Sarepta Therapeutics, Inc.
Form 10-K
February 28, 2019

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, 2018

Or

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from to

Commission file number: 001-14895

Sarepta Therapeutics, Inc.

(Exact name of registrant as specified in its charter)

Delaware	93-0797222
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification Number)
215 First Street Suite 415 Cambridge, MA	02142
(Address of principal executive offices)	(Zip Code)

Registrant's telephone number, including area code: (617) 274-4000

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

Tile of Each Class	Name of Exchange on Which Registered
Common Stock, $0.0001 par value	The NASDAQ Stock Market LLC
	(The NASDAQ Global Select Market)

Securities registered pursuant to 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 if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§ 229.405 of this chapter) is not contained herein, and will not be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

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

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

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

Exchange Act.

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

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant as of June 29, 2018 (the

last business day of the registrant's most recently completed second fiscal quarter) based on the closing price of $132.18 as reported on the Nasdaq Global Select Market was approximately $8,769,647,061.

The number of outstanding shares of the registrant's common stock as of the close of business on February 22, 2019 was 71,292,129.

DOCUMENTS INCORPORATED BY REFERENCE

The registrant has incorporated by reference into Part III of this Annual Report on Form 10-K, portions of its definitive Proxy Statement for its 2018 annual meeting to be filed with the Commission no later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K.

Sarepta Therapeutics, Inc.

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Forward-Looking Information

This Annual Report on Form 10-K, including the "Management's Discussion and Analysis of Financial Condition and Results of Operations" section in Item 7, and other materials accompanying this Annual Report on Form 10-K contain forward-looking statements or incorporate by reference forward-looking statements. Statements that are not purely historical are forward-looking statements. Forward-looking statements are often identified by words such as "believe," "anticipate," "expect," "intend," "plan," "will," "may," "estimate," "could," "continue," "ongoing," "predict," "potential," "like similar expressions, as well as variations or negatives of these words. These statements address expectations, projections of future results of operations or financial condition, or other "forward-looking" information. These statements relate to our future plans, objectives, expectations, intentions and financial performance and the assumptions that underlie these statements. These forward-looking statements include, but are not limited to:

- our belief that our proprietary technology platforms and collaborations can be used to develop novel pharmaceutical products to treat a broad range of diseases and address key currently unmet medical needs;
- our intention to leverage our technology platforms, organizational capabilities, collaborations and resources to lead the field of precision genetic medicines, including the treatment of rare, neuromuscular and other diseases, with a diversified portfolio of product candidates;
- our intention to focus on building our gene therapy engine, advancing the development of and potentially commercialize additional exon-skipping product candidates, investing in our next-generation precision medicine, ensuring appropriate capitalization and nurturing our culture;
- our expectations regarding the continued growth of our business operations due, in part, to the commercialization of EXONDYS 51;
- our technologies and programs, including those with strategic partners, and their respective potential benefits, including our PMO based compounds' potential to be designed to create more, less, or none of certain proteins, or produce analogues of endogenous proteins; the potential of our PPMO to be tailored to reach other organs beyond muscle and result in enhanced delivery into the cell with less frequent dosing than PMOs; the benefits of the unique design of the AAVrh74 vector, the MHCK7 promoter and the transgene, our belief that GALGT2 modifies the dystrophin associated protein complex and up-regulates utrophin to protect muscle from damage in the absence of dystrophin; and the potential of micro-dystrophin and GALGT2 to treat all or nearly all DMD patients regardless of mutation;
- our belief that our partnerships with manufacturers will provide us access to additional commercial manufacturing capacity for our micro-dystrophin DMD gene therapy program, as well as a manufacturing platform for future gene therapy programs, and our belief that our current network of manufacturing partners are able to fulfil the requirements of our commercial plan;
- our plan to continue building out our network for commercial distribution in jurisdictions in which eteplirsen is approved;
- estimated timelines and milestones for 2019 and beyond, including an expected FDA action date of August 19, 2019 for golodirsen, the expectation to complete the open-label portion of our golodirsen trial (4053-101) in 2019, filing an NDA to the FDA for casimersen in 2019, completing a first-in-human, single ascending dose trial for SRP-5051, conducting a confirmatory trial for our micro-dystrophin gene therapy program using commercial supply of SRP-9001 by the end of 2019 and commencing dosing in the clinical trial to test NT-3 gene therapy in 2019 for CMT type 1A;
- our belief that the delivery of NT-3 may have applicability to other subtypes of CMT in addition to other neuropathies and muscle-wasting diseases;
- the timely completion and satisfactory outcome of our post-marketing requirements and commitments, including verification of a clinical benefit for EXONDYS 51 in confirmatory trials;
- our plan to seek follow up EMA scientific advice in 2019 to explore a potential approach for EMA approval of eteplirsen;
- our ability to further secure long term supply of EXONDYS 51 and our product candidates to satisfy our planned commercial, managed access programs, named patient programs and clinical needs;
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our belief that our current network of manufacturing partners is able to produce raw materials and active pharmaceutical ingredients in the quantities that we require, and are capable of continuing to expand capacity as needed;

- the impact of regulations and regulatory decisions by the FDA and other regulatory agencies on our business, as well as the development of our product candidates and our financial and contractual obligations;
- the possible impact of any competing products on the commercial success of EXONDYS 51 and our product candidates and our ability to compete against such products;

- our ability to enter into research, development or commercialization alliances with universities, hospitals, independent research centers, non-profit organizations, pharmaceutical and biotechnology companies and other entities for specific molecular targets or selected disease indications and our ability to selectively pursue opportunities to access certain intellectual property rights that complement our internal portfolio through license agreements or other arrangements;
- our expectations regarding the potential benefits of the partnership, licensing and/or collaboration arrangements and other strategic arrangements and transactions we have entered into or may enter into in the future;
- the extent of protection that our patents provide and our pending patent applications may provide, if patents issue from such applications, to our technologies and programs, and our ability to obtain and maintain patent protection for our technologies and programs;
- our plans and ability to file and progress to issue additional patent applications to enhance and protect our new and existing technologies and programs;
- our belief that our owned and licensed patents and patent applications provide us with a competitive advantage;
- our belief that our current facilities in Cambridge, Andover and Burlington, Massachusetts and Dublin and Columbus, Ohio are suitable and will provide sufficient capacity to meet the projected needs of our business for the next 12 months;
- our estimates regarding how long our currently available cash and cash equivalents will be sufficient to finance our operations and business plans and statements about our future capital needs;
- our estimates regarding future revenues, research and development expenses, other expenses, capital requirements and payments to third parties;
- our expectations relating to potential funding from government and other sources for the development of some of our product candidates;
- our ability to comply with applicable environmental laws and regulations; and
- our beliefs and expectations regarding milestone, royalty or other payments that could be due to third parties under existing agreements.

