.4	Description of Capital Stock, previously filed with the SEC on February 27, 2020 as Exhibit 4.6 to the Company's Annual Report on Form 10-K (File No. 000-26727), which is incorporated herein by reference.
10.1†	Form of Indemnification Agreement for Directors and Officers, previously filed with the SEC on December 19, 2016 as Exhibit 10.1 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference.
10.2†	BioMarin Pharmaceutical Inc. Amended and Restated 2006 Employee Stock Purchase Plan, as amended and restated April 12, 2019, previously filed with the SEC on August 2, 2019 as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q (File No. 000-26727), which is incorporated herein by reference.
10.3†	BioMarin Pharmaceutical Inc. Amended and Restated 2006 Share Incentive Plan, as adopted on May 2, 2006 and as amended and restated on April 16, 2015, previously filed with the SEC on June 15, 2015 as Exhibit 10.1 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference.
10.4†	Form of Agreement Regarding Restricted Share Units for the BioMarin Pharmaceutical Inc. 2006 Share Incentive Plan, previously filed with the SEC on May 16, 2013 as Exhibit 10.1 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference.
10.5†	Form of Amendment to Agreement Regarding Restricted Share Units for the BioMarin Pharmaceutical Inc. 2006 Share Incentive Plan, previously filed with the SEC on December 9, 2016 as Exhibit 10.1 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference.

- 10.6† [Amended and Restated BioMarin Pharmaceutical Inc. Nonqualified Deferred Compensation Plan, as adopted on December 1, 2005 and as amended and restated on January 1, 2009 and further amended and restated on December 19, 2013 and October 7, 2014, previously filed with the SEC on October 14, 2014 as Exhibit 10.2 to the Company's Current Report on Form 8-K \(File No. 000-26727\), which is incorporated herein by reference.](#)
- 10.7† [Amended and Restated Employment Agreement with Jean-Jacques Bienaimé effective December 13, 2016 previously filed with the SEC on December 19, 2016 as Exhibit 10.2 to the Company's Current Report on Form 8-K \(File No. 000-26727\), which is incorporated herein by reference.](#)
- 10.8 [License Agreement dated July 30, 2004, between BioMarin Pharmaceutical Inc. and Daiichi Suntory Pharma Co., Ltd., as amended by Amendment No. 1 to License Agreement dated November 19, 2004, previously filed with the SEC on March 16, 2005 as Exhibit 10.25 to the Company's Annual Report on Form 10-K \(File No. 000-26727\), which is incorporated herein by reference. The SEC has granted confidential treatment with respect to certain portions of this exhibit. Omitted portions have been filed separately with the SEC.](#)
- 10.9 [Operating Agreement with Genzyme Corporation, previously filed with the SEC on July 6, 1999 as Exhibit 10.30 to the Company's Amendment No. 2 to Registration Statement on Form S-1 \(File No. 333-77701\), which is incorporated herein by reference.](#)
- 10.10 [Manufacturing, Marketing and Sales Agreement dated as of January 1, 2008, by and among BioMarin Pharmaceutical Inc., Genzyme Corporation and BioMarin/Genzyme LLC previously filed with the SEC on February 28, 2008 as Exhibit 10.30 to the Company's Annual Report on Form 10-K \(File No. 000-26727\), which is incorporated herein by reference. The SEC has granted confidential treatment with respect to certain portions of this exhibit. Omitted portions have been filed separately with the SEC.](#)
- 10.11 [Amended and Restated Collaboration Agreement dated as of January 1, 2008, by and among BioMarin Pharmaceutical Inc., Genzyme Corporation and BioMarin/Genzyme LLC previously filed with the SEC on February 28, 2008 as Exhibit 10.31 to the Company's Annual Report on Form 10-K \(File No. 000-26727\), which is incorporated herein by reference. The SEC has granted confidential treatment with respect to certain portions of this exhibit. Omitted portions have been filed separately with the SEC.](#)
- 10.12 [Members Agreement dated as of January 1, 2008 by and among BioMarin Pharmaceutical Inc., Genzyme Corporation, BioMarin Genetics Inc., and BioMarin/Genzyme LLC previously filed with the SEC on February 28, 2008 as Exhibit 10.32 to the Company's Annual Report on Form 10-K \(File No. 000-26727\), which is incorporated herein by reference. The SEC has granted confidential treatment with respect to certain portions of this exhibit. Omitted portions have been filed separately with the SEC.](#)
- 10.13† [BioMarin Pharmaceutical Inc. 2012 Inducement Plan, adopted May 8, 2012, previously filed with the SEC on May 9, 2012 as Exhibit 10.2 to the Company's Current Report on Form 8-K \(File No. 000-26727\), which is incorporated herein by reference.](#)
- 10.14† [Form of Stock Options Agreement for the BioMarin Pharmaceutical Inc. 2006 Share Incentive Plan, \(as Amended and Restated 2010\), previously filed with the SEC on August 2, 2012 as Exhibit 10.11 to the Company's Quarterly Report on Form 10-Q \(File No. 000-26727\), which is incorporated herein by reference.](#)
- 10.15† [Form of Stock Options Agreement for the BioMarin Pharmaceutical Inc. 2012 Inducement Plan, previously filed with the SEC on August 2, 2012 as Exhibit 10.13 to the Company's Quarterly Report on Form 10-Q \(File No. 000-26727\), which is incorporated herein by reference.](#)
- 10.16 [Contract of Purchase and Sale and Joint Escrow Instructions, dated December 17, 2013, for the San Rafael Corporate Center, by and among BioMarin Pharmaceutical Inc., through its wholly-owned subsidiary, California Corporate Center Acquisition, LLC, SR Corporate Center Phase One, LLC, and SR Corporate Center Phase Two, previously filed with the SEC on February 26, 2014 as Exhibit 10.68 to the Company's Annual Report on Form 10-K \(File No. 000-26727\), which is incorporated herein by reference.](#)
- 10.17† [BioMarin Pharmaceutical Inc. 2014 Inducement Plan, adopted December 17, 2014, previously filed with the SEC on December 23, 2014 as Exhibit 10.1 to the Company's Current Report on Form 8-K \(File No. 000-26727\), which is incorporated herein by reference.](#)
- 10.18† [Form of Stock Options Agreement for the BioMarin Pharmaceutical Inc. 2014 Inducement Plan, previously filed with the SEC on March 2, 2015 as Exhibit 10.60 to the Company's Annual Report on Form 10-K \(File No. 000-26727\), which is incorporated herein by reference.](#)
- 10.19† [Form of Agreement Regarding Restricted Share Units for the BioMarin Pharmaceutical Inc. 2014 Inducement Plan, previously filed with the SEC on March 2, 2015 as Exhibit 10.61 to the Company's Annual Report on Form 10-K \(File No. 000-26727\), which is incorporated herein by reference.](#)
- 10.20† [Form of Amended and Restated Employment Agreement for the Company's Executive Officers \(other than the Company's Chief Executive Officer\) previously filed with the SEC on June 15, 2015 as Exhibit 10.2 to the Company's Current Report on Form 8-K \(File No. 000-26727\), which is incorporated herein by reference.](#)
- 10.21 [Settlement and License Agreement among BioMarin Pharmaceutical Inc., Merck & Cie, Dr. Reddy's Laboratories, Inc. and Dr. Reddy's Laboratories, Ltd., dated September 14, 2015, previously filed with the SEC on November 2, 2015 as Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q \(File No. 000-26727\), which is incorporated herein by reference. The SEC has granted confidential treatment with respect to certain portions of this exhibit. Omitted portions have been filed separately with the SEC.](#)

10.22	Settlement and License Agreement among BioMarin Pharmaceutical Inc., Merck & Cie and Par Pharmaceutical, Inc., dated as of April 12, 2017, previously filed with the SEC on November 13, 2017 as Exhibit 10.1 to the Company's Amendment No. 1 to Quarterly Report on Form 10-Q/A (File No. 000-26727), which is incorporated herein by reference. The SEC has granted confidential treatment with respect to certain portions of this exhibit. Omitted portions have been filed separately with the SEC.
10.23†	Form of Agreement Regarding Performance Stock Award in the Form of Restricted Stock Units for the BioMarin Pharmaceutical Inc. 2006 Share Incentive Plan, previously filed with the SEC on February 27, 2017 as Exhibit 10.50 to the Company's Annual Report on Form 10-K (File No. 000-26727), which is incorporated herein by reference.
10.24†	BioMarin Pharmaceutical Inc. 2017 Equity Incentive Plan, as adopted April 10, 2017 and amended April 5, 2021, previously filed with the SEC on February 17, 2022 as Exhibit 99.1 to the Company's Registration Statement on Form S-8 (File No. 333-262824), which is incorporated herein by reference.
10.25†	Form of Stock Options Agreement for the BioMarin Pharmaceutical Inc. 2017 Equity Incentive Plan, previously filed with the SEC on June 12, 2017 as Exhibit 10.2 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference.
10.26†	Form of Agreement Regarding Restricted Stock Units for the BioMarin Pharmaceutical Inc. 2017 Equity Incentive Plan, previously filed with the SEC on June 12, 2017 as Exhibit 10.3 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference.
10.27†	Form of Agreement Regarding Performance Stock Award in the Form of Restricted Stock Units for the BioMarin Pharmaceutical Inc. 2017 Equity Incentive Plan, previously filed with the SEC on June 12, 2017 as Exhibit 10.4 to the Company's Current Report on Form 8-K (File No. 000-26727), which is incorporated herein by reference.
10.28†	BioMarin Pharmaceutical Inc. Summary of Independent Director Compensation, previously filed with the SEC on November 4, 2019 as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q (File No. 000-26727), which is incorporated herein by reference.
10.29	Credit Agreement by and among BioMarin Pharmaceutical Inc., as the Borrower, Bank of America, N.A., as Administrative Agent, Swing Line Lender and a Lender, and Citibank N.A. as L/C Issuer, and the Lenders party thereto, dated as of October 19, 2018, previously filed with the SEC on February 28, 2019 as Exhibit 10.48 to the Company's Annual Report on Form 10-K (File No. 000-26727), which is herein incorporated by reference.
10.30	First Amendment, dated May 28, 2021, to the Credit Agreement by and among BioMarin Pharmaceutical Inc., as the Borrower, Bank of America, N.A., as Administrative Agent, Swing Line Lender and a Lender, and Citibank N.A. as L/C Issuer, and the Lenders party thereto, previously filed with the SEC on July 30, 2021 as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q (File No. 000-26727), which is incorporated herein by reference.
10.31	First Amendment to the Amended and Restated BioMarin Pharmaceutical Inc. Nonqualified Deferred Compensation Plan, as adopted June 4, 2019, previously filed with the SEC on August 2, 2019 as Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q (File No. 000-26727), which is incorporated herein by reference.
10.32*†	Second amendment to the Amended and Restated BioMarin Pharmaceutical Inc. Nonqualified Deferred Compensation Plan, as adopted on October 5, 2021.
21.1*	Subsidiaries of BioMarin Pharmaceutical Inc.
23.1*	Consent of KPMG LLP, Independent Registered Public Accounting Firm for BioMarin Pharmaceutical Inc.
24.1*	Power of Attorney (Included in Signature Page to this Report)
31.1*	Certification of Chief Executive Officer pursuant to Rules 13a-14(a)/15d-14(a) of the Securities Exchange Act of 1934, as amended.
31.2*	Certification of Chief Financial Officer pursuant to Rules 13a-14(a)/15d-14(a) of the Securities Exchange Act of 1934, as amended.
32.1*	Certification of Chief Executive Officer and Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002. This Certification accompanies this report and shall not, except to the extent required by the Sarbanes-Oxley Act of 2002, be deemed filed for purposes of §18 of the Securities Exchange Act of 1934, as amended.
101.INS	XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
101.SCH	Inline XBRL Taxonomy Extension Schema Document

101.CAL	Inline XBRL Taxonomy Extension Calculation Document
101.DEF	Inline XBRL Taxonomy Extension Definition Linkbase
101.LAB	Inline XBRL Taxonomy Extension Labels Linkbase Document
101.PRE	Inline XBRL Taxonomy Extension Presentation Link Document
104	XBRL tags for the cover page from the Company's Quarterly Report on Form 10-K for the year ended December 31, 2021, are embedded within the Inline XBRL document.

* Filed herewith

† Management contract or compensatory plan or arrangement

Attached as Exhibit 101 to this report are documents formatted in XBRL (Extensible Business Reporting Language): (i) Consolidated Balance Sheets as of December 31, 2021 and December 31, 2020, (ii) Consolidated Statements of Operations for the years ended December 31, 2021, 2020 and 2019, (iii) Consolidated Statements of Comprehensive Income (Loss) for the years ended December 31, 2021, 2020 and 2019, (iv) Consolidated Statements of Stockholders' Equity for the years ended December 31, 2021, 2020 and 2019, (v) Consolidated Statements of Cash Flows for the years ended December 31, 2021, 2020 and 2019, and (vi) Notes to Consolidated Financial Statements.

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.

Dated: February 25, 2022

BIOMARIN PHARMACEUTICAL INC.

By: _____ /S/ BRIAN R. MUELLER
Brian R. Mueller
Executive Vice President, Finance & Chief Financial Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Jean-Jacques Bienaimé and Brian R. Mueller, his or her attorney-in-fact, with the power of substitution, for him or her in any and all capacities, to sign any amendments to the Report on Form 10-K and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, hereby ratifying and confirming all that each of said attorneys-in-fact, or his substitute or substitutes, may 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
<u>/S/ JEAN-JACQUES BIENAIMÉ</u> Jean-Jacques Bienaimé	Chairman and Chief Executive Officer (Principal Executive Officer)	February 25, 2022
<u>/S/ BRIAN R. MUELLER</u> Brian R. Mueller	Executive Vice President, Finance & Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	February 25, 2022
<u>/S/ MARK J. ALLES</u> Mark J. Alles	Director	February 25, 2022
<u>/S/ ELIZABETH MCKEE ANDERSON</u> Elizabeth McKee Anderson	Director	February 25, 2022
<u>/S/ WILLARD H. DERE, M.D.</u> Willard H. Dere, M.D.	Director	February 25, 2022
<u>/S/ ELAINE J. HERON</u> Elaine J. Heron	Director	February 25, 2022
<u>/S/ MAYKIN HO</u> Maykin Ho	Director	February 25, 2022
<u>/S/ ROBERT J. HOMBACH</u> Robert J. Hombach	Director	February 25, 2022
<u>/S/ V. BRYAN LAWLIS</u> V. Bryan Lawlis	Director	February 25, 2022
<u>/S/ RICHARD A. MEIER</u> Richard A. Meier	Lead Independent Director	February 25, 2022
<u>/S/ DAVID PYOTT</u> David Pyott	Director	February 25, 2022
<u>/S/ DENNIS J. SLAMON</u> Dennis J. Slamon	Director	February 25, 2022

**BIOMARIN PHARMACEUTICAL INC.
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Report of Independent Registered Public Accounting Firm

To the Stockholders and Board of Directors
BioMarin Pharmaceutical Inc.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of BioMarin Pharmaceutical Inc. and subsidiaries (the Company) as of December 31, 2021 and December 31, 2020, the related consolidated statements of operations, comprehensive income (loss), stockholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2021, and the related notes (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2021 and December 31, 2020, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2021, in conformity with U.S. generally accepted accounting principles.