We undertake no obligation to update any of the forward-looking statements contained in this Annual Report on Form 10-K after the date of this report, except as required by law. We caution readers not to place undue reliance on forward-looking statements. Our actual results could differ materially from those discussed in this Annual Report on Form 10-K. The forward-looking statements contained in this Annual Report on Form 10-K, and other written and oral forward-looking statements made by us from time to time, are subject to risks and uncertainties that could cause actual results to differ materially from those anticipated in the forward-looking statements, including the risks, uncertainties and assumptions identified under the heading “Risk Factors” in this Annual Report on Form 10-K.

PART I

Item 1. Business.

Overview

We are a commercial-stage biopharmaceutical company focused on helping patients through the discovery and development of unique RNA-targeted therapeutics, gene therapy and other genetic therapeutic modalities for the treatment of rare diseases. Applying our proprietary, highly-differentiated and innovative technologies, and through collaborations with our strategic partners, we are developing potential therapeutic candidates for a broad range of diseases and disorders, including Duchenne muscular dystrophy ("DMD"), Limb-girdle muscular dystrophies ("LGMDs"), Mucopolysaccharidosis type IIIA ("MPS IIIA") and Pompe.

Our first commercial product in the U.S., EXONDYS 51® (eteplirsen) Injection ("EXONDYS 51"), was granted accelerated approval by the FDA on September 19, 2016. EXONDYS 51 is indicated for the treatment of DMD in patients who have a confirmed mutation of the DMD gene that is amenable to exon 51 skipping. EXONDYS 51 uses our phosphorodiamidate morpholino oligomer ("PMO") chemistry and exon-skipping technology to skip exon 51 of the dystrophin gene. Exon skipping is intended to promote the production of an internally truncated but functional dystrophin protein.

The original PMO structure and variations of this structure that are so-called PMO-based (collectively "PMO-based") are central to our proprietary chemistry platform. PMO technologies can be used to selectively up-regulate or down-regulate the production of a target protein through pre-mRNA splice alteration. Thus, PMO-based compounds have the potential to be designed to create more, less, or none of certain proteins, or produce analogues of endogenous proteins. This technology can be used to correct disease-causing genetic errors by inducing the targeted expression of novel proteins.

In addition to our commercial-stage product, we have PMO-based product candidates in clinical development designed to treat those patients with DMD who have genetic mutations amenable to skipping exon 53 of the Duchenne gene (SRP-4053) and exon 45 of the Duchenne gene (SRP-4045) (golodirsen and casimersen, respectively). In December 2018, we completed the submission of our rolling New Drug Application ("NDA") to the U.S. Food and Drug Administration ("FDA") seeking accelerated approval for golodirsen. The FDA accepted the NDA and granted priority review status for golodirsen with a targeted regulatory action date of August 19, 2019. The FDA also indicated that it does not intend to conduct an advisory board for golodirsen. We are currently conducting both a Phase 1/2 clinical trial and a Phase 3 placebo controlled confirmatory clinical trial (ESSENCE) studying casimersen. We anticipate submitting an NDA to the FDA for casimersen in 2019 if we believe that the results of an interim dystrophin analysis in the ESSENCE trial are positive. We also have other product candidates in discovery and preclinical development that are designed to skip other exons.

The PMO chemistry platform is highly adaptable, and we have developed next-generation PMO-based chemistries for advancing RNA-targeted therapeutics. These next-generation chemistries are specifically designed to enhance tissue targeting, intracellular delivery, target selectivity and drug potency. One of these novel technologies is based on cell-penetrating peptide-conjugated PMO ("PPMO"). The PPMO features covalent attachment of a cell-penetrating peptide to a PMO with the goal of enhanced delivery into the cell. Our most advanced PPMO product candidate is SRP-5051, which is designed to treat DMD in patients with genetic mutations amenable to exon 51 skipping. We are currently conducting a first-in-human, single ascending dose, Phase 1 clinical trial for this product candidate, which we expect to complete in 2019.

As part of our multifaceted approach to DMD, we are also exploring gene therapy technologies to treat DMD. In collaboration with Nationwide Children's Hospital ("Nationwide"), we are testing a product candidate, SRP-9001, that aims to express a smaller but still functional version of dystrophin ("micro-dystrophin"). We use a unique

adeno-associated virus ("AAV") vector called AAVrh74 to transport the transgene – the genetic material that will make the protein of interest – to the target cells. Micro-dystrophin is used because naturally-occurring dystrophin is too large to fit in an AAV. On October 3, 2018, Nationwide presented positive results from a Phase 1/2a clinical trial testing SRP-9001 in four individuals with DMD enrolled in the trial. In the fourth quarter of 2018, we commenced a placebo-controlled trial with the goal to establish the functional benefits of micro-dystrophin expressions. We plan to conduct a confirmatory trial using commercial supply of SRP-9001 by the end of 2019, pending regulatory feedback.

In 2018, through a number of strategic collaboration and licensing arrangements, we expanded our pipeline to include programs that aim to treat a broad range of rare diseases in addition to DMD, such as LGMDs, Charcot-Marie-Tooth ("CMT"), MPS IIIA and Pompe disease. One of our strategic partners, Myonexus Therapeutics, Inc. ("Myonexus") develops gene therapy programs for various forms of LGMDs. The most advanced of Myonexus' product candidates, MYO-101, is designed to transfer a gene that codes for and restores beta-sarcoglycan protein with the goal of restoring the dystrophin associated protein complex. MYO-101 utilizes the same vector and promoter used in the development of SRP-9001. Myonexus commenced a Phase 1/2a trial of MYO-101 in the fourth quarter of 2018, and on February 27, 2019, we announced positive two-month data from the first three-patient cohort dosed in the MYO-101 trial.

Our pipeline includes 25 programs at various stages of pre-clinical and clinical development, reflecting our aspiration to apply our multifaceted approach and expertise in precision genetic medicine to make a profound difference in the lives of patients suffering from rare diseases.

Objectives and Business Strategy

We believe that our proprietary technology platforms and collaborations can be used to develop novel pharmaceutical products to treat a broad range of diseases and address key currently-unmet medical needs. We intend to leverage our technology platforms, organizational capabilities, collaborations and resources to lead the field of precision genetic medicines, including the treatment of rare, neuromuscular and other diseases, with a diversified portfolio of product candidates. In pursuit of this objective, we intend to focus on the following activities:

- building our gene therapy engine, including developing gene therapy product candidates, operationalizing our manufacturing strategy and establishing our commercial foundation in preparation for potential regulatory approvals;
- advancing the development of additional exon-skipping product candidates (e.g., golodirsen and casimersen), launching potential approved products and supporting marketed products;
- investing in next-generation precision medicine through internal research, strategic partnerships, collaborations and other potential opportunities;
- ensuring we have the appropriate capitalization to fund our business objectives and strategies, including by raising additional capital through licensing, collaborations and offerings of equity and / or debt; and
- nurturing our culture, which is based on bias to action, a self-starter mentality, smart and appropriate risk-taking and high ethics.

Core Therapeutic Areas

DMD: We primarily focus on rapidly advancing the development of our potentially disease-modifying pipeline of exon-skipping, gene therapy and gene editing product candidates targeting DMD. DMD is a rare x-linked recessive genetic disorder affecting children (primarily males) that is characterized by progressive muscle deterioration and weakness. It is the most common type of muscular dystrophy. DMD is caused by an absence of dystrophin, a protein that protects muscle cells. The absence of dystrophin in muscle cells leads to significant cell damage and ultimately causes muscle cell death and fibrotic replacement. In the absence of dystrophin protein, affected individuals generally experience the following symptoms, although disease severity and life expectancy vary:

- muscle damage characterized by inflammation, fibrosis and loss of myofibers beginning at an early age;
- muscle weakness and progressive loss of muscle function beginning in the first few years of life;
- decline of ambulation and respiratory function after the age of seven;
- total loss of ambulation in the pre-teenage or early teenage years;
- progressive loss of upper extremity function during mid- to late-teens; and
- respiratory and/or cardiac failure, resulting in death before the age of 30.

LGMDs are autosomal recessive, monogenic, rare neuromuscular diseases caused by missense and deletion mutations. These diseases affect males and females equally. Some types of LGMDs affect skeletal muscle and cardiac muscle. More severe forms of LGMDs mimic DMD. LGMDs as a class affect an estimated range of approximately 1 in every 14,500 to 1 in every 123,000 individuals. Currently, there are no available treatment options for LGMDs.

MPS IIIA is a rare inherited neurodegenerative lysosomal storage disorder characterized by intractable behavioral problems and developmental regression resulting in early death. It is caused by mutations in the SGSH gene, which encodes an enzyme called Heparan-N-sulfamidase necessary for heparan sulfate (“HS”) recycling in cells. The disrupted lysosomal degradation and resulting storage of HS and glycolipids such as gangliosides leads to severe neurodegeneration. MPS IIIA affects approximately 1 in 100,000 individuals and is inherited in an autosomal recessive pattern. There are currently no treatment options for patients.

CMT is a group of hereditary, degenerative nerve diseases that are caused by mutations in genes that produce proteins involved in the structure and function of either the peripheral nerve axon or the myelin sheath. CMT can cause degeneration of motor skills, resulting in muscle weakness, and limiting patients' ability to walk or use their hands, and in some cases, can cause degeneration of sensory nerves, resulting in a reduced ability to feel heat, cold, and pain. CMT affects approximately 1 in every 2,500

individuals, while CMT type 1A, which is most often caused by an extra copy of the PMP22 gene, affects approximately 50,000 patients in the U.S. Most patients are diagnosed at infancy, while other patients develop symptoms at adolescence. Currently, there are no available treatment options.

Pompe disease is caused by mutation in the gene that codes for the enzyme acid alpha-glucosidase ("GAA"), which is responsible for metabolizing glycogen in lysosomes. The disease causes buildup of glycogen in the body's cells, which in certain organs and tissues, especially muscles, impairs ability to function normally. Pompe disease is progressive and often debilitating, disables the heart and skeletal muscles with muscle weakness worsening over time. It affects both sexes equally and is often fatal. Pompe disease affects an estimated 1 in approximately every 40,000 individuals.

Our Commercial Product

EXONDYS 51, our first commercial product, approved by the FDA on September 19, 2016, is indicated for the treatment of DMD in patients who have a confirmed mutation of the DMD gene that is amenable to exon 51 skipping EXONDYS 51 uses our PMO chemistry and exon-skipping technology to skip exon 51 of the dystrophin gene. PMO-based compounds are synthetic compounds that bind to complementary sequences of RNA by standard Watson-Crick nucleobase pairing. The two key structural differences between PMO-based compounds and naturally occurring RNA are that the PMO nucleobases are bound to synthetic morpholino rings instead of ribose rings, and the morpholino rings are linked by phosphorodiamidate groups instead of phosphodiester groups. Replacement of the negatively charged phosphodiester in RNA with the uncharged phosphorodiamidate group in PMO eliminates linkage ionization at physiological pH. Due to these modifications, PMO-based compounds are resistant to degradation by plasma and intracellular enzymes. Unlike the RNA-targeted technologies such as siRNAs and DNA gapmers, PMO-based compounds operate by steric blockade rather than by cellular enzymatic degradation to achieve their biological effects. Thus, PMOs use a fundamentally different mechanism from other RNA-targeted technologies.

We are in the process of assessing and conducting various EXONDYS 51 clinical trials, including studies that are required to comply with regulatory NDA and studies we need to conduct to comply with our post-marketing FDA requirements/commitments to verify and describe the clinical benefit of EXONDYS 51.

EXONDYS 51 targets the most frequent series of mutations that cause DMD. Approximately 13% of DMD patients are amenable to exon 51 skipping. For the years ended December 31, 2018, 2017, and 2016, the Company recorded net revenue of $301.0 million, $154.6 million, and $5.4 million, respectively, related to the sale of EXONDYS 51.

Our Pipeline

Golodirsen (SRP-4053) uses our PMO chemistry and exon-skipping technology to skip exon 53 of the DMD gene. Golodirsen is designed to bind to exon 53 of dystrophin pre-mRNA, resulting in exclusion, or "skipping", of this exon during mRNA processing in patients with genetic mutations that are amenable to exon 53 skipping. We are enrolling and dosing patients in ESSENCE (4045-301), our Phase 3 placebo controlled confirmatory trial in patients who have a confirmed mutation of the DMD gene that is amenable to exon 45 or 53 skipping using casimersen and golodirsen, respectively. Golodirsen is also being evaluated in a Phase 1/2 trial having two parts. Part I of the Phase 1/2 trial has been completed, and Part II, an open-label portion of the trial, is expected to be completed in 2019 (Study 4053-101). In September 2017, we announced positive results of an analysis that included biopsies of the bicep muscle at baseline and on-treatment at the Part II, Week 48 time point. The 4053-101 interim trial results demonstrated statistical significance on all primary and secondary biological endpoints. In December 2018, we completed the submission of our rolling NDA to the FDA seeking accelerated approval for golodirsen. The FDA accepted the NDA and granted priority review status for golodirsen with a targeted regulatory action date of August 19, 2019. The FDA also indicated that it does not intend to conduct an advisory board for golodirsen.

Casimersen (SRP-4045) uses our PMO chemistry and exon-skipping technology to skip exon 45 of the DMD gene. Casimersen is designed to bind to exon 45 of dystrophin pre-mRNA, resulting in exclusion, or "skipping", of this exon

during mRNA processing in patients with genetic mutations that are amenable to exon 45 skipping. We are enrolling and dosing patients in ESSENCE, further described above. We have completed a dose titration portion (Phase 1) and the open-label portion (Phase 2) of a Sarepta sponsored Phase 1/2 the trial clinical trial studying casimersen (4045-101). We anticipate submitting an NDA to the FDA for casimersen in 2019 if we believe the results of an interim dystrophin analysis in the ESSENCE study are positive.