We also have 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, 2021, 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 25, 2022 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated 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 consolidated financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matter

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

Evaluation of variable consideration relating to Aldurazyme product sales

As described in Notes 1 and 12 to the consolidated financial statements, during the year ended December 31, 2021 the Company recognized \$123 million in Aldurazyme net product revenue. Under its arrangement with Sanofi, the Company receives payments ranging from 39.5% to 50% on worldwide net Aldurazyme sales by Sanofi, depending on Sanofi's sales volume. The Company estimates this variable consideration based on the amount that it expects to be entitled to from Sanofi's sales of Aldurazyme. The Company recognizes this revenue upon satisfying the product performance obligation, which is when the product is shipped to Sanofi and all required quality control certificates are complete.

We identified the evaluation of variable consideration relating to Aldurazyme net product revenue as a critical audit matter. Evaluating the key assumptions of forecasted Sanofi sales volume and average price per vial involved a high degree of subjective auditor judgment due to the nature of available supporting evidence being limited to historical sales and price data related to these assumptions. Changes in these key assumptions could have had a significant impact on Aldurazyme net product revenue.

The following are the primary procedures we performed to address this critical audit matter. We evaluated the design and tested the operating effectiveness of certain internal controls related to the Company's process for recognizing Aldurazyme net product revenue. This included controls over forecasting Sanofi's sales volume and average price per vial used to estimate variable

Report of Independent Registered Public Accounting Firm

consideration. We evaluated the Company's ability to estimate the variable consideration by comparing historical estimates of sales volume and price per vial to actual sales volume and price per vial of product sold by Sanofi. We also compared the Company's current-period forecasts of future Sanofi sales volume and average price per vial to Sanofi's historical sales volume and price per vial. We performed a sensitivity analysis to assess the impact of changes in these key assumptions on the Company's estimate of variable consideration.

/s/ KPMG LLP

We have served as the Company's auditor since 2002.

San Francisco, California
February 25, 2022

Report of Independent Registered Public Accounting Firm

To the Stockholders and Board of Directors
BioMarin Pharmaceutical Inc.:

Opinion on Internal Control Over Financial Reporting

We have audited BioMarin Pharmaceutical Inc. and subsidiaries' (the Company) internal control over financial reporting as of December 31, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2021, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2021 and December 31, 2020, the related consolidated statements of operations, comprehensive income (loss), stockholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2021, and the related notes (collectively, the consolidated financial statements), and our report dated February 25, 2022 expressed an unqualified opinion on those consolidated 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 Annual 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 of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included 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/ KPMG LLP

San Francisco, California
February 25, 2022

BIOMARIN PHARMACEUTICAL INC.
CONSOLIDATED BALANCE SHEETS
December 31, 2021 and 2020

(In thousands of U.S. Dollars, except share and per share amounts)

	December 31, 2021	December 31, 2020
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 587,276	\$ 649,158
Short-term investments	426,599	416,228
Accounts receivable, net	373,399	448,351
Inventory	776,669	698,548
Other current assets	110,442	129,934
Total current assets	<u>2,274,385</u>	<u>2,342,219</u>
Noncurrent assets:		
Long-term investments	507,793	285,473
Property, plant and equipment, net	1,035,461	1,032,471
Intangible assets, net	388,652	417,271
Goodwill	196,199	196,199
Deferred tax assets	1,449,075	1,432,150
Other assets	151,760	142,237
Total assets	<u>\$ 6,003,325</u>	<u>\$ 5,848,020</u>
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable and accrued liabilities	\$ 491,590	\$ 492,548
Short-term contingent consideration	48,232	—
Total current liabilities	<u>539,822</u>	<u>492,548</u>
Noncurrent liabilities:		
Long-term convertible debt, net	1,079,077	1,075,145
Long-term contingent consideration	15,167	60,130
Other long-term liabilities	98,519	114,195
Total liabilities	<u>1,732,585</u>	<u>1,742,018</u>
Stockholders' equity:		
Common stock, \$0.001 par value: 500,000,000 shares authorized; 183,912,514 and 181,740,999 shares issued and outstanding, respectively	184	182
Additional paid-in capital	5,191,502	4,993,407
Company common stock held by Nonqualified Deferred Compensation Plan (the NQDC)	(9,689)	(9,839)
Accumulated other comprehensive income (loss)	14,432	(16,139)
Accumulated deficit	(925,689)	(861,609)
Total stockholders' equity	<u>4,270,740</u>	<u>4,106,002</u>
Total liabilities and stockholders' equity	<u>\$ 6,003,325</u>	<u>\$ 5,848,020</u>

The accompanying notes are an integral part of these Consolidated Financial Statements.

BIOMARIN PHARMACEUTICAL INC.
CONSOLIDATED STATEMENTS OF OPERATIONS
Years Ended December 31, 2021, 2020 and 2019
(In thousands of U.S. Dollars, except per share amounts)

	2021	2020	2019
REVENUES:			
Net product revenues	\$ 1,783,498	\$ 1,805,861	\$ 1,661,043
Royalty and other revenues	62,777	54,594	43,005
Total revenues	<u>1,846,275</u>	<u>1,860,455</u>	<u>1,704,048</u>
OPERATING EXPENSES:			
Cost of sales	470,515	524,272	359,466
Research and development	628,793	628,116	715,007
Selling, general and administrative	759,375	737,669	680,924
Intangible asset amortization and contingent consideration	69,933	66,658	74,108
Gain on sale of nonfinancial assets	—	(59,495)	(25,000)
Total operating expenses	<u>1,928,616</u>	<u>1,897,220</u>	<u>1,804,505</u>
LOSS FROM OPERATIONS	<u>(82,341)</u>	<u>(36,765)</u>	<u>(100,457)</u>
Interest income	10,482	16,610	22,748
Interest expense	(15,337)	(29,309)	(23,460)
Other income, net	11,846	7,142	6,358
LOSS BEFORE INCOME TAXES	<u>(75,350)</u>	<u>(42,322)</u>	<u>(94,811)</u>
Benefit from income taxes	(11,270)	(901,422)	(70,963)
NET INCOME (LOSS)	<u>\$ (64,080)</u>	<u>\$ 859,100</u>	<u>\$ (23,848)</u>
NET INCOME (LOSS) PER SHARE, BASIC	<u>\$ (0.35)</u>	<u>\$ 4.75</u>	<u>\$ (0.13)</u>
NET INCOME (LOSS) PER SHARE, DILUTED	<u>\$ (0.35)</u>	<u>\$ 4.53</u>	<u>\$ (0.13)</u>
Weighted average common shares outstanding, basic	<u>182,852</u>	<u>180,804</u>	<u>179,039</u>
Weighted average common shares outstanding, diluted	<u>182,852</u>	<u>191,678</u>	<u>179,039</u>

The accompanying notes are an integral part of these Consolidated Financial Statements.

BIOMARIN PHARMACEUTICAL INC.
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)
Years Ended December 31, 2021, 2020 and 2019
(In thousands of U.S. Dollars)

	2021	2020	2019
NET INCOME (LOSS)	\$ (64,080)	\$ 859,100	\$ (23,848)
OTHER COMPREHENSIVE INCOME (LOSS):			
Available-for-sale debt securities:			
Unrealized holding gain (loss) arising during the period, net of tax impact of \$1,596, \$(227) and \$(1,640), respectively.	(5,262)	749	5,482
Less: reclassifications to net income (loss), net of tax impact of \$0, \$(127) and \$0, respectively.	—	425	—
Net change in unrealized holding gain (loss), net of tax	(5,262)	324	5,482
Cash flow hedges:			
Unrealized holding gain (loss) arising during the period, net of tax impact of \$0 for all periods presented.	34,379	(23,462)	25,266
Less: reclassifications to net income (loss), net of tax impact of \$0 for all periods presented.	(1,454)	13,180	15,853
Net change in unrealized holding gain (loss), net of tax	35,833	(36,642)	9,413
Other	—	15	(2)
OTHER COMPREHENSIVE INCOME (LOSS), NET OF TAX	30,571	(36,303)	14,893
COMPREHENSIVE INCOME (LOSS)	\$ (33,509)	\$ 822,797	\$ (8,955)

The accompanying notes are an integral part of these Consolidated Financial Statements.

BIOMARIN PHARMACEUTICAL INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY
Years Ended December 31, 2021, 2020 and 2019
(In thousands of U.S. Dollars and share amounts in thousands)

	2021	2020	2019
Shares of Common Stock, beginning balances	181,741	179,838	178,253
Issuances under equity incentive plans	2,172	2,421	1,585
Repurchase of common stock	—	(518)	—
Shares of Common Stock, ending balances	<u>183,913</u>	<u>181,741</u>	<u>179,838</u>
Total stockholders' equity, beginning balances	\$ 4,106,002	\$ 3,122,381	\$ 2,967,940
Common stock:			
Beginning balances	182	180	178
Issuances under equity incentive plans, net of tax	2	2	2
Ending balances	<u>184</u>	<u>182</u>	<u>180</u>
Additional paid-in capital:			
Beginning balances	4,993,407	4,832,707	4,669,926
Issuances under equity incentive plans, net of tax	3,389	27,275	(11,071)
Stock-based compensation	194,856	183,547	163,891
Repurchase of common stock	—	(50,000)	—
Common stock held by the NQDC	(150)	(122)	(692)
Accounting impact of NQDC Plan change	—	—	10,653
Ending balances	<u>5,191,502</u>	<u>4,993,407</u>	<u>4,832,707</u>
Treasury stock:			
Beginning balances	—	—	—
Purchase of treasury stock	—	(50,000)	—
Retirement of treasury stock	—	50,000	—
Ending balance	<u>—</u>	<u>—</u>	<u>—</u>
Company common stock held by the NQDC:			
Beginning balances	(9,839)	(9,961)	(13,301)
Common stock held by the NQDC	150	122	692
Accounting impact of NQDC Plan change	—	—	2,648
Ending balances	<u>(9,689)</u>	<u>(9,839)</u>	<u>(9,961)</u>
Accumulated other comprehensive income (loss):			
Beginning balances	(16,139)	20,164	5,271
Other comprehensive income (loss)	30,571	(36,303)	14,893
Ending balances	<u>14,432</u>	<u>(16,139)</u>	<u>20,164</u>
Accumulated deficit:			
Beginning balances	(861,609)	(1,720,709)	(1,694,134)
Impact of changes in accounting principles	—	—	(2,727)
Net income (loss)	(64,080)	859,100	(23,848)
Ending balances	<u>(925,689)</u>	<u>(861,609)</u>	<u>(1,720,709)</u>
Total stockholders' equity, ending balances	<u>\$ 4,270,740</u>	<u>\$ 4,106,002</u>	<u>\$ 3,122,381</u>

The accompanying notes are an integral part of these Consolidated Financial Statements.

BIOMARIN PHARMACEUTICAL INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
Years Ended December 31, 2021, 2020 and 2019
(In thousands of U.S. dollars)

	2021	2020	2019
CASH FLOWS FROM OPERATING ACTIVITIES:			
Net income (loss)	\$ (64,080)	\$ 859,100	\$ (23,848)
Adjustments to reconcile net income (loss) to net cash used in operating activities:			
Depreciation and amortization	108,039	105,172	105,300
Non-cash interest expense	4,146	16,511	13,960
Amortization of premium on investments (accretion of discount)	5,155	567	(2,000)
Stock-based compensation expense	197,263	189,711	159,865
Gain on sale of nonfinancial assets	—	(59,495)	(25,000)
Inventory reserves, net of stock-based compensation	—	75,609	—
Deferred income taxes	(15,608)	(888,907)	(82,760)
Unrealized foreign exchange loss (gain)	(1,810)	8,011	1,025
Non-cash changes in the fair value of contingent consideration	8,026	4,500	5,205
Other	(2,629)	(997)	(2,393)
Changes in operating assets and liabilities:			
Accounts receivable, net	65,574	(59,035)	(37,852)
Inventory	(35,060)	(61,151)	(107,554)
Other current assets	29,760	18,312	(27,008)
Other assets	(6,593)	(28,647)	(8,895)
Accounts payable and accrued liabilities	15,689	(87,025)	77,089
Other long-term liabilities	(3,336)	(6,871)	3,128
Net cash provided by operating activities	304,536	85,365	48,262
CASH FLOWS FROM INVESTING ACTIVITIES:			
Purchases of property, plant and equipment	(95,578)	(114,312)	(145,026)
Maturities and sales of investments	691,049	555,834	740,211
Purchase of available-for-sale debt securities	(937,143)	(529,663)	(632,023)
Proceeds from sale of nonfinancial assets	—	67,159	25,000
Purchase of intangible assets	(23,647)	(23,207)	(18,380)
Investment in convertible note	—	(8,709)	—
Other	(994)	(723)	(808)
Net cash used in investing activities	(366,313)	(53,621)	(31,026)
CASH FLOWS FROM FINANCING ACTIVITIES:			
Proceeds from exercises of awards under equity incentive plans	49,194	71,913	31,611
Taxes paid related to net share settlement of equity awards	(45,805)	(44,638)	(42,680)
Repurchase of common stock	—	(50,000)	—
Proceeds from convertible senior subordinated note offering, net	—	585,752	—
Repayments of convertible debt	—	(374,991)	—
Payment of contingent consideration	—	—	(58,518)
Principal repayments of financing leases	(3,039)	(6,918)	(5,087)
Other	(398)	—	—
Net cash provided by (used in) financing activities	(48)	181,118	(74,674)
Effect of exchange rate changes on cash	(57)	(1,150)	902
NET INCREASE (DECREASE) IN CASH AND CASH EQUIVALENTS	(61,882)	211,712	(56,536)
Cash and cash equivalents:			
Beginning of period	649,158	437,446	493,982
End of period	\$ 587,276	\$ 649,158	\$ 437,446
SUPPLEMENTAL CASH FLOW DISCLOSURES:			
Cash paid for interest, net of interest capitalized into fixed assets	\$ 10,395	\$ 12,178	\$ 8,552
Cash paid for income taxes	\$ 18,153	\$ 8,977	\$ 9,726
SUPPLEMENTAL CASH FLOW DISCLOSURES FOR NON-CASH INVESTING AND FINANCING ACTIVITIES:			
Increase (decrease) in accounts payable and accrued liabilities related to fixed assets	\$ (4,749)	\$ (5,184)	\$ 7,589
Increase (decrease) in accounts payable and accrued liabilities related to intangible assets	\$ 9,428	\$ (292)	\$ 4,247

The accompanying notes are an integral part of these Consolidated Financial Statements.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

(In thousands of U.S. Dollars, except per share amounts or as otherwise disclosed)

(1) BUSINESS OVERVIEW AND SIGNIFICANT ACCOUNTING POLICIES***Nature of Operations***

BioMarin Pharmaceutical Inc. (the Company or BioMarin) is a global biotechnology company that develops and commercializes innovative therapies for people with serious and life-threatening rare diseases and medical conditions. The Company selects product candidates for diseases and conditions that represent a significant unmet medical need, have well-understood biology and provide an opportunity to be first-to-market or offer a significant benefit over existing products. The Company's portfolio consists of seven commercial products and multiple clinical and preclinical product candidates for the treatment of various diseases. Voxzogo (formerly known as vosoritide) was granted marketing approval in the European Union (EU) and the United States (U.S.) on August 27, 2021 and November 19, 2021, respectively.

Basis of Presentation

These Consolidated Financial Statements have been prepared pursuant to United States generally accepted accounting principles (U.S. GAAP) and the rules and regulations of the Securities and Exchange Commission (the SEC) for Annual Reports on Form 10-K and include the accounts of BioMarin and its wholly owned subsidiaries. All intercompany transactions have been eliminated. Management performed an evaluation of the Company's activities through the date of filing of this Annual Report on Form 10-K, and has concluded that there were no subsequent events or transactions that occurred subsequent to the balance sheet date and prior to the filing of this Annual Report on Form 10-K except for the transaction disclosed in Note 19 to these Consolidated Financial Statements.