SRP-5051 uses our next-generation chemistry platform, PPMO, and our exon-skipping technology to skip exon 51 of the dystrophin gene. The PPMO technology features covalent attachment of a cell-penetrating peptide to a PMO with the goal of enhanced delivery into the cell. In pre-clinical research, our proprietary class of PPMO compounds demonstrated an increase in dystrophin production and a more durable response compared to PMO. In addition, PPMO treatment in non-human primates results in high levels of exon-skipping in skeletal, cardiac and smooth muscle tissues. Pre-clinical trials also indicate that PPMOs may require less frequent dosing than PMOs, and that PPMOs could potentially be tailored to reach other organs beyond muscle.

In the fourth quarter of 2017, we received clearance from the FDA and commenced a first-in-human, single ascending dose, trial for the treatment of DMD using SRP-5051 in patients who are amenable to exon 51 skipping. We expect to complete this trial in 2019.

SRP-9001 (micro-dystrophin gene therapy program), in collaboration with Nationwide, aims to express micro-dystrophin – a smaller but still functional version of dystrophin. A unique, engineered micro-dystrophin is used because naturally-occurring dystrophin is too large to fit in an AAV vector. SRP-9001 developed in collaboration with Nationwide employs the AAVrh74 vector, which is designed to be systemically and robustly delivered to skeletal, diaphragm and cardiac muscle without promiscuously crossing the blood brain barrier, which we believe makes it a strong candidate to treat peripheral neuromuscular diseases. An MHCK7 promoter was chosen for its ability to robustly express in the heart, which is critically important for patients with DMD, who typically die from pulmonary or cardiac complications. Lastly, the transgene was designed to maintain spectrin-like repeats 2 and 3, which has been reported to be critical to maintaining muscle force.

In the fourth quarter of 2017, an investigational new drug ("IND") application for the micro-dystrophin gene therapy program, in collaboration with Nationwide, was cleared by the FDA, and a Phase 1/2a clinical trial in individuals with DMD was initiated. On October 3, 2018, Nationwide presented what we believe to be positive updated results from the Phase 1/2a clinical trial in four individuals with DMD enrolled in the trial. In the fourth quarter of 2018, we commenced a placebo-controlled trial with the goal to establish the functional benefits of micro-dystrophin expressions. We plan to conduct a confirmatory trial using commercial supply of SRP-9001 by the end of 2019, pending regulatory feedback.

MYO-101. We are collaborating with Myonexus to develop gene therapy programs for various types of LGMDs. All the Myonexus programs use the AAVrh.74 vector, the same vector used in the micro-dystrophin gene therapy program, to transfect a restorative gene. The most advanced of Myonexus' product candidates, MYO-101, aims to treat LGMD2E, also known as beta-sarcoglycanopathy, a severe and debilitating form of LGMD characterized by progressive muscle fiber loss, inflammation and muscle fiber replacement with fat and fibrotic tissue. MYO-101 is designed to transfect a gene that codes for and restores beta-sarcoglycan protein with the goal of restoring the dystroglycan complex. MYO-101 has generated positive pre-clinical safety and efficacy data utilizing the AAVrh.74 vector. Myonexus commenced a Phase 1/2a trial of MYO-101 in the fourth quarter of 2018, and on February 27, 2019, we announced positive two-month data from the first three-patient cohort dosed in the MYO-101 trial.

GALGT2. An additional gene therapy program for DMD and other muscular dystrophies, also in collaboration with Nationwide, aims to express the enzyme GALGT2 from an AAV vector. We believe that GALGT2 modifies the dystrophin associated protein complex (DAPC) and up-regulates utrophin (a protein significantly homologous to dystrophin) to protect muscle from damage in the absence of dystrophin. We believe that the micro-dystrophin and GALGT2 technologies have the potential to treat all or nearly all DMD patients regardless of mutation.

In the fourth quarter of 2017, an IND application for GALGT2 was cleared by the FDA, and a Phase 1/2a clinical trial testing GALGT2 for the treatment of DMD was initiated.

LYS-SAF 302. We are collaborating with Lysogene S.A. ("Lysogene") to develop a gene therapy, LYS-SAF302, to treat MPS IIIA. LYS-SAF302 is an AAV-mediated gene therapy, the goal of which is to replace the faulty N-sulfoglucosamine sulfohydrolase ("SGSH") gene with a healthy copy of the gene. LYS-SAF302 employs the AAVrh10 virus, chosen for its ability to target the central nervous system ("CNS"). Proof-of-concept was established in MPS IIIA pre-clinical models demonstrating strong expression, broad distribution, and the ability of the compound to correct lysosomal storage defects by producing the missing enzyme. Safety data from an IND-enabling toxicity and a biodistribution Good Laboratory Practice ("GLP") trial showed that, at any dose level evaluated, LYS-SAF302 was not associated with unexpected mortality, change in clinical signs, body weight, behavior or macroscopic findings in the brain.

The first patient has been dosed in AAVance, a global Phase 2/3 clinical trial of LYS-SAF302, aiming at evaluating the effectiveness of a one-time delivery of a AAVrh10 virus carrying the N-SGSH gene.

Neutrophin 3 (CMT Type 1A). A gene therapy program in collaboration with Nationwide that aims to express neurotrophin 3 ("NT-3") encoding the NTF3 gene to treat CMT neuropathies, including CMT type 1A. We believe that the delivery of NT-3 may have applicability to other sub-types of CMT in addition to other neuropathies and muscle-wasting diseases. Pre-clinical research has shown the ability of the NT-3 gene construct to regenerate nerves. Further pre-clinical research is under way to explore its potential. A clinical trial to test NT-3 gene therapy is planned to commence dosing in 2019 for CMT type 1A, pending regulatory feedback. We believe that the delivery of NT-3 may have applicability to other sub-types of CMT in addition to other muscle-wasting diseases.

Programs in Collaboration with Lacerta. Our collaboration with Lacerta Therapeutics, Inc. ("Lacerta") utilizes proprietary AAV capsid variants and a scalable vector manufacturing platform to develop treatments for central nervous system and lysosomal storage diseases. The lead candidate, still in discovery phase, is a gene therapy approach with a novel AAV variant for the treatment of Pompe disease.

CRSPR/Cas9. We are exploring, in collaboration with Duke University, the gene-editing technology CRSPR/Cas9 that aims to restore dystrophin expression by removing or "excising" exons directly from the dystrophin gene to correct out-of-frame mutations. CRSPR/Cas9 technology can also potentially be used to fix stop codon mutations in the dystrophin gene so that dystrophin can be translated to a function protein. This program is in the discovery phase.

The chart below summarizes the status of our more advanced programs, including those with our strategic partners:

Manufacturing, Supply and Distribution

We have developed proprietary state-of-the-art Chemistry, Manufacturing and Controls ("CMC") and manufacturing capabilities that allow synthesis and purification of our product candidates to support both clinical development as well as commercialization. Our current main focus in manufacturing is to continue scaling up production of our PMO-based therapies and optimizing manufacturing for PPMO and gene therapy-based product candidates. We have entered into certain manufacturing and supply arrangements with third-party suppliers which will in part utilize these capabilities to support production of certain of our product candidates and their components. In 2017, we opened a facility in Andover, Massachusetts, which significantly enhances our research and development manufacturing capabilities. However, we currently do not have internal large scale Good Manufacturing Practices ("GMP") manufacturing capabilities to produce our product and product candidates for commercial and/or clinical use. For our current and future manufacturing needs, we have entered into supply agreements with specialized contract manufacturing organizations (each a "CMO") to produce custom raw materials, the active pharmaceutical Ingredients ("APIs") and finished goods for our product candidates. All of our CMO partners have extensive technical expertise, GMP experience and experience manufacturing our specific technology.

For our commercial DMD program, we have commenced work with our existing manufacturers to increase product capacity from mid-scale to large-scale. While there are a limited number of companies that can produce raw materials and APIs in the quantities and with the quality and purity that we require for EXONDYS 51, based on our diligence to date, we believe our current network of manufacturing partners are able to fulfill these requirements, and are capable of continuing to expand capacity as needed. Additionally, we have, and will continue to evaluate further relationships with additional suppliers to increase overall capacity as well as further reduce risks associated with reliance on a limited number of suppliers for manufacturing.

EXONDYS 51 is distributed in the U.S. through a limited network of home infusion specialty pharmacy providers that deliver the medication to patients and a specialty distributor that distributes EXONDYS 51 to hospitals and hospital outpatient clinics. With respect to the pre-commercial distribution of eteplirsen to patients outside of the U.S., we have contracted with third party distributors and service providers to distribute eteplirsen in certain countries on a named patient basis and through our ex-U.S. early

access programs ("EAP"). We plan to continue building out our network for commercial distribution in jurisdictions in which eteplirsen is approved.

Our gene therapy manufacturing capabilities have been greatly enhanced through partnerships with Brammer Bio LLC ("Brammer"), Paragon Bioservices, Inc. ("Paragon") and Aldevron LLC ("Aldevron"). We have adopted a hybrid manufacturing strategy in which we are building internal manufacturing expertise relative to all aspects of AAV-based manufacturing, including gene therapy and gene editing supply, while closely partnering with first-in-class manufacturing partners to expedite development and commercialization of our gene therapy programs. The partnership with Brammer will support our clinical and commercial manufacturing capacity for our micro-dystrophin DMD gene therapy programs and LGMD programs, while also acting as a manufacturing platform for potential future gene therapy programs. The collaboration integrates process development, clinical production and testing, and commercial manufacturing. Our partnership with Paragon will provide us access to additional commercial manufacturing capacity for our micro-dystrophin DMD gene therapy program, as well as a manufacturing platform for future gene therapy programs, such as LGMD. Aldevron will provide GMP-grade plasmid for our micro-dystrophin DMD gene therapy program and LGMD programs, as well as plasmid source material for future gene therapy programs, such as CMT, MPS IIIA, Pompe and other CNS diseases.

Manufacturers and suppliers of product candidates are subject to the FDA's current GMP ("cGMP") requirements and other rules and regulations prescribed by foreign regulatory authorities. We depend on our third-party partners for continued compliance with cGMP requirements and applicable foreign standards.

Material Agreements

We believe that our RNA-targeted and gene therapy technologies could be broadly applicable for the potential development of pharmaceutical products in many therapeutic areas. To further exploit our core technologies, we have and may continue to enter into research, development or commercialization alliances with universities, hospitals, independent research centers, non-profit organizations, pharmaceutical and biotechnology companies and other entities for specific molecular targets or selected disease indications. We may also selectively pursue opportunities to access certain intellectual property rights that complement our internal portfolio through license agreements or other arrangements.

Myonexus

On May 3, 2018, we purchased from Myonexus, a privately-held Delaware corporation, a warrant to purchase common stock of Myonexus (the "Warrant"), which, in combination with amendments to the Myonexus certificate of incorporation, provides us with an exclusive option (the "Option") to acquire Myonexus. In consideration for the Warrant, we made an up-front payment of $60.0 million to Myonexus. On February 26, 2019, we delivered to Myonexus an exercise notice (the "Exercise Notice") stating our intention to exercise the Option.

Prior to the delivery of the Exercise Notice, on February 26, 2019, we entered into a letter agreement (the "Letter Agreement") with Myonexus to amend certain terms of the Warrant to (i) reduce the payment price we would be required to make at the closing of the Option exercise from $200.0 million to $165.0 million, subject to certain adjustments (the "Warrant Exercise Price"), and (ii) terminate our obligation to pay any development milestone payments that have yet to be earned under the Warrant and pay Myonexus shareholders an additional amount in recognition of amounts Myonexus expended toward the achievement of those milestones, agreed for this purpose to be $6.0 million, to be paid upon exercise of the Option. Our obligation to make contingent payments to the Myonexus' former shareholders following the exercise of the Option upon achievement of a threshold amount of net sales of Myonexus products and the receipt and subsequent sale of a priority review voucher with respect to a Myonexus product will remain unchanged.

We retain the right to terminate the Warrant at any time prior to the closing of the Option exercise, which is expected to occur at the end of our first fiscal quarter ending March 31, 2019, subject to the expiration or termination of the waiting period under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended.

BioMarin

License Agreement

On July 17, 2017, Sarepta Therapeutics, Inc. and Sarepta International C.V. (collectively, "Sarepta") and BioMarin Leiden Holding BV, BioMarin Nederlands BV and BioMarin Technologies BV (collectively, "BioMarin") executed a License Agreement (the "License Agreement"), pursuant to which BioMarin granted Sarepta a royalty-bearing, worldwide license under patent rights ("Licensed Patents") and know-how ("Licensed Know-How") controlled by BioMarin with respect to BioMarin's DMD program, which are potentially necessary or useful for the treatment of DMD, to practice and exploit the Licensed Patents and Licensed Know-How in all fields of use and for all purposes, including to develop and commercialize antisense oligonucleotide products that target one or more exons of the dystrophin gene to induce exon skipping, including eteplirsen (collectively, the "Products").

The license granted by BioMarin to Sarepta under the terms of the License Agreement is exclusive, even as to BioMarin, with respect to the Licensed Patents, and is non-exclusive with respect to Licensed Know-How. Under the License Agreement, BioMarin has the option to convert the exclusive license under the Licensed Patents into a co-exclusive license (co-exclusive with BioMarin) ("BioMarin Co-Exclusive Option").

Under the terms of the License Agreement, Sarepta is required to pay BioMarin an up-front payment of $15.0 million, and BioMarin will be eligible to receive up to $20.0 million from Sarepta per dystrophin gene exon (other than exon 51) targeted by one or more Products in specified regulatory milestones, as well as an additional $10.0 million milestone, payable following the regulatory approval of eteplirsen by the European Medicines Agency in the EU ("EMA"). BioMarin will also be eligible to receive $15.0 million from Sarepta upon the achievement of $650 million in sales, as well as royalties segmented by specified geographic markets, in some jurisdictions dependent on the existence of a patent, ranging from four (4) to eight (8) percentages of net sales on a product-by-product and country-by-country basis.