Use of Estimates

U.S. GAAP requires management to make estimates and assumptions that affect amounts reported in the Company's Consolidated Financial Statements and accompanying disclosures. Although these estimates are based on management's best knowledge of current events and actions that the Company may undertake in the future, actual results may be different from those estimates. The Consolidated Financial Statements reflect all adjustments of a normal, recurring nature that are, in the opinion of management, necessary for a fair presentation of results. The full extent to which the COVID-19 pandemic could continue to directly or indirectly impact the Company's business, results of operations and financial condition, including revenues, expenses, reserves and allowances, manufacturing, clinical trials and research and development costs, will depend on future developments that remain uncertain at this time, particularly as virus variants continue to spread. As events continue to evolve and additional information becomes available, the Company's estimates may change materially in future periods.

Significant Accounting Policies**Cash and Cash Equivalents**

The Company treats highly liquid investments, readily convertible to cash, with original maturities of three months or less on the purchase date as cash equivalents.

Marketable and Non-Marketable Securities

On January 1, 2020, the Company adopted Financial Accounting Standards Board (FASB) Accounting Standards Update (ASU) No. 2016-13, *Financial Instruments-Credit Losses: Measurement of Credit Losses on Financial Instruments* (ASU 2016-13), as amended, using a modified retrospective approach. The adoption of this standard had no impact on the Company's Financial Statements.

Marketable Securities

The Company determines the appropriate classification of its investments in debt and equity securities at the time of purchase and reevaluates such designations at each reporting period. The Company classifies its debt and equity securities with original maturities greater than three months when purchased as either short-term or long-term investments based on each instrument's underlying contractual maturity date and its availability for use in current operations.

All marketable securities are classified as available-for-sale. Available-for-sale debt securities are measured and recorded at fair market value with unrealized gains and losses included in Accumulated Other Comprehensive Income (AOCI) on the Company's Consolidated Balance Sheets, with the exception of any declines in fair value below the cost basis that are a result of a

BIOMARIN PHARMACEUTICAL INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)
(In thousands of U.S. Dollars, except per share amounts or as otherwise disclosed)

credit loss, which, if any, are reported in Other Income, Net in the current period through an allowance for credit losses. Impairment assessments are made at the individual security level each reporting period. When the fair value of an investment is less than its cost at the balance sheet date, a determination is made as to whether the impairment is related to a credit loss and, if so, an impairment loss is recognized in earnings equal to the difference between the investment's amortized cost and fair value at such date.

Non-Marketable Equity Securities

The Company records investments in equity securities, other than equity method investments, at fair market value, if fair value is readily determinable. Equity securities with no readily determinable fair values are recorded using the measurement alternative of cost adjusted for observable price changes in orderly transactions for identical or similar investments of the same issuer less impairment, if any. Investments in equity securities are recorded in Other Assets on the Company's Consolidated Balance Sheets. Unrealized gains and losses are reported in Other Income, Net. The Company regularly reviews its non-marketable equity securities for indicators of impairment.

Inventory*Commercial Inventory*

The Company values inventory at the lower of cost and net realizable value and determines the cost of inventory using the average-cost method. The Company analyzes its inventory levels quarterly for obsolescence and, if required, adjusts inventory to its net realizable value if the cost basis of inventory is in excess of its expected net realizable value, or for quantities in excess of expected demand. If the Company determines cost exceeds its net realizable value, the resulting adjustments are recognized as Cost of Sales in the Consolidated Statements of Operations.

Inventory Produced Prior to Regulatory Approval

When future commercialization for a product candidate is considered probable and management believes that material uncertainties related to the ultimate regulatory approval have been significantly reduced and the Company expects to realize economic benefit in the future, the Company capitalizes pre-launch or pre-qualification manufacturing costs prior to regulatory approval. For inventories that are capitalized in preparation of product launch, a number of factors are taken into consideration based on information available at the time, including the product candidate's current status in the drug development and regulatory approval process, results from the related pivotal clinical trial, results from meetings with the relevant regulatory authorities prior to the filing of regulatory applications, historical experience, as well as potential impediments to the approval process such as product safety or efficacy, as well as commercialization and market trends. If additional requirements are subsequently presented by the regulatory authorities, prior to their final decision thus extending anticipated regulatory approval timelines resulting in expiration of the product prior to revised demand forecasts, the pre-launch inventory costs are expensed to Cost of Sales. If the marketing application is ultimately rejected by the applicable regulators and the pre-launch inventory cannot be sold for commercial use, the pre-launch inventory costs are expensed to Research and Development (R&D).

Property, Plant and Equipment

Property, plant and equipment are stated at historical cost net of accumulated depreciation. Depreciation is computed using the straight-line method over the related estimated useful lives, as presented in the table below. Significant additions and improvements are capitalized, whereas repairs and maintenance are expensed as incurred. Depreciation of property, plant and equipment are included in Cost of Sales, R&D and Selling, General and Administrative (SG&A), as appropriate, in the Consolidated

BIOMARIN PHARMACEUTICAL INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)
(In thousands of U.S. Dollars, except per share amounts or as otherwise disclosed)

Statements of Operations. Property and equipment purchased for specific R&D projects with no alternative future uses are expensed as incurred and recorded to R&D in the Consolidated Statements of Operations.

Leasehold improvements	Shorter of life of asset or lease term
Building and improvements	20 to 50 years
Manufacturing and laboratory equipment	5 to 15 years
Computer hardware and software	3 to 7 years
Office furniture and equipment	5 years
Land improvements	10 to 20 years
Land	Not applicable
Construction-in-progress	Not applicable

Leases

The Company determines if an arrangement is a lease at contract inception. For leases where the Company is the lessee, ROU assets represent the Company's right to use the underlying asset for the term of the lease and the lease liabilities represent the lease payment obligation. ROU assets and lease liabilities are recognized at the lease commencement date based on the present value of the future lease payments over the lease term. The Company uses its incremental borrowing rate based on the information available at the commencement date of the underlying lease arrangement to determine the present value of lease payments. The ROU asset also includes any prepaid lease payments and any lease incentives received. The lease term to calculate the ROU asset and related lease liability includes options to extend or terminate the lease when it is reasonably certain that the Company will exercise the option. The Company's lease agreements generally do not contain any material variable lease payments, residual value guarantees or restrictive covenants.

Lease expense for operating leases is recognized on a straight-line basis over the lease term as an operating expense while expense for financing leases is recognized as depreciation expense and interest expense using the accelerated interest method of recognition. When an arrangement requires payments for lease and non-lease components, the Company has elected to account for lease and non-lease components separately. Lease expense for leases with a term of twelve months or less is recognized on a straight-line basis and are not included in the recognized ROU assets and lease liabilities.

Goodwill and Intangible Assets

The Company records goodwill in a business combination when the total consideration exceeds the fair value of the assets acquired. Intangible assets with indefinite useful lives are related to purchased in-process research and development (IPR&D) projects and are measured at their respective fair values as of the acquisition date. Intangible assets related to IPR&D projects are considered to be indefinite-lived until the completion or abandonment of the associated R&D efforts. If and when development is complete, which generally occurs if and when regulatory approval to market a product is obtained, the associated assets are considered finite-lived and are amortized using the straight-line method based on their respective estimated useful lives at that point in time. The amortization of these intangible assets is included in Intangible Asset Amortization and Contingent Consideration in the Consolidated Statements of Operations.

Impairment

The Company assesses goodwill and indefinite-lived intangible assets for impairment annually in the fourth quarter, or more frequently as warranted by events or changes in circumstances that indicate that the carrying amount may not be recoverable.

Goodwill is assessed for impairment by comparing the fair value of the Company's reporting unit with its carrying amount. If the carrying value of the reporting unit exceeds its fair value, an impairment loss equal to the difference would be recorded.

Indefinite-lived intangible assets are assessed for impairment first by performing a qualitative assessment. If the qualitative assessment indicates that it is more likely than not that the fair value of an indefinite-lived intangible asset is less than its carrying amount, then the Company will perform a quantitative assessment and record an impairment loss. Impairment charges that are not material are recorded to Intangible Asset Amortization and Contingent Consideration in the Consolidated Statements of Operations.

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Long-lived Asset Impairment

The Company's long-lived assets consist of property, plant and equipment, leased ROU assets and finite-lived intangible assets. Should there be an indication of impairment, the Company tests for recoverability by comparing the estimated undiscounted future cash flows expected to result from the use of the asset or asset group and its eventual disposition to the carrying amount of the asset or asset group. Any excess of the carrying value of the asset or asset group over its estimated fair value is recognized as an impairment loss. Impairment charges related to property, plant or equipment that are not material are recorded to depreciation expense and presented in SG&A in the Consolidated Statements of Operations. Impairment charges related to finite-lived intangible assets that are not material are recorded to Intangible Asset Amortization and Contingent Consideration in the Consolidated Statements of Operations.

Revenue Recognition

The Company recognizes revenue when its customer obtains control of promised goods or services, in an amount that reflects the consideration which the Company expects to receive in exchange for those goods or services. To determine revenue recognition for arrangements that are within the scope of ASC Topic 606, the Company performs the following five steps:

- (i) identification of the promised goods or services in the contract;
- (ii) determination of whether the promised goods or services are performance obligations including whether they are distinct in the context of the contract;
- (iii) measurement of the transaction price, including the constraint on variable consideration;
- (iv) allocation of the transaction price to the performance obligations based on estimated selling prices; and
- (v) recognition of revenue when (or as) the Company satisfies each performance obligation. A performance obligation is a promise in a contract to transfer a distinct good or service to the customer and is the unit of account.

Net Product Revenues

In the U.S., the Company's commercial products, except for Palynziq and Aldurazyme, are generally sold to specialty pharmacies or end-users, such as hospitals, which act as retailers. Palynziq is distributed in the U.S. through certain certified specialty pharmacies under the Palynziq Risk Evaluation and Mitigation Strategy (REMS) and Aldurazyme is marketed world-wide by Sanofi (formerly referred to as Sanofi Genzyme). Outside the U.S., the Company's commercial products are sold to its authorized distributors or directly to government purchasers or hospitals, which act as the end-users. Revenues from product sales are recognized when the customer obtains control of the Company's product, which occurs at a point in time, typically upon shipment to the customer. Amounts collected from customers and remitted to governmental authorities, which primarily consist of value-added taxes related to product sales in foreign jurisdictions, are presented on a net basis on the Company's Consolidated Statements of Operations, in that taxes billed to customers are not included as a component of Net Product Revenues.

For Aldurazyme revenues, the Company receives a payment ranging from 39.5% to 50% on worldwide net Aldurazyme sales by Sanofi depending on sales volume, which is included in Net Product Revenues on the Company's Consolidated Statements of Operations. The Company recognizes its best estimate of the revenue it expects to earn when the product is released and control is transferred to Sanofi. The Company records Aldurazyme net product revenues based on the estimated variable consideration payable when the product is sold through by Sanofi. Actual amounts of consideration ultimately received may differ from the Company's estimates. Differences between the estimated variable consideration to be received from Sanofi and actual payments received are not expected to be material. If actual results vary from the Company's estimates, the Company will make adjustments, which would affect Net Product Revenues and earnings in the period such variances become known.

Revenue Reserves

Revenues from product sales are recorded at the net sales price (transaction price), which includes estimates of variable consideration for which reserves are established and which result from government rebates, sales returns, and other incentives that are offered within contracts between the Company and its customers, such as specialty pharmacies, hospitals, authorized distributors and government purchasers. These reserves are based on the amounts earned or to be claimed on the related sales and are classified as reductions of accounts receivable (if the amount is payable to the customer) or a current liability (if the amount is payable to a party other than a customer). Where appropriate, these estimates take into consideration a range of possible outcomes that are probability-weighted for relevant factors such as the Company's historical experience, current contractual and statutory requirements, specific known market events and trends, industry data and forecasted customer buying and payment patterns. Overall, these reserves reflect the Company's best estimates of the amount of consideration to which it is entitled based on the terms of the contract. The amount of variable consideration that is included in the transaction price may be constrained and

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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 will not occur in a future period. Actual amounts of consideration ultimately received may differ from the Company's estimates, however the Company does not expect any such difference to be material. If actual results in the future vary from the Company's estimates, the Company will adjust its estimates, which would affect net product revenue and earnings in the period such variances become known.

Government Rebates: The Company records reserves for rebates payable under Medicaid and other government programs as a reduction of revenue at the time product revenues are recorded. The Company's reserve calculations require estimates, including estimates of customer mix, to determine which sales will be subject to rebates and the amount of such rebates. The Company updates its estimates and assumptions on a quarterly basis and records any necessary adjustments to its reserves.

Sales Returns: The Company records allowances for product returns, if appropriate, as a reduction of revenue at the time product sales are recorded. Several factors are considered in determining whether an allowance for product returns is required, including market exclusivity of the products based on their orphan drug status, the patient population, the customers' limited return rights and the Company's historical experience with returns. Because of the pricing of the Company's commercial products, the limited number of patients and the customers' limited return rights, most customers and retailers carry a limited inventory. The Company relies on historical return rates to estimate a reserve for returns. Based on these factors and the fact that the Company has not experienced significant product returns to date, return allowances are not material.

Other Incentives: Other incentives include fees paid to the Company's distributors and discounts for prompt payment. The Company also offers a branded co-pay assistance program for eligible patients with commercial insurance in the U.S. who are on an eligible BioMarin product. The branded co-pay assistance programs assist commercially insured patients who have coverage for an eligible BioMarin product and are intended to reduce each participating patient's portion of the financial responsibility of the purchase price up to a specified dollar amount of assistance. The Company records fees paid to distributors, cash discounts and amounts paid under the brand specific co-pay assistance program for each patient as a reduction of revenue.

Royalty and Other Revenues

Royalties: For arrangements that include the receipt of sales-based royalties, including milestone payments based on the level of sales when the license is deemed to be the predominant item to which the royalties relate, the Company recognizes revenue at the later of (a) when the related sales occur, or (b) when the performance obligation to which some or all of the royalty has been allocated has been satisfied (or partially satisfied).

Licenses of intellectual property: If the license to the Company's intellectual property is determined to be distinct from the other performance obligations identified in the arrangement, the Company recognizes revenues from non-refundable, up-front fees allocated to the license when the license is transferred to the customer and the customer is able to use and benefit from the license. For licenses that are bundled with other promises, the Company uses judgment to assess the nature of the combined performance obligation to determine whether the combined performance obligation is satisfied over time or at a point in time and, if over time, the appropriate method of measuring progress for purposes of recognizing revenue from non-refundable, up-front fees. The Company evaluates the measure of progress each reporting period and, if necessary, adjusts the measure of performance and related revenue recognition.

Milestone payments: At the inception of each arrangement that includes developmental, regulatory or commercial milestone payments, the Company evaluates whether achieving the milestones is considered probable 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 value of the associated milestone (such as a regulatory submission by the Company) is included in the transaction price. Milestone payments that are not within the control of the Company, such as approvals from regulators or where attainment of the specified event is dependent on the development activities of a third party, are not considered probable of being achieved until those approvals are received or the specified event occurs. Revenue is recognized from the satisfaction of performance obligations in the amount billable to the customer.

Research and Development

R&D costs are generally expensed as incurred. These expenses include contract R&D services provided by third parties, preclinical and clinical studies, raw materials costs associated with manufacturing clinical product, quality control and assurance, other R&D activities, facilities and regulatory costs and R&D-related personnel costs including salaries, benefits and stock-based compensation. Upfront and milestone payments made to third parties in connection with licensed intellectual property, which does

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)
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not have an alternative future use or does not reach technological feasibility, are expensed as incurred up to the point of regulatory approval.