Milestones and royalties are payable with respect to eteplirsen (an exon 51 skipping Product), casimersen (an exon 45 skipping Product), golodirsen (an exon 53 skipping Product) and other Products. For eteplirsen, casimersen and golodirsen, the royalty term will expire upon the end of 2023 in the U.S., upon September 30, 2024 in the European Union ("EU") and no later than September 30, 2024 in other countries provided certain conditions are met. For Products other than exon 45 skipping Products, exon 51 skipping Products and exon 53 skipping Products, the royalty term will end on a country-by country basis upon expiration of granted Licensed Patents covering the applicable Product. The royalties for all Products are subject to reduction upon BioMarin's exercise of the BioMarin Co-Exclusive Option. All royalties are subject to further potential reductions, including for generic competition and, under specified conditions, for a specified portion of payments that Sarepta may become required to pay under third-party license agreements, subject to a maximum royalty reduction.

Unless earlier terminated, the License Agreement will expire upon the expiration of the last-to-expire royalty term. Either party may terminate the License Agreement in the event of the other party's uncured material breach. BioMarin may also terminate the License Agreement on a Licensed Patent-by-Licensed Patent basis under specified circumstances relating to patent challenges by Sarepta.

Settlement Agreement

On July 17, 2017, Sarepta and The University of Western Australia on the one hand, and the BioMarin Parties and Academisch Ziekenhuis Leiden ("AZL") on the other hand (collectively, the "Settlement Parties"), executed a Settlement Agreement pursuant to which all legal actions in the U.S. and certain legal actions in Europe (the "Actions") would be stopped or withdrawn as between the Settlement Parties. Specifically, the terms of the Settlement Agreement require that existing efforts pursuing ongoing litigation and opposition proceedings would be stopped as between the Settlement Parties, and the Settlement Parties would cooperate to withdraw the Actions before the European Patent Office (except for actions involving third parties), the U.S. Patent and Trademark Office, the U.S. Court of Appeals for the Federal Circuit and the High Court of Justice of England and Wales, except for the cross-appeal of the Interlocutory Decision of the Opposition Division dated April 15, 2013 of the European Patent Office of EP 1619249B1 ("EP '249 Appeal") in which Sarepta will withdraw its appeal and BioMarin/AZL will continue with its appeal with Sarepta having oversight of the continued appeal by BioMarin/AZL.

Additionally, under the terms of the Settlement Agreement, the Settlement Parties agree to release each other and the customers, end-users, agents, suppliers, distributors, resellers, contractors, consultants, services and partners of Sarepta or BioMarin (as applicable) from claims and damages related to (i) the patent rights controlled by the releasing party that are involved in the Actions, (ii) with respect to Sarepta and UWA, its patent rights related to the patent rights involved in the Actions, and (iii) with respect to BioMarin and AZL, all of the Licensed Patents and Licensed Know-How.

Under the terms of the Settlement Agreement, Sarepta made an upfront payment of $20.0 million to BioMarin.

University of Western Australia

In April 2013, we entered into an agreement with University of Western Australia ("UWA") under which an existing exclusive license agreement between the two parties was amended and restated (the "Amended and Restated UWA License Agreement"). The Amended and Restated UWA License Agreement grants us specific rights to the treatment of DMD by inducing the skipping of certain exons. EXONDYS 51, golodirsen and casimersen fall under the scope of the license agreement. Under the Amended and Restated UWA License Agreement, we may be required to make payments of up to $6.0 million in aggregate to UWA based on the successful achievement of certain development and regulatory milestones relating to EXONDYS 51 and up to five additional product candidates. As of the date of this Annual Report, $2.0 million of the $6.0 million development and regulatory milestone payments has been made. We may also be obligated to make payments to UWA of up to $20.0 million upon the achievement of certain sales milestones. Additionally, we may be required to pay a low-single-digit percentage royalty on net sales of

products covered by issued patents licensed from UWA during the term of the Amended and Restated UWA License Agreement. However, we have the option to purchase future royalties up-front. Under this option, prior to the First Amendment (defined below), we could be required to make a one-time royalty payment of $30.0 million to UWA.

In June 2016, we entered into the first amendment to the Amended and Restated UWA License Agreement (the "First Amendment") with UWA. Under the First Amendment, we made an up-front payment of $7.0 million to UWA upon execution of the First Amendment. Under the terms of the First Amendment, UWA has waived rights to certain royalties and amended the timing of certain other royalty payments under the Amended and Restated UWA License Agreement, including lowering the one-time royalty payment that is due by us upon exercise of the option to purchase future royalties up-front. Upon exercise of the option to purchase future royalties up-front, we will be obligated to make a $23.0 million payment to UWA. Additionally, we would still be obligated to make up to $20.0 million in payments to UWA upon achievement of certain sales milestones.

Currently, the latest date on which an issued patent covered by our agreement with UWA expires is November 2030 (excluding any patent term extension, supplemental protection certificate or pediatric extensions that may be available); however, patents granted from pending patent applications could result in a later expiration date.

Strategic Alliances

In connection with our multi-front battle against DMD and other rare neuromuscular diseases, we have entered into a number of partnering opportunities. We believe these collaborations, taken along with our own programs, represent a comprehensive approach to treating these rare neuromuscular diseases.

Nationwide Children's Hospital

In December 2015, we entered into an exclusive license agreement with Nationwide to acquire exclusive rights to its GALGT2 gene therapy program. This program explores the potential surrogate gene therapy approach to DMD. In the fourth quarter of 2017, the IND application for the GALGT2 gene therapy program was cleared by the FDA, and a Phase 1/2a clinical trial in individuals with DMD was initiated.

In addition, in December 2016, we entered into an exclusive option agreement with Nationwide to acquire exclusive rights to their micro-dystrophin gene therapy program as well as a sponsored research agreement to conduct pre-IND research and conduct the first clinical trial with the lead micro-dystrophin gene therapy. In October 2018, we exercised our exclusive license option and an option under the sponsored research agreement and entered into an exclusive license agreement with Nationwide to acquire exclusive rights to their micro-dystrophin gene therapy program. On October 3, 2018, Nationwide presented positive updated results from our Phase 1/2a clinical trial testing SRP-9001 in four individuals with DMD enrolled in the trial.

Furthermore, in October 2018, we entered into an exclusive option agreement with Nationwide to acquire exclusive rights to their NT-3 gene therapy program for the treatment of certain CMT neuropathy subtypes, including CMT Type 1A. The option agreement contains pre-determined economic terms for the exclusive license to be entered into upon us exercising our option. The clinical trial to test NT-3 gene therapy is planned to commence dosing in 2019 for CMT type 1A, pending regulatory feedback.

Lysogene

In October 2018, we entered into a license agreement with Lysogene, a gene therapy company focused on the treatment of orphan diseases of the CNS, for the development of a gene therapy, LYS-SAF302, to treat MPS IIIA. Concomitantly, we also entered into an option with Lysogene to acquire an exclusive license to an additional CNS-targeted gene therapy candidate. Lysogene is responsible for completion of the pivotal trial for LYS-SAF302. We have exclusive commercial rights to LYS-SAF302 and exclusive option rights for the additional CNS-targeted

gene therapy program in the United States and all territories outside of Europe, and Lysogene will retain exclusive commercial rights to each program in Europe. We will be responsible for global manufacturing of LYS-SAF302 and will supply Lysogene for its territory. If all milestones are met, we may be required to pay up to $130.8 million in development and commercial milestones and tiered royalties upon commercialization.

Lacerta

In August 2018, we entered into a license and option agreement with Lacerta, a gene therapy company using a constellation of proprietary AAV vector technologies to develop treatments for CNS-targeted and lysosomal storage diseases. Under this agreement, we have an exclusive license to Lacerta's gene therapy candidate for Pompe disease and exclusive options to obtain an exclusive license for two additional gene therapy candidates. Lacerta will manage the majority of pre-clinical development for the Pompe candidate while we will lead clinical development and commercialization. We will owe development and sales-based milestones to Lacerta and pay single-digit royalties on net sales.

Duke University

In October 2017, we entered into a sponsored research and exclusive option agreement with Duke University, granting us an exclusive option to an exclusive license to intellectual property and technology related to certain CRISPR/Cas9 technology developed in the laboratory of Charles A. Gersbach, Ph.D. The underlying premise of Dr. Gersbach's approach is to restore dystrophin expression by removing or "excising" exons from the dystrophin gene. This includes a strategy to excise exons potentially enabling treatment for a majority of the DMD patient population.

Genethon

In May 2017, we entered into a gene therapy research collaboration and option agreement with Genethon to jointly develop micro-dystrophin gene therapy products for the treatment of DMD. Under the terms of the collaboration, Genethon is responsible for the early development work, and we have the option to co-develop Genethon's micro-dystrophin program, which includes exclusive U.S. commercial rights.

Charley's Fund Agreement

In October 2007, Charley's Fund, Inc. ("Charley's Fund"), a nonprofit organization that funds drug development and discovery initiatives specific to DMD, awarded us a research grant of approximately $2.5 million and, in May 2009, the grant authorization was increased to a total of $5.0 million. Pursuant to the related sponsored research agreement, the grant was provided to support the development of product candidates related to exon 50 skipping using our proprietary exon-skipping technologies. As of December 31, 2017, Charley's Fund had made payments of approximately $3.4 million to us and no payments have been made to us since this date. Revenue associated with this research and development arrangement is recognized based on the proportional performance method. To date, we have recognized approximately $0.1 million as revenue. We have deferred $3.3 million of previous receipts, which are anticipated to be recognized as revenue upon resolution of outstanding performance obligations.

Previously, we noted unexpected toxicology findings in the kidney as part of our series of pre-clinical trials for AVI-5038, our PMO-based candidate designed for the treatment of individuals with DMD who have an error in the gene coding for dystrophin that can be treated by skipping exon 50. We have conducted additional pre-clinical trials and have not alleviated the toxicity problem. Pursuant to the terms of our agreement with Charley's Fund, the receipt of additional funds is tied to the satisfaction of certain clinical milestones. Because of the toxicity issues with AVI-5038, satisfaction of the additional milestones under the agreement is unlikely and we do not expect to receive any additional funds from Charley's Fund.

Summit

On October 3, 2016, we entered into an exclusive Collaboration and License Agreement (the "Collaboration Agreement") with (Oxford) Ltd. ("Summit"), which grants us the exclusive right to commercialize products in Summit's utrophin modulator pipeline in the EU, Switzerland, Norway, Iceland, Turkey and the Commonwealth of Independent States. On June 27, 2018, Summit announced that it decided to discontinue the development of ezutromid after reviewing the top-line results from its Phase 2 trial.

Patents and Proprietary Rights

Our success depends in part upon our ability to obtain and maintain exclusivity for our product, product candidates and platform technologies. We typically rely on a combination of patent protection and regulatory exclusivity to maintain exclusivity for our product and product candidates, whereas exclusivity for our platform technologies is generally based on patent protection and trade secret protection. In addition to patent protection, regulatory exclusivity, and trade secret protection, we also protect our product, product candidates and platform technologies with copyrights, trademarks, and contractual protections.

We actively seek patent protection for our product candidates and certain of our proprietary technologies by filing patent applications in the U.S. and other countries as appropriate. These patent applications are directed to various inventions, including, but not limited to, active ingredients, pharmaceutical formulations, methods of use, and manufacturing methods. In addition, we actively acquire exclusive rights to third party patents and patent applications to protect our in-licensed product candidates and corresponding platform technologies.

We do not have patents or patent applications in every jurisdiction where there is a potential commercial market for our product candidates. For each of our programs, our decision to seek patent protection in specific foreign markets, in addition to the U.S., is based on many factors, including:

- our available resources;
- the number and types of patents already filed or pending;

- the likelihood of success of the product candidate;
- the size of the commercial market;
- the presence of a potential competitor in the market; and
- whether the legal authorities in the market effectively enforce patent rights.

We continually evaluate our patent portfolio and patent strategy and believe our owned and licensed patents and patent applications provide us with a competitive advantage; however, if markets where we do not have patents or patent applications become commercially important, our business may be adversely affected. A discussion of certain risks and uncertainties that may affect our patent position, regulatory exclusivities and other proprietary rights is set forth in Item 1A. Risk Factors included in this report, and a discussion of legal proceedings related to the key patents protecting our product and product candidates is set forth below in the footnotes that immediately below the tables in this section.

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, the anticipated date of first regulatory approval, whether we believe the intellectual property rights of others are valid, whether we believe 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, the term of the rights, and the likelihood of and liability resulting from an adverse outcome should we be found to infringe the intellectual property rights of others.

Currently, U.S. patents, as well as most foreign patents, are generally effective for 20 years from the date the earliest regular application was filed. In some countries, the patent term may be extended to recapture a portion of the term lost during regulatory review of the claimed therapeutic. For example, 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 an FDA-approved drug may be eligible for patent term extension (for up to 5 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. In the U.S., only one patent may be extended for any product based on FDA delay. In addition to patent term extension, patents in the U.S. may be granted additional term due to delays at the U.S. Patent and Trademark Office (“USPTO”) during prosecution of a patent application. We actively strive to maximize the potential for patent protection for our product and product candidates in accordance with the law.

Key Patents & Regulatory Exclusivities

Our product candidates and our technologies are primarily protected by composition of matter and use patents and patent applications. A summary of granted composition of matter and/or use patents that we own or control in the U.S. and Europe, which cover our product and late-stage clinical product candidates, is provided below. To the extent the product or product candidate indicated above the tables that immediately follow the name of such product is covered by a patent that is licensed to Sarepta, we may owe milestones and/or royalties to the indicated licensor in connection with the development and/or commercial sale of the product or product candidate.