Net Income (Loss) Per Common Share

Basic net income (loss) per share is calculated by dividing Net Income (Loss) by the weighted average shares of common stock outstanding during the period. Diluted net income (loss) per share reflects the potential dilution that would occur if securities or other contracts to issue common stock were exercised or converted into common stock; however, potential common equivalent shares are excluded if their effect is anti-dilutive.

Stock-Based Compensation

The Company has equity incentive plans under which various types of equity-based awards may be granted to employees. Stock-based compensation expense is recognized on a straight-line basis over the requisite service period, which is generally the vesting period required to obtain full vesting, and is classified as Cost of Sales, R&D or SG&A, as appropriate, in the Consolidated Statements of Operations. The Company accounts for forfeitures as they occur.

Restricted Stock Units

The fair value of restricted stock units (RSUs) with service-based vesting conditions and RSUs with performance conditions is determined to be the fair market value of the Company's underlying common stock on the date of grant. The stock-based compensation expense for RSUs with service-based vesting is recognized over the period during which the vesting restrictions lapse. Stock-based compensation expense for RSUs with performance conditions is recognized beginning in the period the Company determines it is probable that the performance condition will be achieved. Management expectations related to the achievement of performance goals associated with RSUs with performance conditions are assessed regularly to determine whether such grants are expected to vest. The fair value for RSUs with market conditions is estimated using the Monte Carlo valuation model, utilizing expected volatility rates derived from those of the Company and the members of the referenced peer group. Related stock-based compensation is recognized, beginning on the grant date, on a straight-line basis regardless of whether the market condition is met unless the required service is not performed.

Stock Options and Purchase Rights

The fair value of each stock option award and purchase rights under the Company's Employee Stock Purchase Plan (ESPP) are estimated on the date of grant using the Black-Scholes valuation model and the following assumptions: expected term, expected volatility, risk-free interest rate and expected dividend yield. The dividend yield reflects that the Company has not paid any cash dividends since inception and does not intend to pay any cash dividends in the foreseeable future. The expected term of stock options is based on observed historical exercise patterns. In estimating the life of stock options, the Company has identified two employee groups with distinctly different historical exercise patterns: executive and non-executive. The executive employee group has a history of holding stock options for longer periods than non-executive employees. The expected term of purchase rights for ESPP is based on each tranche of an offering period, which is four tranches in a twenty-four-month period.

The determination of the fair value of stock-based payment awards using an option-pricing model is affected by the Company's stock price and may use assumptions regarding a number of complex and subjective variables.

Income Taxes

The Company calculates and provides for income taxes in each of the tax jurisdictions in which it operates. Deferred tax assets and liabilities, measured using enacted tax rates, are recognized for the future tax consequences of temporary differences between the tax and financial statement basis of assets and liabilities. A valuation allowance reduces the deferred tax assets to the amount that is more likely than not to be realized. The Company establishes liabilities or reduces assets for uncertain tax positions when the Company believes certain tax positions are not more likely than not of being sustained if challenged. Each quarter, the Company evaluates these uncertain tax positions and adjusts the related tax assets and liabilities in light of changing facts and circumstances.

The Company uses financial projections to support its net deferred tax assets, which contain significant assumptions and estimates of future operations. If such assumptions were to differ significantly, it may have a material impact on the Company's ability to realize its deferred tax assets. At the end of each period, the Company will reassess the ability to realize its deferred tax benefits. If it is more likely than not that the Company would not realize the deferred tax benefits, a valuation allowance may need to be established against all or a portion of the deferred tax assets, which will result in a charge to tax expense.

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Foreign Currency

For the Company and its subsidiaries, the functional currency has been determined to be the U.S. Dollar (USD). Assets and liabilities denominated in foreign currency are remeasured at period-end exchange rates for monetary assets. Non-monetary assets and liabilities denominated in foreign currencies are remeasured at historical rates. Foreign currency transaction gains and losses resulting from remeasurement are recognized in SG&A in the Consolidated Statements of Operations.

Derivatives and Hedging Activities

The Company uses foreign currency exchange forward contracts (forward contracts) to hedge certain operational exposures resulting from potential changes in foreign currency exchange rates. Such exposures result from portions of the Company's forecasted revenues and operating expenses being denominated in currencies other than the USD, primarily the Euro. The Company designates certain of these forward contracts as hedging instruments and also enters into forward contracts that are considered to be economic hedges that are not designated as hedging instruments. Whether designated or undesignated, these forward contracts protect against the reduction in value of forecasted foreign currency cash flows resulting from product revenues, royalty revenues, operating expenses and asset or liability positions designated in currencies other than the USD. To receive hedge accounting treatment, cash flow hedges must be highly effective in offsetting changes to expected future cash flows on hedged transactions. The Company does not hold or issue derivative instruments for trading or speculative purposes.

The Company is exposed to counterparty credit risk on its derivatives. The Company has established and maintains strict counterparty credit guidelines and enters into hedging agreements with financial institutions that are investment grade or better to minimize the Company's exposure to potential defaults. The Company is not required to pledge collateral under these agreements.

The Company accounts for its derivative instruments as either assets or liabilities on its Consolidated Balance Sheets and measures them at fair value, which is estimated using current exchange rates and interest rates and takes into consideration the current creditworthiness of the counterparties or the Company, as applicable. For derivatives designated as hedging instruments, the entire change in the fair value of qualifying derivative instruments is recorded in AOCI and amounts deferred in AOCI are reclassified to earnings in the same line item in which the earnings effect of the hedged item is reported. Derivatives not designated as hedging instruments are adjusted to fair value through earnings in SG&A in the Consolidated Statements of Operations.

Fair Value of Financial Instruments

The Company applies fair value accounting for all financial assets and liabilities and non-financial assets and liabilities that are recognized or disclosed at fair value in the financial statements on a recurring basis. The Company defines fair value as the price that would be received from selling an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. When determining the fair value measurements for assets and liabilities that are required to be recorded at fair value, the Company considers the principal or most advantageous market in which the Company would transact and the market-based risk measurements or assumptions that market participants would use to price the asset or liability, such as risks inherent in valuation techniques, transfer restrictions and credit risk. When estimating fair value, depending on the nature and complexity of the asset or liability, the Company may use the following techniques:

- Income approach, which is based on the present value of a future stream of net cash flows
- Market approach, which is based on market prices and other information from market transactions involving identical or comparable assets or liabilities.

The Company's fair value methodologies depend on the following types of inputs:

- Quoted prices for identical assets or liabilities in active markets (Level 1 inputs)
- Quoted prices for similar assets or liabilities in active markets, or quoted prices for identical or similar assets or liabilities that are not active, or inputs other than quoted process that are directly or indirectly observable, or inputs that are derived principally from, or corroborated by, observable market data by correlation or other means (Level 2 inputs)
- Unobservable inputs that reflect estimates and assumptions (Level 3 inputs)

The Company's Level 2 instruments are valued using third-party pricing sources. The pricing services utilize industry standard valuation models, including both income and market-based approaches, for which all significant inputs are observable, either directly or indirectly, to estimate fair value. These inputs include reported trades of and broker/dealer quotes on the same or similar securities, issuer credit spreads, benchmark securities, prepayment/default projections based on historical data and other observable inputs. The Company validates the prices provided by its third-party pricing services by understanding the models used,

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obtaining market values from other pricing sources, analyzing pricing data in certain instances and confirming those securities traded in active markets.

The Company's Level 3 financial assets and liabilities include acquired intangible assets and contingent consideration resulting from business acquisitions. The estimated fair value of acquired finite-lived and indefinite-lived intangible assets and contingent consideration are measured by applying a probability-based income approach utilizing an appropriate discount rate as of the acquisition date. Key assumptions used by management to estimate the fair value of contingent consideration include estimated probabilities, the estimated timing of when a milestone may be attained and assumed discount periods and rates. Changes in the fair value of the contingent consideration can result from changes to one or more inputs, including the estimated probability with respect to regulatory approval, changes in the assumed timing of when milestones are likely to be achieved and changes in assumed discount periods and rates. Contingent consideration is remeasured on a recurring basis and resulting changes in the fair value, due to the revision of key assumptions, are recorded in Intangible Asset Amortization and Contingent Consideration on the Company's Consolidated Statements of Operations.

See Notes 2, 7, 8, 10 and 17 to these Consolidated Financial Statements for further information on the nature of these financial instruments.

Segment Information

The Company currently operates in one segment focused on the development and commercialization of innovative therapies for people with serious and life-threatening rare diseases and medical conditions. A single management team reports to the chief operating decision maker who comprehensively manages the entire business. All products are included in one operating segment because the majority of the Company's products have similar economic and other characteristics, including the nature of the products and production processes, type of customers, distribution methods and regulatory environment. The Company is not organized by market and is managed and operated as one business. The Company does not operate any separate lines of business or separate business entities with respect to its products. Accordingly, the Company does not accumulate discrete financial information with respect to separate products, other than revenues, cost of sales and certain other operating expenses.

Recent Accounting Pronouncements

There have been no new accounting pronouncements adopted by the Company or new accounting pronouncements issued by the FASB during 2021 that the Company believes are of significance or potential significance to the Company.

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(2) FINANCIAL INSTRUMENTS

The following tables show the Company's cash, cash equivalents and available-for-sale securities by significant investment category as of December 31, 2021 and 2020, respectively:

		December 31, 2021						
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Aggregate Fair Value	Cash and Cash Equivalents	Short-term Marketable Securities ⁽¹⁾	Long-term Marketable Securities ⁽²⁾	
Level 1:								
Cash	\$ 301,177	\$ —	\$ —	\$ 301,177	\$ 301,177	\$ —	\$ —	
Level 2:								
Money market instruments	285,099	—	—	285,099	285,099	—	—	
Corporate debt securities	584,000	386	(2,086)	582,300	—	200,304	381,996	
U.S. government agency securities	224,774	182	(325)	224,631	—	146,421	78,210	
Commercial paper	68,384	—	—	68,384	1,000	67,384	—	
Asset-backed securities	56,936	10	(95)	56,851	—	9,451	47,400	
Foreign and other	3,097	141	(12)	3,226	—	3,039	187	
Subtotal	<u>1,222,290</u>	<u>719</u>	<u>(2,518)</u>	<u>1,220,491</u>	<u>286,099</u>	<u>426,599</u>	<u>507,793</u>	
Total	<u>\$ 1,523,467</u>	<u>\$ 719</u>	<u>\$ (2,518)</u>	<u>\$ 1,521,668</u>	<u>\$ 587,276</u>	<u>\$ 426,599</u>	<u>\$ 507,793</u>	

		December 31, 2020						
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Aggregate Fair Value	Cash and Cash Equivalents	Short-term Marketable Securities ⁽¹⁾	Long-term Marketable Securities ⁽²⁾	
Level 1:								
Cash	\$ 370,325	\$ —	\$ —	\$ 370,325	\$ 370,325	\$ —	\$ —	
Level 2:								
Money market instruments	264,833	—	—	264,833	264,833	—	—	
Corporate debt securities	413,137	3,261	(8)	416,390	—	220,551	195,839	
U.S. government agency securities	265,298	1,555	(1)	266,852	14,000	192,488	60,364	
Asset-backed securities	31,659	85	(2)	31,742	—	3,189	28,553	
Foreign and other	549	168	—	717	—	—	717	
Subtotal	<u>975,476</u>	<u>5,069</u>	<u>(11)</u>	<u>980,534</u>	<u>278,833</u>	<u>416,228</u>	<u>285,473</u>	
Total	<u>\$ 1,345,801</u>	<u>\$ 5,069</u>	<u>\$ (11)</u>	<u>\$ 1,350,859</u>	<u>\$ 649,158</u>	<u>\$ 416,228</u>	<u>\$ 285,473</u>	

(1) The Company's short-term marketable securities mature in one year or less.

(2) The Company's long-term marketable securities mature between one and five years.

As of December 31, 2021, the Company had the ability and intent to hold all investments that were in an unrealized loss position until maturity. The Company considered its intent and ability to hold the securities until recovery of amortized cost basis, the extent to which fair value is less than amortized cost basis, conditions specifically related to the security's industry and geography, payment structure and history and changes to the ratings (if any) in determining that the decline in fair value compared to carrying value is not related to a credit loss.

The Company has certain investments in non-marketable equity securities, measured using unobservable valuation inputs and remeasured on a nonrecurring basis, which are collectively considered strategic investments. As of December 31, 2021 and

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2020, the fair value of the Company's strategic investments was \$16.5 million and \$10.5 million, respectively. These investments were recorded in Other Assets in the Company's Consolidated Balance Sheets.

See Note 1 to these Consolidated Financial Statements for additional discussion regarding the Company's fair value measurements.

(3) GOODWILL AND INTANGIBLE ASSETS

The change in the carrying value of Goodwill was as follows:

	December 31,	
	2021	2020
Beginning balance	\$ 196,199	\$ 197,039
Disposition	—	(840)
Ending carrying value	<u>\$ 196,199</u>	<u>\$ 196,199</u>

In January 2020, the Company completed the sale of worldwide rights to Firdapse, the Company's commercial product for the treatment of Lambert-Eaton myasthenic syndrome, to a third party in exchange for a one-time cash payment of \$67.2 million plus residual royalties. Under the terms of the agreement, the Company agreed to provide certain transition services to the third-party purchaser, such as customer sales and support, for up to 12 months after the closing of the transaction. During the first quarter of 2020, the Company recognized a before-tax net gain of \$59.5 million related to the sale of the Firdapse intellectual property (IP) and existing inventory. As a result of the sale of Firdapse, in the first quarter of 2020 the Company recognized a \$0.8 million reduction to Goodwill and disposed of \$32.2 million in intangible assets, including related accumulated amortization of \$31.6 million.

The Company performed its annual assessment for goodwill impairment for the year ended December 31, 2021 and no goodwill impairment charges were recorded.

Intangible Assets, Net consisted of the following:

	December 31,	
	2021	2020
Finite-lived intangible assets	\$ 677,350	\$ 644,087
Accumulated amortization	(288,698)	(226,816)
Net carrying value	<u>\$ 388,652</u>	<u>\$ 417,271</u>

During the fourth quarter of 2021 the Company capitalized a \$6.0 million Voxzogo regulatory approval milestone payment as a finite-lived intangible asset in the Company's Consolidated Balance Sheet following the FDA's approval of Voxzogo.

The following table summarizes the carrying value and estimated remaining life of the Company's finite-lived intangible assets as of December 31, 2021:

	Net Balance	Average Remaining Life
Acquired intellectual property	\$ 295,299	6.0 years
Technology transfer	74,055	Not applicable ⁽¹⁾
Repurchased royalty rights	12,937	1.9 years
License payments	6,203	8.7 years
Other	158	1.4 years
Total	<u>\$ 388,652</u>	

(1) The technology transfer intangible asset has not yet been placed into service.

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As of December 31, 2021, the estimated future amortization expense associated with the Company's finite-lived intangible assets, exclusive of the technology transfer asset that has not been placed into service, was as follows:

Fiscal Year	Amount
2022	\$ 62,606
2023	61,978
2024	55,702
2025	36,426
2026	36,426
Thereafter	61,459
	\$ 314,597

In 2019, the Company received \$25.0 million due to the achievement by a third party of development and regulatory milestones and commercial sales milestones related to a previously sold intangible asset, which the Company recorded as a Gain on Sale of Nonfinancial Assets in the Consolidated Statements of Operations.

(4) PROPERTY, PLANT AND EQUIPMENT

Property, Plant and Equipment, Net, consisted of the following:

	December 31,	
	2021	2020
Building and improvements	\$ 774,923	\$ 761,560
Manufacturing and laboratory equipment	444,182	414,439
Computer hardware and software	201,382	189,740
Land	90,418	90,418
Leasehold improvements	55,279	55,134
Furniture and equipment	42,976	40,223
Land improvements	10,132	7,412
Construction-in-progress	136,743	109,140
	1,756,035	1,668,066
Accumulated depreciation	(720,574)	(635,595)
Total property, plant and equipment, net	\$ 1,035,461	\$ 1,032,471

Depreciation expense, net of amounts capitalized into inventory, was \$46.1 million, \$43.0 million and \$51.8 million for the years ended December 31, 2021, 2020 and 2019, respectively.

(5) INVENTORY

Inventory consisted of the following:

	December 31,	
	2021	2020
Raw materials	\$ 80,269	\$ 76,673
Work-in-process	415,261	308,286
Finished goods	281,139	313,589
Total inventory	\$ 776,669	\$ 698,548

In the third quarter of 2020, the Company unexpectedly received a Complete Response Letter from the U.S. Food and Drug Administration (FDA) and a Joint Assessment Report from the European Medicines Agency (EMA) respectively, both indicating that the Company's regulatory applications for valoctocogene roxaparvovec could not be approved in their present form and requesting additional safety and efficacy data from the ongoing Phase 3 study. The Company evaluated the impact of the new requirement for Phase 3 data that is currently unknown and determined the value of the pre-launch inventory was no longer

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NOTES TO CONSOLIDATED FINANCIAL STATEMENTS (Continued)
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recoverable due to delays in anticipated regulatory approvals. As a result, the Company adjusted the pre-launch inventory to zero, its net realizable value, as of December 31, 2020. The Company recorded \$24.3 million and \$87.2 million to Cost of Sales during the years ended December 31, 2021 and December 31, 2020. The Company had no pre-launch inventory balance as of December 31, 2021.

See Note 1 to these Consolidated Financial Statements for additional information related to the Company's policy on inventory produced prior to regulatory approval.

(6) SUPPLEMENTAL BALANCE SHEET INFORMATION

Accounts Payable and Accrued Liabilities consisted of the following:

	December 31,	
	2021	2020
Accrued compensation expense	\$ 204,446	\$ 165,023
Accounts payable and accrued operating expenses	193,003	191,429
Accrued rebates payable	47,987	65,526
Accrued royalties payable	15,215	17,155
Lease liabilities	10,464	11,754
Deferred revenue	6,956	152
Forward foreign currency exchange contracts	6,263	17,798
Value added taxes payable	1,935	9,562
Accrued income taxes	1,213	9,661
Other	4,108	4,488
Total accounts payable and accrued liabilities	\$ 491,590	\$ 492,548

The roll forward of significant estimated accrued rebates and reserve for cash discounts for the years ended December 31, 2021, 2020 and 2019, were as follows:

	Balance at Beginning of Period	Provision for Current Period Sales	Payments	Balance at End of Period
Year ended December 31, 2021:				
Accrued rebates	\$ 65,526	\$ 116,691	\$ (134,230)	\$ 47,987
Reserve for cash discounts	\$ 1,716	\$ 16,003	\$ (15,706)	\$ 2,013
Year ended December 31, 2020:				
Accrued rebates	\$ 57,163	\$ 113,165	\$ (104,802)	\$ 65,526
Reserve for cash discounts	\$ 1,889	\$ 17,191	\$ (17,364)	\$ 1,716
Year ended December 31, 2019:				
Accrued rebates	\$ 43,116	\$ 91,748	\$ (77,701)	\$ 57,163
Reserve for cash discounts	\$ 1,197	\$ 15,335	\$ (14,643)	\$ 1,889

(7) FAIR VALUE MEASUREMENTS

The Company measures certain financial assets and liabilities at fair value in accordance with the policy described in Note 1 to these Consolidated Financial Statements.

The following tables present the classification within the fair value hierarchy of financial assets and liabilities not disclosed elsewhere in these Consolidated Financial Statements that are remeasured on a recurring basis as of December 31, 2021 and 2020. Other than the Company's fixed-rate convertible debt disclosed in Note 10 to these Consolidated Financial Statements, there

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were no financial assets or liabilities that were remeasured using a quoted price in active markets for identical assets (Level 1) as of December 31, 2021 and 2020.

	Fair Value Measurements as of December 31, 2021		
	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Total
Assets:			
Other current assets:			
NQDC Plan assets	\$ 2,043	\$ —	\$ 2,043
Other assets:			
NQDC Plan assets	23,929	—	23,929
Restricted investments ⁽¹⁾	2,940	—	2,940
Total other assets	26,869	—	26,869
Total assets	\$ 28,912	\$ —	\$ 28,912
Liabilities:			
Current liabilities:			
NQDC Plan liability	\$ 2,043	\$ —	\$ 2,043
Contingent consideration	—	48,232	48,232
Total current liabilities	2,043	48,232	50,275
Other long-term liabilities:			
NQDC Plan liability	23,929	—	23,929
Contingent consideration	—	15,167	15,167
Total other long-term liabilities	23,929	15,167	39,096
Total liabilities	\$ 25,972	\$ 63,399	\$ 89,371

	Fair Value Measurements as of December 31, 2020		
	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Total
Assets:			
Other current assets:			
NQDC Plan assets	\$ 2,415	\$ —	\$ 2,415
Other assets:			
NQDC Plan assets	19,962	—	19,962
Restricted investments ⁽¹⁾	4,487	—	4,487
Total other assets	24,449	—	24,449
Total assets	\$ 26,864	\$ —	\$ 26,864
Liabilities:			
Current liabilities:			
NQDC Plan liability	\$ 2,415	\$ —	\$ 2,415
Other long-term liabilities:			
NQDC Plan liability	19,962	—	19,962
Contingent consideration	—	60,130	60,130
Total other long-term liabilities	19,962	60,130	80,092
Total liabilities	\$ 22,377	\$ 60,130	\$ 82,507

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- (1) The restricted investments as of December 31, 2021 and 2020 secure the Company's irrevocable standby letters of credit obtained in connection with certain commercial agreements.

There were no transfers between levels during the periods presented.

Liabilities measured at fair value using Level 3 inputs consisted of contingent consideration. The following tables represent a roll-forward of contingent consideration.

Contingent consideration as of December 31, 2020	\$	60,130
Changes in the fair value of contingent consideration		8,026
Foreign exchange remeasurement of Euro denominated contingent consideration		(4,757)
Contingent consideration as of December 31, 2021	\$	<u>63,399</u>

(8) DERIVATIVE INSTRUMENTS AND HEDGING STRATEGIES

The Company's forward contracts designated as hedging instruments have maturities up to 2 years. The Company's forward contracts that are considered to be economic hedges that are not designated as hedging instruments have maturities up to 3 months.

The following table summarizes the aggregate notional amounts for the Company's derivatives outstanding as of the periods presented.

Forward Foreign Exchange Contracts	December 31, 2021	December 31, 2020
Derivatives designated as hedging instruments:		
Sell	\$ 740,667	\$ 782,327
Purchase	\$ 183,256	\$ 189,540
Derivatives not designated as hedging instruments:		
Sell	\$ 113,257	\$ 98,343
Purchase	\$ 31,068	\$ 12,277

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The fair value carrying amounts of the Company's derivatives, as classified within the fair value hierarchy, were as follows:

Balance Sheet Location	December 31, 2021	December 31, 2020
Derivatives designated as hedging instruments:		
Asset Derivatives - Level 2 ⁽¹⁾		
Other current assets	\$ 17,357	\$ 6,268
Other assets	4,991	3,148
Subtotal	\$ 22,348	\$ 9,416
Liability Derivatives - Level 2 ⁽¹⁾		
Accounts payable and accrued liabilities	\$ 5,487	\$ 17,551
Other long-term liabilities	1,378	11,020
Subtotal	\$ 6,865	\$ 28,571
Derivatives not designated as hedging instruments:		
Asset Derivatives - Level 2 ⁽¹⁾		
Other current assets	\$ 427	\$ 84
Liability Derivatives - Level 2 ⁽¹⁾		
Accounts payable and accrued liabilities	\$ 776	\$ 247
Total Derivatives Assets	\$ 22,775	\$ 9,500
Total Derivatives Liabilities	\$ 7,641	\$ 28,818

(1) See Note 1 to these Consolidated Financial Statements for additional information related to the Company's fair value measurements.

The following tables summarize the impact of gains and losses from the Company's derivatives on its Consolidated Statements of Operations for the periods presented.

	Years Ended December 31,			
	2021		2020	
Derivatives Designated as Cash Flow Hedging Instruments	Cash Flow Hedging Gains (Losses) Reclassified into Earnings	Cash Flow Hedging Gains (Losses) Reclassified into Earnings	Cash Flow Hedging Gains (Losses) Reclassified into Earnings	Cash Flow Hedging Gains (Losses) Reclassified into Earnings
Net product revenues as reported	\$ 1,783,498	\$ 196	\$ 1,805,861	\$ 18,122
Operating expenses as reported	\$ 1,928,616	\$ (1,650)	\$ 1,897,220	\$ (4,942)
Derivatives Not Designated as Hedging Instruments	Gains (Losses) Recognized in Earnings		Gains (Losses) Recognized in Earnings	
Operating expenses	\$ 1,548		\$ 115	

As of December 31, 2021, the Company expects to reclassify unrealized losses of \$12.2 million from AOCI to earnings as the forecasted revenue and operating expense transactions occur over the next twelve months. For additional discussion of balances in AOCI see Note 11 to these Consolidated Financial Statements.

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(9) LEASES

The following table presents the Company's ROU assets and lease liabilities for the periods presented.

Lease Classification	Classification	December 31,	
		2021	2020
Assets:			
Operating	Other assets	\$ 38,198	\$ 46,014
Financing	Other assets	8,220	11,095
Total ROU assets		\$ 46,418	\$ 57,109
Liabilities:			
Current:			
Operating	Accounts payable and accrued liabilities	\$ 8,198	\$ 8,889
Financing	Accounts payable and accrued liabilities	2,266	2,865
Noncurrent:			
Operating	Other long-term liabilities	31,882	40,483
Financing	Other long-term liabilities	1,960	4,006
Total lease liabilities		\$ 44,306	\$ 56,243

Maturities of lease liabilities as of December 31, 2021 by fiscal year were as follows:

Maturity of Lease Liabilities	Operating	Financing	Total
2022	\$ 10,193	\$ 2,427	\$ 12,620
2023	8,493	1,869	10,362
2024	6,490	85	6,575
2025	5,802	41	5,843
2026	4,304	11	4,315
Thereafter	11,811	—	11,811
Total lease payments	47,093	4,433	51,526
Less: Interest	(7,013)	(207)	(7,220)
Present value of lease liabilities	\$ 40,080	\$ 4,226	\$ 44,306

Lease costs associated with payments under the Company's leases for the periods presented were as follows:

Lease Cost	Classification	Years Ended December 31,	
		2021	2020
Operating ⁽¹⁾	Operating expenses	\$ 13,962	\$ 12,841
Financing:			
Amortization	Operating expenses	3,339	3,271
Interest expense	Operating expenses	283	448
Total lease costs		\$ 17,584	\$ 16,560

(1) Includes short-term leases and variable lease costs, both of which were not material in the periods presented.

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The following table includes the weighted average remaining lease terms and the weighted average discount rate used to calculate the present value of the Company's lease liabilities:

Other Information	Years Ended December 31,	
	2021	2020
Weighted average remaining lease term (in years):		
Operating leases	6.2	6.8
Financing leases	1.9	2.6
Weighted average discount rate:		
Operating leases	5.0 %	4.9 %
Financing leases	5.1 %	5.2 %

As of December 31, 2021, no leases were expected to commence that would create significant rights and obligations for the Company.

Supplemental Cash Flow Information	Years Ended December 31,	
	2021	2020
Cash paid for amounts included in the measurement of lease liabilities:		
Cash used in operating activities:		
Operating leases	\$ 10,664	\$ 10,536
Financing leases	\$ 283	\$ 450
Cash used in financing activities:		
Financing leases	\$ 3,039	\$ 6,918
ROU assets obtained in exchange for lease obligations:		
Operating leases	\$ 760	\$ 4,779
Financing leases	\$ 462	\$ 3,941

(10) DEBT**Convertible Notes**

As of December 31, 2021, the Company had outstanding fixed-rate notes with varying maturities for an undiscounted aggregate principal amount of \$1.1 billion (collectively the Notes). The Notes are senior subordinated convertible obligations, and

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interest is payable in arrears, semi-annually. The following table summarizes information regarding the Company's convertible debt:

	December 31,	
	2021	2020
1.25% senior subordinated convertible notes due in May 2027 (the 2027 Notes)	\$ 600,000	\$ 600,000
Unamortized discount net of deferred offering costs	(10,971)	(12,995)
2027 Notes, net	<u>589,029</u>	<u>587,005</u>
0.599% senior subordinated convertible notes due in August 2024 (the 2024 Notes)	495,000	495,000
Unamortized discount net of deferred offering costs	(4,952)	(6,860)
2024 Notes, net	<u>490,048</u>	<u>488,140</u>
Total convertible debt, net	<u>\$ 1,079,077</u>	<u>\$ 1,075,145</u>
Fair value of fixed rate convertible debt ⁽¹⁾:		
2027 Notes	\$ 625,122	\$ 627,090
2024 Notes	521,082	530,714
Total fair value of fixed rate convertible debt	<u>\$ 1,146,204</u>	<u>\$ 1,157,804</u>

- (1) The fair value of the Company's fixed-rate convertible debt is based on open market trades and is classified as Level 1 in the fair value hierarchy. See Note 1 to these Consolidated Financial Statements for additional discussion of fair value measurements.

Interest expense on the Company's convertible debt consisted of the following:

	Years Ended December 31,		
	2021	2020	2019
Coupon interest expense	\$ 10,465	\$ 12,350	\$ 4,907
Accretion of discount on convertible notes	3,339	14,682	15,917
Amortization of debt issuance costs	593	1,829	2,031
Total interest expense on convertible debt	<u>\$ 14,397</u>	<u>\$ 28,861</u>	<u>\$ 22,855</u>

2027 Notes

In May 2020, the Company issued \$600.0 million in aggregate principal amount of senior subordinated unsecured convertible notes with a maturity date of May 15, 2027. The 2027 Notes were issued to the public at par value and bear interest at the rate of 1.25% per annum. Interest is payable semi-annually in cash in arrears on May 15 and November 15 of each year, beginning November 15, 2020. The 2027 Notes are convertible, at the option of the holder into shares of the Company's common stock. The initial conversion rate for the 2027 Notes is 7.2743 shares per \$1,000 principal amount of the 2027 Notes, which represents a conversion price of approximately \$137.47 per share, subject to adjustment under certain conditions. Following certain corporate transactions, the Company will, in certain circumstances, increase the conversion rate for a holder that elects to convert its 2027 Notes in connection with such corporate transactions by a number of additional shares of the Company's common stock. A holder may convert fewer than all of such holder's 2027 Notes so long as the amount of the 2027 Notes converted is an integral multiple of \$1,000 principal amount. Net proceeds from the offering were \$585.8 million. In connection with the issuance of the 2027 Notes, the Company recorded a discount on the 2027 Notes of \$13.5 million, which will be accreted and recorded as additional interest expense over the life of the 2027 Notes.

The 2027 Notes are senior subordinated, unsecured obligations, and rank (i) subordinated in right of payment to the prior payment in full of all of the Company's existing and future senior debt, (ii) equal in right of payment with the Company's existing and future senior subordinated debt, (iii) senior in right of payment to the Company's existing and future indebtedness that is expressly subordinated in right of payment to the notes, (vi) effectively subordinated to the Company's existing and future secured indebtedness, to the extent of the value of the collateral securing that indebtedness, and (v) structurally subordinated to all existing

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and future indebtedness and other liabilities, including trade payables, and (to the extent the Company is not a holder thereof) preferred equity, if any, of the Company's subsidiaries. Upon the occurrence of a "fundamental change," as defined in the indenture governing the 2027 Notes, the holders may require the Company to repurchase all or a portion of such holder's 2027 Notes for cash at 100% of the principal amount of the 2027 Notes being purchased, plus any accrued and unpaid interest.

The offer and sale of the 2027 Notes and the shares of the Company's common stock issuable upon conversion of the 2027 Notes have not been registered under the Securities Act or any state securities laws and the 2027 Notes were offered only to qualified institutional buyers as defined in Rule 144A under the Securities Act.

2024 Notes

In August 2017, the Company issued \$495.0 million in aggregate principal amount of senior subordinated convertible notes with a maturity date of August 1, 2024. The 2024 Notes were issued to the public at 98% of face value and bear interest at the rate of 0.599% per annum. Interest is payable semi-annually in cash in arrears on February 1 and August 1 of each year, beginning February 1, 2018. The 2024 Notes are convertible, at the option of the holder into shares of the Company's common stock. The initial conversion rate for the 2024 Notes is 8.0212 shares per \$1,000 principal amount of the 2024 Notes, which represents a conversion price of approximately \$124.67 per share, subject to adjustment under certain conditions. Following certain corporate transactions, the Company will, in certain circumstances, increase the conversion rate for a holder that elects to convert its 2024 Notes in connection with such corporate transactions by a number of additional shares of the Company's common stock. A holder may convert fewer than all of such holder's 2024 Notes so long as the amount of the 2024 Notes converted is an integral multiple of \$1,000 principal amount. Net proceeds from the offering were \$481.7 million. In connection with the issuance of the 2024 Notes, the Company recorded a discount on the 2024 Notes of \$9.9 million, which will be accreted and recorded as additional interest expense over the life of the 2024 Notes.

The 2024 Notes are senior subordinated, unsecured obligations, and rank (i) subordinated in right of payment to the prior payment in full of any of the Company's existing and future senior debt, (ii) equal in right of payment to any of the Company's existing and future senior subordinated debt, (iii) senior in right of payment to any of the Company's existing and future indebtedness that is expressly subordinated in right of payment to the 2024 Notes, and (iv) effectively subordinated to any of the Company's existing and future secured indebtedness, to the extent of the value of the collateral securing that indebtedness and structurally subordinated to all existing and future indebtedness and other liabilities, including trade payables, and (to the extent the Company is not a holder thereof) preferred equity, if any, of the Company's subsidiaries. Upon the occurrence of a "fundamental change," as defined in the indenture governing the 2024 Notes, the holders may require the Company to repurchase all or a portion of such holder's 2024 Notes for cash at 100% of the principal amount of the 2024 Notes being purchased, plus any accrued and unpaid interest.

See Note 16 to these Consolidated Financial Statements for further discussion of the effect of conversion of the Company's convertible debt on net income (loss) per common share.

Revolving Credit Facility

In October 2018, the Company entered into an unsecured revolving credit facility of up to \$200.0 million, which includes a letter of credit subfacility and a swingline loan subfacility. The credit facility is intended to finance ongoing working capital needs and for other general corporate purposes. In May 2021, the Company entered into an amendment agreement in respect of the credit facility, extending the maturity date from October 19, 2021 to May 28, 2024, among other changes. The amended credit facility contains financial covenants including a maximum leverage ratio and a minimum interest coverage ratio. As of December 31, 2021, there were no amounts outstanding under the credit facility and the Company and certain of its subsidiaries that serve as guarantors were in compliance with all covenants.

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(11) ACCUMULATED OTHER COMPREHENSIVE INCOME (LOSS)

The following table summarizes changes in the accumulated balances for each component of AOCI, including current period other comprehensive income (loss) and reclassifications out of AOCI, for the periods presented.

	Unrealized Gains (Losses) on Cash Flow Hedges	Unrealized Gains (Losses) on Available-for-Sale Debt Securities	Other	Total
AOCI balance as of December 31, 2018	\$ 7,201	\$ (1,917)	\$ (13)	\$ 5,271
Other comprehensive income (loss) before reclassifications	25,266	7,122	(2)	32,386
Less: gain (loss) reclassified from AOCI	15,853	—	—	15,853
Tax effect	—	(1,640)	—	(1,640)
Net current-period other comprehensive income (loss)	9,413	5,482	(2)	14,893
AOCI balance at December 31, 2019	\$ 16,614	\$ 3,565	\$ (15)	\$ 20,164
Other comprehensive income (loss) before reclassifications	(23,462)	976	15	(22,471)
Less: gain (loss) reclassified from AOCI	13,180	552	—	13,732
Tax effect	—	(100)	—	(100)
Net current-period other comprehensive income (loss)	(36,642)	324	15	(36,303)
AOCI balance at December 31, 2020	\$ (20,028)	\$ 3,889	\$ —	\$ (16,139)
Other comprehensive income (loss) before reclassifications	34,379	(6,858)	—	27,521
Less: gain (loss) reclassified from AOCI	(1,454)	—	—	(1,454)
Tax effect	—	1,596	—	1,596
Net current-period other comprehensive income (loss)	35,833	(5,262)	—	30,571
AOCI balance at December 31, 2021	\$ 15,805	\$ (1,373)	\$ —	\$ 14,432

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(12) REVENUE, CREDIT CONCENTRATIONS AND GEOGRAPHIC INFORMATION

The following table presents Total Revenues and disaggregates Net Product Revenues by product.

	Years Ended December 31,		
	2021	2020	2019
Net product revenues by product:			
Vimizim	\$ 623,145	\$ 544,257	\$ 544,345
Naglazyme	380,449	391,298	374,334
Kuvan	285,776	457,736	463,353
Palyngiq	237,474	170,983	86,857
Brineura	128,034	110,192	71,997
Voxzogo	5,855	—	—
Firdapse	—	1,288	22,348
Total net product revenues marketed by the Company	1,660,733	1,675,754	1,563,234
Aldurazyme net product revenues marketed by Sanofi	122,765	130,107	97,809
Total net product revenues	1,783,498	1,805,861	1,661,043
Royalty and other revenues	62,777	54,594	43,005
Total revenues	\$ 1,846,275	\$ 1,860,455	\$ 1,704,048

The Company considers there to be revenue concentration risks for regions where Net Product Revenues exceed 10% of consolidated Net Product Revenues. The concentration of the Company's Net Product Revenues within the regions below may have a material adverse effect on the Company's revenues and results of operations if sales in the respective regions experience difficulties. The table below disaggregates total Net Product Revenues by geographic region, which is based on patient location for Company's commercial products sold directly by the Company, except for Aldurazyme, which is sold exclusively by Sanofi worldwide.

	Years Ended December 31,		
	2021	2020	2019
United States	\$ 657,700	\$ 756,863	\$ 669,171
Europe	558,952	498,725	485,596
Latin America	191,151	205,862	218,792
Rest of world	252,930	214,304	189,675
Total net product revenues marketed by the Company	1,660,733	1,675,754	1,563,234
Aldurazyme net product revenues marketed by Sanofi	122,765	130,107	97,809
Total net product revenues	\$ 1,783,498	\$ 1,805,861	\$ 1,661,043

The following table illustrates the percentage of the Company's total Net Product Revenues attributed to the Company's largest customers for the periods presented.

	Years Ended December 31,		
	2021	2020	2019
Customer A	18 %	16 %	17 %
Customer B	14 %	15 %	13 %
Customer C	10 %	12 %	11 %
Total	42 %	43 %	41 %

On a consolidated basis, two customers accounted for 28% and 16% of the Company's December 31, 2021 accounts receivable balance, respectively, compared to December 31, 2020 when two customers accounted for 24% and 22% of the accounts receivable balance, respectively. As of December 31, 2021 and 2020, the accounts receivable balance for Sanofi included \$67.9 million and \$72.1 million, respectively, of unbilled accounts receivable, which becomes payable to the Company

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when the product is sold through by Sanofi. The Company does not require collateral from its customers, but does perform periodic credit evaluations of its customers' financial condition and requires prepayments in certain circumstances.

The Company's global revenue sources and its business operations were impacted by the COVID-19 pandemic during the year ended December 31, 2021 and 2020, mostly in the form of demand interruptions such as missed patient infusions and delayed treatment starts for new patients, and the Company anticipates a continued impact due to COVID-19 on its financial results in 2022. The extent and duration of such effects remain uncertain and difficult to predict, particularly as virus variants continue to spread. The Company is actively monitoring and managing its response and assessing actual and potential impacts to its operating results and financial condition, as well as developments in its business, which could further impact developments, trends and expectations.

The Company is mindful that conditions in the current macroeconomic environment could affect the Company's ability to achieve its goals. The Company sells its products in countries that face economic volatility and weakness. Although the Company has historically collected receivables from customers in certain countries, sustained weakness or further deterioration of the local economies and currencies and effects of the impact of the ongoing COVID-19 pandemic may cause customers in those countries to delay payment or be unable to pay for the Company's products. The Company believes that the allowances for doubtful accounts related to these countries, if any, are adequate based on its analysis of the specific business circumstances and expectations of collection for each of the underlying accounts in these countries. The Company will continue to monitor these conditions and will attempt to adjust its business processes, as appropriate, to mitigate macroeconomic risks to its business.

Long-lived assets, which consist of net property, plant and equipment and ROU assets are summarized by geographic region in the following table.

	December 31,	
	2021	2020
Long-lived assets by geography:		
United States	\$ 763,847	\$ 771,286
Ireland	304,748	300,555
Rest of world	13,284	17,739
Total long-lived assets	\$ 1,081,879	\$ 1,089,580

(13) EQUITY COMPENSATION PLANS AND STOCK-BASED COMPENSATION**Equity Compensation Plans***Shares Available Under Equity Compensation Plans*

As of December 31, 2021, an aggregate of approximately 44.5 million unissued shares was authorized for future issuance under the Company's stock plans, which primarily includes shares issuable under the 2017 Equity Incentive Plan (2017 EIP) and the ESPP. Under the 2017 EIP, shares issued and outstanding under the Amended and Restated 2006 Share Incentive Plan (the 2006 Share Incentive Plan) and the 2017 Equity Incentive Plan that expire or are forfeited generally become available for future issuance under the 2017 Equity Incentive Plan. No additional awards will be granted under the 2006 Share Incentive Plan; however, there are vested and unvested awards outstanding under the 2006 Share Incentive Plan. The Company's stock-based compensation plans are administered by the Company's Board of Directors (the Board), or designated Committee thereof, which selects persons to receive awards and determines the number of shares subject to each award and the terms, conditions, performance measures and other provisions of the awards. See Note 1 to these Consolidated Financial Statements for discussion regarding the valuation of equity awards.

2017 Equity Incentive Plan

The 2017 Equity Incentive Plan provides for awards of RSUs and stock options as well as other forms of equity compensation. Stock option awards granted to employees generally vest over a four-year period on a cliff basis 12 months after the grant date and then monthly thereafter. The contractual term of stock option awards is generally 10 years from the grant date. RSUs granted to employees generally vest annually over a straight-line four-year period after the grant date. PRSUs generally vest

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over a three-year period on a cliff basis three years after the grant date. As of December 31, 2021, approximately 29.6 million shares were authorized and reserved for future issuance under the 2017 Equity Incentive Plan.

Employee Stock Purchase Plan

The ESPP was initially approved in June 2006, replacing the Company's previous plan, and was most recently amended in June 2019. Under BioMarin's ESPP, employees meeting specific employment qualifications are eligible to participate and can purchase shares on established dates (each purchase date) semi-annually through payroll deductions at the lower of 85% of the fair market value of the stock at the commencement of the offering period or each purchase date of the offering period. Each offering period will span up to two years. The ESPP permits eligible employees to purchase common stock through payroll deductions for up to 10% of qualified compensation, up to an annual limit of \$25,000. The ESPP is intended to qualify as an "employee stock purchase plan" under Section 423 of the Internal Revenue Code. During the year ended December 31, 2021, the Company issued 0.3 million shares under the ESPP. As of December 31, 2021, approximately 7.0 million shares were authorized and 3.1 million shares reserved for future issuance under the ESPP.

Board of Director Grants

On the date of the Company's annual meeting of stockholders for a given year, each re-elected Independent Director receives an RSU grant valued at \$400,000, with the number of RSUs to be granted calculated based on the three-month trailing average closing price of the Company's common stock on the Nasdaq Global Select Market. The annual RSU grant for a director who has served for less than a year is prorated to the nearest quarter of the calendar year. The RSUs subject to the annual award vest in full on the one-year anniversary of the grant date, subject to each respective Director providing service to the Company through such vesting date. Upon election or appointment, a new Independent Director will receive an RSU grant on the same terms as the annual award, pro-rated for amount and vesting to the nearest quarter for the time such new Independent Director will serve prior to the Company's next annual meeting of stockholders.

Stock-based Compensation

Stock-based compensation expense included on the Company's Consolidated Statements of Operations for all stock-based compensation arrangements was as follows:

	Years Ended December 31,		
	2021	2020	2019
Cost of sales	\$ 22,357	\$ 26,246	\$ 16,146
Research and development	67,196	61,942	56,649
Selling, general and administrative	107,710	101,523	87,070
Total stock-based compensation expense	\$ 197,263	\$ 189,711	\$ 159,865

Stock-based compensation of \$20.0 million, \$20.1 million and \$20.3 million was capitalized into inventory for the years ended December 31, 2021, 2020 and 2019, respectively. Capitalized stock-based compensation is recognized in Cost of Sales when the related product is sold.

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Restricted Stock Units*Restricted Stock Unit Awards with Service-Based Vesting Conditions*

Below is a summary of activity related to RSUs with service-based vesting conditions under the plan for the year ended December 31, 2021:

	Shares	Weighted Average Grant Date Fair Value
Non-vested units as of December 31, 2020	4,173,124	\$ 83.41
Granted	2,338,270	\$ 78.46
Vested	(1,499,408)	\$ 85.74
Forfeited	(574,474)	\$ 80.57
Non-vested units as of December 31, 2021	<u>4,437,512</u>	<u>\$ 80.38</u>

The weighted-average grant date fair value per share of RSUs granted during the years ended December 31, 2021, 2020 and 2019, was \$78.46, \$77.13 and \$91.28, respectively. The total intrinsic value of restricted stock that vested and released in the years ended December 31, 2021, 2020 and 2019, was \$117.2 million, \$109.9 million and \$101.0 million respectively.

As of December 31, 2021, total unrecognized compensation cost related to unvested RSUs with service-based vesting conditions of \$250.6 million was expected to be recognized over a weighted average period of 2.6 years.

Restricted Stock Unit Awards with Performance-based Vesting Conditions

Revenue PRSUs: Although no PRSUs with vesting conditions based on revenue performance were granted during the year ended December 31, 2021 or 2020, awards granted during prior periods presented were contingent upon the achievement of an annual revenue target and the earned RSUs vest over a three-year service period. The number of shares that may be earned ranged between 50% and 200% of the base RSUs, depending on the percentage of the respective annual year's Net Product Revenues, excluding net revenues attributable to Aldurazyme, and determined using fixed foreign currency exchange rates achieved against the target, with a threshold achievement level of 75% of target and a ceiling achievement level of 125% of target.

Below is a summary of activity related to Revenue PRSUs under the Company's equity plan for the year ended December 31, 2021:

	Shares	Weighted Average Grant Date Fair Value
Non-vested units as of December 31, 2020	99,351	\$ 90.31
Granted	—	\$ —
Vested	(68,773)	\$ 88.44
Forfeited	—	\$ —
Non-vested units as of December 31, 2021	<u>30,578</u>	<u>\$ 94.53</u>

The weighted-average grant date fair value of Revenue PRSUs granted during the year ended December 31, 2019, was \$94.53. As of December 31, 2021, total unrecognized compensation expense of \$0.4 million related to Revenue PRSUs was expected to be recognized over a weighted average period of approximately three months.

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Other PRSUs: Below is a summary of activity related to RSUs with vesting conditions based on other performance targets under the Company's equity plan for the year ended December 31, 2021:

	Shares	Weighted Average Grant Date Fair Value
Non-vested units as of December 31, 2020	220,665	\$ 83.83
Granted	234,120	\$ 78.09
Vested	(8,310)	\$ 116.83
Forfeited	(40,004)	\$ 61.09
Non-vested units as of December 31, 2021	<u>406,471</u>	<u>\$ 70.82</u>

The weighted-average grant date fair value of Other PRSUs for the years ended December 31, 2021, 2020 and 2019, was \$78.09, \$84.17 and \$81.00, respectively.

Non-vested Other PRSUs included grants with vesting contingent upon the achievement of a three-year Non-GAAP income target and grants with vesting contingent upon achievement of a three-year strategic goal target. The awarded PRSUs, if any, vest ratably over a three-year service period. The Company evaluated the targets in the context of its current long-range financial plan, its product candidate development pipeline and planned regulatory activity and determined that attainment of each grant target was probable for accounting purposes commencing in the quarter granted. The number of shares that may be earned range between 50% and 200% of the base RSUs.

Also included in non-vested Other PRSUs were awards that vest contingent upon achievement of certain regulatory milestones some of which, for accounting purposes, were deemed not yet probable of vesting as of December 31, 2021. Therefore, as of December 31, 2021, total unrecognized compensation expense of \$10.9 million related to awards deemed probable of vesting and \$10.6 million related to awards not yet deemed probable of vesting. The expected weighted average period over which expense is to be recognized for the awards that are considered probable of vesting as of December 31, 2021 was 1.7 years.

Restricted Stock Unit Awards with Market-based Vesting Conditions

The Compensation Committee and Board may grant RSUs with market-based vesting conditions (base TSR-RSUs) to certain executives. These base TSR-RSUs vest, if at all, in full following a three-year service period only if certain total shareholder return (TSR) results relative to the Nasdaq Biotechnology Index comparative companies are achieved. The number of shares that may be earned range between zero percent and 200% of the base TSR-RSUs with a ceiling achievement level of 100% of the base TSR-RSUs in the event the Company's TSR is above the 50th percentile but negative on an absolute basis.

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Below is a summary of activity related to RSUs with market-based vesting conditions under the Company's equity plan for the year ended December 31, 2021:

	Shares	Weighted Average Grant Date Fair Value
Non-vested units as of December 31, 2020	220,990	\$ 127.23
Granted	141,610	\$ 117.52
Vested	—	\$ —
Forfeited	(11,740)	\$ 114.94
Non-vested units as of December 31, 2021	<u>350,860</u>	<u>\$ 123.73</u>

The grant date fair values and assumptions used to determine the grant date fair value of TSR-RSUs granted during the periods presented were as follows:

	Years Ended December 31,		
	2021	2020	2019
Grant date fair value	\$117.52	\$112.12 – \$217.65	\$143.92
Expected volatility	24.7% – 161.7%	21.3% – 159.9%	21.7% – 155.6%
Dividend yield	0.0%	0.0%	0.0%
Expected term	2.8 years	2.5 – 2.8 years	2.8 years
Risk-free interest rate	0.3%	0.2 – 0.4%	2.4%

As of December 31, 2021, total unrecognized compensation expense of \$14.9 million related to base TSR-RSUs was expected to be recognized over a weighted average period of 1.9 years.

Stock Options and Purchase Rights

Stock Options

The following table summarizes activity under the Company's stock option plans for the year ended December 31, 2021. All stock option grants presented in the table had exercise prices not less than the fair value of the underlying common stock on the grant date:

	Shares	Weighted Average Exercise Price	Weighted Average Remaining Years	Aggregate Intrinsic Value ⁽¹⁾
Options outstanding as of December 31, 2020	6,829,437	\$ 73.19		\$ 119,607
Granted	665,610	\$ 78.33		
Exercised	(892,890)	\$ 34.99		
Expired and forfeited	(152,465)	\$ 82.26		
Options outstanding as of December 31, 2021	<u>6,449,692</u>	\$ 78.79	4.8	\$ 80,857
Options unvested as of December 31, 2021	1,287,835	\$ 79.82	8.6	\$ 12,334
Exercisable at December 31, 2021	5,161,857	\$ 78.54	3.8	\$ 68,523

(1) The aggregate intrinsic value for outstanding options is calculated as the difference between the exercise price of the underlying awards and the quoted price of the Company's common stock on the Nasdaq Global Select Market as of the last trading day for the respective year. The aggregate intrinsic value of options outstanding and exercisable includes options with an exercise price below \$88.35, the closing price of the Company's common stock on the Nasdaq Global Select Market on December 31, 2021.

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The weighted-average fair value per stock option granted in the years ended December 31, 2021, 2020 and 2019, were \$31.61, \$27.47 and \$36.84, respectively. The total intrinsic value of options exercised during the years ended December 31, 2021, 2020 and 2019, was \$40.7 million, \$71.9 million and \$32.5 million, respectively, determined as of the date of option exercise. Upon the exercise of the options, the Company issues new common stock from its authorized shares.

The assumptions used to estimate the per share fair value of stock options granted during the periods presented were as follows:

	Years Ended December 31,		
	2021	2020	2019
Expected volatility	39.4 – 41.6%	36.5 – 42.2%	37.1 – 37.4%
Dividend yield	0.0%	0.0%	0.0%
Expected term	4.7 – 6.0 years	4.6 – 5.9 years	4.6 – 5.8 years
Risk-free interest rate	0.7 – 1.3%	0.3 – 1.7%	2.2 – 3.0%

As of December 31, 2021, total unrecognized compensation cost related to unvested stock options of \$31.3 million was expected to be recognized over a weighted average period of 2.5 years. The net tax expense from stock options exercised during the year ended December 31, 2021 was \$0.5 million.

Stock Purchase Rights

The assumptions used to estimate the per share fair value of stock purchase rights granted under the ESPP were as follows:

	Years Ended December 31,		
	2021	2020	2019
Expected volatility	23.7 – 69.2%	30.6 – 69.2%	27.7% – 35.0%
Dividend yield	0.00%	0.00%	0.00%
Expected term	0.5 – 2.0 years	0.5 – 2.0 years	0.5 – 2.0 years
Risk-free interest rate	0.04% – 2.4%	0.1 – 2.8%	1.2 – 2.8%

As of December 31, 2021, total unrecognized compensation cost related to unvested stock purchase rights under the ESPP of \$17.0 million was expected to be recognized over a weighted average period of 1.4 years.

(14) OTHER EMPLOYEE BENEFITS*401(k) Plan*

The Company sponsors the BioMarin Retirement Savings Plan (the 401(k) Plan) for eligible U.S. employees. The Company pays the direct expenses of the 401(k) Plan and matches 100% of each participating employee's eligible contributions, up to a maximum of the lesser of 6% of the employee's annual compensation or the annual statutory contribution limit. The Company's matching contribution vests immediately and was approximately \$31.6 million, \$26.4 million and \$28.5 million for the years ended December 31, 2021, 2020 and 2019, respectively.

Deferred Compensation Plan

The Company maintains the NQDC under which eligible directors and key employee may defer compensation. The NQDC prohibits the diversification of deferrals of Company stock. Company stock issued and held by the NQDC is accounted for similarly to treasury stock in that the fair value of the employer stock was determined on the grant date and the shares are issued into the NQDC when the restricted stock vests. The corresponding deferred compensation obligation is classified as equity with no changes in the fair value of Company stock held in the NQDC recognized in earnings. Other contributions held in the NQDC are classified

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as trading securities, recorded at fair value with the corresponding deferred compensation obligation classified as a liability and subsequent changes in the fair value of these non-BioMarin investments are recognized in earnings in the period they occur.

See Note 10 to these Consolidated Financial Statements for additional discussion on the fair value and presentation of the NQDC assets and liabilities.

(15) INCOME TAXES

The benefit from income taxes was based on loss before income taxes as follows:

	Years Ended December 31		
	2021	2020	2019
U.S. Source	\$ (259,258)	\$ (162,939)	\$ (182,112)
Non-U.S. Source	183,908	120,617	87,301
Loss before income taxes	\$ (75,350)	\$ (42,322)	\$ (94,811)

The U.S. and foreign components of the benefit from income taxes were as follows:

	Years Ended December 31,		
	2021	2020	2019
Provision for (benefit from) current income tax expense:			
Federal	\$ (2,038)	\$ (14,758)	\$ 5,127
State and local	1,339	1,201	1,331
Foreign	5,037	1,042	5,339
	4,338	(12,515)	11,797
Provision for (benefit from) deferred income taxes:			
Federal	(29,895)	(45,038)	(58,311)
State and local	(1,230)	(5,321)	(5,394)
Foreign	15,517	(838,548)	(19,055)
	(15,608)	(888,907)	(82,760)
Benefit from income taxes	\$ (11,270)	\$ (901,422)	\$ (70,963)

In the third quarter of 2020, the Company completed an intra-entity transfer of certain intellectual property rights from a wholly owned foreign subsidiary (tax resident in the Bahamas) to its wholly owned Irish subsidiary. The rights were sold to the Company's Irish subsidiary where its ex-U.S. regional headquarters are located and has significant manufacturing and commercial operations, to better align ownership of intellectual property rights with how the business operates. The intra-entity transfer did not result in a taxable gain in 2020 in any jurisdiction including the U.S. as the transaction was disregarded for U.S. tax purposes. The Company filed an election to treat the Irish subsidiary as a disregarded entity for U.S. income tax purposes in 2011. The transaction resulted in a step-up in the tax basis in the transferred intellectual property rights and the Company's Irish subsidiary recognized a deferred tax asset for the book and tax basis difference of the transferred intellectual property rights. As a result, the Company recognized a deferred tax asset of \$835.1 million and related tax benefit on its Consolidated Financial Statements based on the fair value of the transferred intellectual property rights. The fair value of the transferred intellectual property rights was determined utilizing the income approach which relied on projections of product-specific revenues and the inclusion or exclusion of a terminal value for each product.

The tax deductions related to the amortization of these transferred intellectual property rights will be recognized in the future and any amortization not deducted for tax purposes will be carried forward indefinitely under Irish tax laws. The Company expects to be able to realize the deferred tax asset resulting from this transaction and has not recorded a valuation allowance as of December 31, 2021 and 2020.

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The following is a reconciliation of the statutory federal income tax benefit to the Company's effective tax rate:

	December 31,		
	2021	2020	2019
Federal statutory income tax benefit	\$ (15,824)	\$ (8,888)	\$ (19,911)
State and local taxes	509	(3,264)	(2,784)
Orphan Drug & General Business Credit	(29,363)	(44,114)	(43,124)
Stock compensation expense	7,859	(1,101)	239
Changes in the fair value of contingent consideration	—	—	(1,804)
Foreign Source Income Subject to U.S. Tax	16,878	6,266	(52)
Foreign tax rate differential ^{(1) (2)}	(16,971)	(16,238)	(30,639)
Section 162(m) limitation	6,304	9,571	8,294
Tax Reserves	15,530	2,166	12,123
Intra-entity transfer of assets	(3,920)	(852,338)	—
CARES Act carryback claim	—	(2,201)	—
Valuation allowance/deferred benefit	6,821	6,876	7,827
Other	907	1,843	(1,132)
Effective income tax benefit	<u>\$ (11,270)</u>	<u>\$ (901,422)</u>	<u>\$ (70,963)</u>

- (1) For the year ended December 31, 2021, the foreign rate differential included foreign local tax expense which was at an effective rate lower than the U.S. statutory rate and includes the recognition of the valuation allowance against a portion of the deferred tax assets of the Company's Dutch subsidiary of \$9.3 million.
- (2) For the year ended December 31, 2019, the foreign rate differential included foreign local tax expense which was at an effective rate lower than the U.S. statutory rate and was offset by the benefit of the valuation allowance release against the deferred tax assets of the Company's Dutch subsidiary of \$29.6 million.

The significant components of the Company's net deferred tax assets were as follows:

	December 31,	
	2021	2020
Net deferred tax assets:		
Net operating loss carryforwards	\$ 25,936	\$ 30,718
Tax credit carryforwards	563,022	532,394
Accrued expenses, reserves, and prepaids	72,759	66,889
Intangible assets	875,311	873,575
Stock-based compensation	50,910	47,011
Lease liabilities	7,422	8,991
Inventory	25,169	32,012
Other	1,943	454
Valuation allowance	(109,176)	(93,075)
Total deferred tax assets	<u>1,513,296</u>	<u>1,498,969</u>
Joint venture basis difference	(1,665)	(1,164)
Acquired intangibles	(1,250)	(1,364)
Deferred revenue	—	(1,517)
ROU assets	(6,808)	(8,280)
Property, plant and equipment	(54,498)	(54,682)
Total deferred tax liabilities	<u>(64,221)</u>	<u>(67,007)</u>
Net deferred tax assets	<u>\$ 1,449,075</u>	<u>\$ 1,431,962</u>

Valuation allowances are provided to reduce the amounts of the Company's deferred tax assets to an amount that is more likely than not to be realized based on an assessment of positive and negative evidence, including estimates of future taxable income necessary to realize future deductible amounts. At the end of each period, the Company will reassess the ability to realize

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its deferred tax benefits. If it is more likely than not that the Company would not realize the deferred tax benefits, a valuation allowance may need to be established against all or a portion of the deferred tax assets, which will result in a charge to tax expense.

In the fourth quarter of 2021, the Company renegotiated a license agreement that resulted in lower royalty projections for its Dutch subsidiary. The revised royalty projections required establishment of a valuation allowance on net operating loss deferred tax assets that were no longer expected to be realizable. The valuation allowance also increased in 2021 due to the Company's expectation that state R&D credits will not be utilized.

As of December 31, 2021, the Company had the following net operating loss and tax credit carryforwards, which if not utilized, will expire as follows:

Type	Amount	Year
Federal net operating loss carryforwards	\$ 4,147	2030-2033
Federal R&D and orphan drug credit carryforwards	\$ 592,710	2024-2041
State net operating loss carryforwards	\$ 230,500	2023-2041
Dutch net operating loss carryforwards	\$ 48,903	Indefinite

Not included in the table above are \$137.3 million of state research credit carryovers that will carry forward indefinitely.

The Company's net operating losses and credits could be subject to annual limitations due to ownership change limitations provided by IRC Section 382 and similar state provisions. An annual limitation could result in the expiration of net operating losses and tax credit carryforward before utilization. There are limitations on the tax attributes of acquired entities however, the Company does not believe the limitations will have a material impact on the utilization of the net operating losses or tax credits.

The financial statement recognition of the benefit for a tax position is dependent upon the benefit being more likely than not to be sustainable upon audit by the applicable taxing authority. If this threshold is met, the tax benefit is then measured and recognized at the largest amount that is greater than 50% likely of being realized upon ultimate settlement.

A reconciliation of the beginning and ending amount of unrecognized tax benefits for the years ended December 31, 2021 and 2020, is as follows:

	December 31,	
	2021	2020
Balance at beginning of period	\$ 182,564	\$ 168,748
Additions based on tax positions related to the current year	23,499	16,481
(Deletions) Additions for tax positions of prior years	(786)	(2,527)
Lapse of statute of limitations	(182)	(138)
Balance at end of period	<u>\$ 205,095</u>	<u>\$ 182,564</u>

Included in the balance of unrecognized tax benefits as of December 31, 2021 were potential benefits of \$196.7 million that, if recognized, would affect the effective tax rate. The Company's policy for classifying interest and penalties associated with unrecognized income tax benefits is to include such items in the income tax expense. The total amount of accrued interest and penalties was not significant as of December 31, 2021. The Company believes it will not have any material decreases in its previously unrecognized tax benefits within the next twelve months.

The Company files income tax returns in the U.S., Ireland and various foreign jurisdictions. The U.S. and foreign jurisdictions have statute of limitations ranging from three to five years. However, carryforward tax attributes that were generated in 2014 and earlier may still be adjusted upon examination by tax authorities.

U.S. income and foreign withholding taxes have not been recognized on the excess of the amount for financial reporting over the tax basis of investments in foreign subsidiaries that are essentially permanent in duration. This excess totaled approximately \$16.3 million as of December 31, 2021, which will be indefinitely reinvested; deferred income taxes have not been provided on such foreign earnings.

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(16) NET INCOME (LOSS) PER COMMON SHARE

Potentially issuable shares of common stock include shares issuable upon the exercise of outstanding employee stock option awards, common stock issuable under the Company's ESPP, unvested RSUs, the Company's common stock held by the NQDC and contingent issuances of common stock related to the Company's convertible debt.

The following table sets forth the computation of basic and diluted income (loss) per common share (common shares in thousands):

	Years Ended December 31,		
	2021	2020	2019
Numerator:			
Net income (loss), basic	\$ (64,080)	\$ 859,100	\$ (23,848)
Add: Interest on convertible notes	—	8,313	—
Net income (loss), diluted	<u>\$ (64,080)</u>	<u>\$ 867,413</u>	<u>\$ (23,848)</u>
Denominator:			
Weighted-average common shares outstanding, basic	182,852	180,804	179,039
Effect of dilutive securities:			
Options to purchase common stock	—	1,543	—
Common stock issuable under the 2027 notes	—	2,874	—
Common stock issuable under the 2024 notes	—	3,970	—
Unvested RSUs	—	1,938	—
Common stock potentially issuable for ESPP purchases	—	353	—
The Company's common stock held by the NQDC	—	196	—
Weighted-average common shares outstanding, diluted	<u>182,852</u>	<u>191,678</u>	<u>179,039</u>
Net income (loss) per common share, basic	<u>\$ (0.35)</u>	<u>\$ 4.75</u>	<u>\$ (0.13)</u>
Net income (loss) per common share, diluted	<u>\$ (0.35)</u>	<u>\$ 4.53</u>	<u>\$ (0.13)</u>

In addition to the equity instruments included in the table above, the table below presents potential shares of common stock that were excluded from the computation of basic and diluted income (loss) per common share as they were anti-dilutive (in thousands):

	Years Ended December 31,		
	2021	2020	2019
Options to purchase common stock	6,450	5,287	7,264
Common stock issuable under the 2027 Notes	4,365	—	—
Common stock issuable under the 2024 Notes	3,970	—	3,970
Common stock issuable under the 2020 Notes	—	—	3,983
Unvested RSUs	5,225	2,235	3,956
Common stock potentially issuable for ESPP purchases	594	314	587
The Company's common stock held by the NQDC	181	—	205
Total number of potentially issuable shares	<u>20,785</u>	<u>7,836</u>	<u>19,965</u>

The 1.50% senior subordinated convertible notes that matured on October 15, 2020 (the 2020 Notes) were settled in cash for approximately \$375.0 million. The potential effect of the capped call transactions with respect to the 2020 Notes was excluded from the diluted net income (loss) per share as the Company's closing stock price on December 31, 2019 did not exceed the conversion price of \$94.15 per share for the 2020 Notes. There is no similar capped call transaction associated with the 2024 Notes or 2027 Notes. See Note 10 to these Consolidated Financial Statements for information on the Company's convertible debt.

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(17) LICENSE AND COLLABORATION AGREEMENTS

In October 2019, the Company entered into a worldwide, exclusive licensing agreement with a third party for tralesenidase alfa (formerly referred to as BMN 250), an investigational enzyme replacement therapy to treat Sanfilippo Syndrome Type B. In consideration, the Company received an upfront payment of \$3.0 million, a minority 15% equity ownership interest in the licensee, and is entitled to receive royalties on net sales of tralesenidase alfa and milestone payments if certain development, regulatory and sales milestones are met by the licensee.

The Company evaluated the design and purpose of the third-party licensee and determined that it is a variable interest entity (VIE), as the equity-at-risk is insufficient to support the licensee's operations. The Company has concluded that it is not the primary beneficiary of the VIE as the Company does not have the power to direct the activities of the VIE that most significantly impact its performance. The Company is accounting for the minority equity investment at cost, less impairment, if any, adjusted for observable price changes, as it does not exercise significant influence over the operations of the licensee. Other than providing the licensee with specified transition services, the Company has no other involvement with the operations of the VIE as of December 31, 2021. As a result, the Company's loss exposure is limited to the value of the equity investment of \$12.6 million which is included in Other Assets on the Company's Consolidated Balance Sheets as of December 31, 2021.

In July 2017, the Company executed a license agreement with Sarepta Therapeutics (Sarepta) that provides Sarepta with global exclusive rights to the Company's Duchenne muscular dystrophy (DMD) patent estate for EXONDYS 51 and all future exon-skipping products. Under the license agreement, Sarepta pays the Company royalties and may pay the Company certain milestone payments for exons 51, 45, 53 and possibly other exon-skipping products. In the fourth quarter of 2021, the Company and Sarepta amended the license agreement to, among other things, make the license co-exclusive at a future date and reduce future royalty rates.

On October 1, 2015, the Company entered into an agreement with Ares Trading S.A. (Merck Serono) under which the Company acquired all global rights to Kuvan and Palynziq from Merck Serono, with the exception of Kuvan in Japan. Previously, the Company had exclusive rights to Kuvan in the U.S. and Canada and Palynziq in the U.S. and Japan. Pursuant to the A&R Kuvan Agreement, if future sales milestones are met, the Company is obligated to pay Merck Serono up to a maximum of €60.0 million, in cash, which was an estimated value of \$68.1 million using the current exchange rate as of December 31, 2021. Pursuant to the Pegvaliase Agreement, the Company paid Merck Serono €125.0 million in cash when the Palynziq development milestones were achieved.

In October 2012, the Company licensed to Catalyst Pharmaceutical Partners, Inc. (Catalyst) the North American rights to develop and market Firdapse, the Company's former commercial product for the treatment of Lambert-Eaton myasthenic syndrome. In exchange for the North American rights to Firdapse, commencing in the first quarter of 2019 the Company receives royalties of 7% to 10% on net product sales of Firdapse in North America. In January 2020, the Company completed the sale of worldwide rights to Firdapse to a third party. The Company retained the rights to receive the royalties from Catalyst. See Note 3 to these Consolidated Financial Statements for further information about the Firdapse sale.

In September 2007, the Company licensed to Asubio Pharma Co., Ltd. (a subsidiary of Daiichi Sankyo) exclusive rights to data and intellectual property contained in the Kuvan new drug application. The Company receives royalties on net sales of the product in Japan.

The Company is engaged in R&D collaborations with various other entities. These provide for sponsorship of R&D by the Company and may also provide for exclusive royalty-bearing intellectual property licenses or rights of first negotiation regarding licenses to intellectual property development under the collaborations. Typically, these agreements can be terminated for cause by either party upon written notice.

(18) COMMITMENTS AND CONTINGENCIES***Contingencies***

From time to time the Company is involved in legal actions arising in the normal course of its business. The process of resolving matters through litigation or other means is inherently uncertain and it is possible that an unfavorable resolution of these matters could adversely affect the Company, its results of operations, financial condition or cash flows. The Company's general practice is to expense legal fees as services are rendered in connection with legal matters, and to accrue for liabilities when losses are probable and reasonably estimable.

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As of December 31, 2021, the Company was subject to contingent payments considered reasonably possible of \$788.5 million, including \$389.0 million related to an early stage development program licensed from a third party in the fourth quarter of 2021 and \$225.0 million related to an early stage development program licensed from a third party in the second quarter of 2020.

Other Commitments

The Company uses experts and laboratories at universities and other institutions to perform certain R&D activities. These amounts are included as R&D expense as services are provided. In the normal course of business, the Company enters into various firm purchase commitments primarily to procure active pharmaceutical ingredients, certain inventory-related items and certain third-party R&D services, production services and facility construction services. As of December 31, 2021, such commitments were estimated at approximately \$133.3 million, all of which were short-term. The Company has also licensed technology, for which it is required to pay royalties upon future sales, subject to certain annual minimums.

(19) SUBSEQUENT EVENT

On February 9, 2022, the Company entered into an agreement to sell the Rare Pediatric Disease Priority Review Voucher (PRV) it received from the FDA in connection with the U.S. approval of Voxzogo. In exchange for the PRV the Company will receive a lump sum payment of \$110.0 million. The transaction remains subject to customary closing conditions, including anti-trust review. The proceeds from the sale of the PRV will be recognized as a gain on the sale of nonfinancial assets on the Company's Consolidated Statement of Operations.

**SECOND AMENDMENT
TO THE AMENDED AND RESTATED
BIOMARIN PHARMACEUTICAL INC.
NONQUALIFIED DEFERRED COMPENSATION PLAN (the "Plan")**
(as amended and restated on October 7, 2014)

Effective Date: October 5, 2021

1. Subsection 1.25 of the Plan is amended and restated in its entirety to read as follows:

[intentionally omitted]

2. Section 5.1 of the Plan is amended and restated in its entirety to read as follows:

Fixed Payment Dates; Separation from Service. During the Open Enrollment Period of each Plan Year and on his or her Election a Participant may select a fixed payment date for the payment of amounts (or a portion of amounts) credited to his or her vested Account during the Plan Year for which the Participant Election is effective, which will be valued and payable according to the provisions of Article 6. Such fixed payment dates or distribution methods set forth on the Election may be postponed to later dates so long as elections to so postpone the dates or changes the distribution methods are made by the Participant at least twelve (12) months prior to the date on which the distribution was originally scheduled to be made, the election will not take effect until at least twelve (12) months after the date on which the election is made, and the new postponed distribution date is at least five (5) years after the originally scheduled date.

A Participant who selects a fixed payment date for amounts credited to his or her Account during a Plan Year shall receive payment of such vested amounts at the earlier of such fixed payment date (as postponed, if applicable) or his or her Separation from Service.

Any fixed payment date elected by a Participant as provided above must be a date no earlier than the January 1 of the second calendar year after the calendar year for which the election is effective.

During the first Open Enrollment Period for which a Participant elects Compensation Deferrals, the Participant may specify on his or her Election whether he or she wishes to elect installment distributions in accordance with Section 6.3(b) for distributions on account of the Participant's Separation from Service. In the absence of such a timely election such payments will be in a lump sum in accordance with Section 6, but a Participant may thereafter elect to receive installment distributions in accordance with Section 6.3(b) at any time that is at least (12) months prior to the Participant's Separation from Service if the election does not take effect until at least twelve (12) months after the date on which the election is made, and payments do not commence until at least five (5) years after the originally scheduled distribution date.

3. Section 6.3(b) of the Plan is amended and restated in its entirety to read as follows:

the Participant's employment was terminated, and if elected by the Participant in his or her most recent effective Election made in accordance with Section 5.1, in annual installment payments of substantially equal amounts over a period of up to fifteen (15) years;

4. Section 6.3(c) of the Plan is amended and restated in its entirety to read as follows:

a Participant may amend his or her Election so as to select installments upon Separation from Service by filing an amended Election provided, however, that such Election to so change to installment distributions upon such Separation of Service is made by the Participant at least twelve

(12) months prior to the separation date, the election will not take effect until at least twelve (12) months after the date on which the election is made, and the new postponed distribution date is at least five (5) years from the original Separation from Service by the Participant; provided that, in no event shall any such distribution date be accelerated to a date earlier than that initially selected by the Participant; and

5. Section 6.3(d) of the Plan is amended and restated in its entirety to read as follows:

the Employer (or its designee) may establish from time to time limitations on the Participant's ability to select the time and method of payment of his Account based upon the amount in the Participant's Account; provided further that, unless and until changed by the Employer (or its designee), any Account that has a total vested balance of less than \$5,000 (\$50,000 in the case of a Participant who commences participation after October 5, 2021) at the time of distribution shall be paid in a lump sum regardless of an election by the Participant to be paid in installments.

6. The modifications set forth above shall not affect any other provisions of the Plan.

Subsidiaries of BioMarin Pharmaceutical Inc. as of December 31, 2021

Name	Direct Parent	Ownership	Jurisdiction of Incorporation
BioMarin Commercial Ltd	BioMarin Pharmaceutical Inc.	100%	Ireland
BioMarin International Ltd	BioMarin Commercial Ltd.	100%	Ireland

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the registration statements (No. 333-136963, 333-168552, 333-181697, 333-188620, 333-197759, 333-201504, 333-206094, 333-218695, 333-234231, 333-262824) on Forms S-8 and in the registration statement (No. 333-212974) on Form S-3 of our reports dated February 25, 2022, with respect to the consolidated financial statements of BioMarin Pharmaceutical Inc. and the effectiveness of internal control over financial reporting..

/s/ KPMG LLP
San Francisco, California
February 25, 2022

CERTIFICATION

I, Jean-Jacques Bienaimé, certify that:

1. I have reviewed this Annual Report on Form 10-K of BioMarin Pharmaceutical Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2022

/S/ JEAN-JACQUES BIENAIMÉ

Jean-Jacques Bienaimé
Chief Executive Officer

CERTIFICATION

I, Brian R. Mueller certify that:

1. I have reviewed this Annual Report on Form 10-K of BioMarin Pharmaceutical Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) all significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2022

/S/ BRIAN R. MUELLER

Brian R. Mueller
Executive Vice President, Finance &
Chief Financial Officer

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report on Form 10-K of BioMarin Pharmaceutical Inc. (the Company) for the year ended December 31, 2021 as filed with the Securities and Exchange Commission on the date hereof (the Report), we, Jean-Jacques Bienaimé, and Brian R. Mueller, hereby certify, pursuant to 18 U.S.C. §1350, as adopted pursuant to §906 of the Sarbanes-Oxley Act of 2002, that:

- (1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- (2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/S/ JEAN-JACQUES BIENAIMÉ

Jean-Jacques Bienaimé
Chief Executive Officer

Date: February 25, 2022

/S/ BRIAN R. MUELLER

Brian R. Mueller
Executive Vice President, Finance &
Chief Financial Officer

Date: February 25, 2022

This certification accompanies the 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 BioMarin Pharmaceutical Inc. 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 Form 10-K), irrespective of any general incorporation language contained in such filing.