Eteplirsen

Patent Number	Country/Region*	Patent Type	Expiration Date**	Owner/Licensor (if not Sarepta)
U.S. 9,416,361	United States	Composition of Matter	May 4, 2021	Sarepta
U.S. 7,960,541[1]	United States	Composition of Matter	June 28, 2025	UWA
U.S. 8,486,907[2]	United States	Methods of Use	June 28, 2025	UWA
U.S. 9,018,368	United States	Composition of Matter	June 28, 2025	UWA
U.S. 7,807,816[1]	United States	Composition of Matter	February 23, 2026	UWA
U.S. 9,243,245[3]	United States	Methods of Use	October 27, 2028	BioMarin/AZL
U.S. 9,506,058	United States	Methods of Use	March 14, 2034	Sarepta

[1] Previously involved in U.S. Patent Interference No. 106,008. Judgment dated September 20, 2016 ordered cancellation of all claims of U.S. Application No. 13/550,210 to BioMarin (AZL). Appeal by BioMarin (AZL) to the Court of Appeals for the Federal Circuit (Case No. 2017-1078) voluntarily dismissed July 27, 2017. Reissue of U.S. 7,807,816 (U.S. Application No. 15/349,535) filed November 11, 2016.

[2] Previously involved in U.S. Patent Interference No. 106,013. Judgment dated September 29, 2015 ordered cancellation of U.S. 8,486,907 to us (UWA). Decision dated December 29, 2015 denied our Request for Rehearing. Appeal by us (UWA) to the Court of Appeals for the Federal Circuit (Case Nos. 2016-1937, 2016-2086 (consolidated)) voluntarily dismissed July 27, 2017. Reissue of U.S. 8,486,907 (U.S. Application No. 15/655,646) filed July 20, 2017.

[3] Reissue application of U.S. 9,243,245 pending.

Patent Number	Country/Region*	Patent Type	Expiration Date**	Owner/Licensor (if not Sarepta)
EP 1 619 249 B1[1]	Europe	Methods of Use	September 21, 2021	BioMarin/AZL
EP 2 284 264 B1	Europe	Composition of Matter & Methods of Use	September 21, 2021	BioMarin/AZL
EP 2 801 618 B1	Europe	Composition of Matter & Methods of Use	September 21, 2021	BioMarin/AZL
EP 1 766 010 B1	Europe	Composition of Matter & Methods of Use	June 28, 2025	UWA
EP 2 203 173 B1[2]	Europe	Methods of Use	October 27, 2028	BioMarin/AZL

[1] Involved in EPO Opposition. Cross-appeal of Interlocutory Decision dated April 15, 2013 is pending.

[2] Involved in EPO Opposition proceedings initiated on September 22, 2016. EPO ordered revocation of patent on April 4, 2018. Appeal filed June 8, 2018 is pending.

The various types of regulatory exclusivity for which our product has been granted and our product candidates are anticipated to be eligible to receive is generally discussed below, under ‘Government Regulation’ – ‘Data and Market Exclusivities’ and ‘Orphan Drug Designation and Exclusivity’. In connection with its FDA approval on September 19, 2016, the FDA granted EXONDYS 51 (eteplirsen) New Chemical Entity (“NCE”) exclusivity until September 19, 2021, and Orphan Drug Exclusivity until September 19, 2023.

Golodirsen

Patent Number	Country/Region*	Patent Type	Expiration Date**	Owner/Licensor (if not Sarepta)
U.S. 9,416,361	United States	Composition of Matter	May 4, 2021	Sarepta
U.S. 8,455,636[1]	United States	Composition of Matter & Methods of Use	June 28, 2025	UWA
U.S. 9,024,007	United States	Composition of Matter	June 28, 2025	UWA
U.S. 9,994,851	United States	Composition of Matter	June 28, 2025	UWA

[1] Previously involved in U.S. Patent Interference No. 106,007. Judgment dated April 29, 2016 ordered cancellation of (i) all claims, except claim 77, of U.S. Application No. 11/233,495 to BioMarin (AZL); and (ii) U.S. 8,455,636 to us (UWA). Appeal by BioMarin (AZL) to the Court of Appeals for the Federal Circuit (Case No. 2016-2262) voluntarily dismissed July 27, 2017. Reissue of U.S. 8,455,636 (U.S. Application No. 15/645,842) filed July 10, 2017.

Patent Number	Country/Region*	Patent Type	Expiration Date**	Owner/Licensor (if not Sarepta)
EP 1 619 249 B1[1]	Europe	Methods of Use	September 21, 2021	BioMarin/AZL
EP 2 602 322 B1[2]	Europe	Composition of Matter & Methods of Use	September 21, 2021	BioMarin/AZL
EP 2 206 781 B1[3]	Europe	Composition of Matter & Methods of Use	June 28, 2025	UWA
EP 2 970 964 B1	Europe	Composition of Matter	March 14, 2034	Sarepta

[1] Involved in EPO Opposition. Cross-appeal of Interlocutory Decision dated April 15, 2013 is pending.
[2] Involved in Opposition proceedings initiated on November 28, 2016.
[3] Involved in Opposition proceedings initiated on August 25, 2016. EPO ordered revocation of patent on December 19, 2017. Appeal filed April 27, 2018 is pending.

Casimersen

Patent Number	Country/Region*	Patent Type	Expiration Date**	Owner/Licensor (if not Sarepta)
U.S. 9,416,361	United States	Composition of Matter	May 4, 2021	Sarepta
U.S. 9,447,415	United States	Composition of Matter	June 28, 2025	UWA
U.S. 8,524,880	United States	Composition of Matter & Methods of Use	April 2, 2026	UWA
U.S. 9,228,187	United States	Composition of Matter	November 12, 2030	UWA
U.S. 9,758,783	United States	Methods of Use	November 12, 2030	UWA

Patent Number	Country/Region*	Patent Type	Expiration Date**	Owner/Licensor (if not Sarepta)
EP 2 499 249 B1	Europe	Composition of Matter & Methods of Use	November 12, 2030	UWA

* Granted patents in the United States and Europe (EP) are shown here. Additional patent protection in the U.S., Europe (EP) or other countries or regions through pending or granted foreign counterparts may be available.
** Stated expiration dates do not account for any patent term extension, supplemental protection certificate or pediatric extensions that may be available.

In addition to the foregoing composition of matter and method of use patents that protect eteplirsen, casimersen and golodirsen, we either solely own or exclusively license from UWA, BioMarin or AZL patents and patent applications in the U.S. and in major foreign markets that provide additional protection for eteplirsen, casimersen, and golodirsen, which cover the composition of matter, preparation and/or uses of the product and product candidates. These patents, and patent applications, if granted, would expire through 2038, such expiration dates not accounting for any patent term extension, patent term adjustment, supplemental protection certificate or pediatric extensions that may be

available.

Platform Technologies

We separately own patents and patent applications in the U.S. and in major foreign markets that cover our proprietary PMO-based platform technologies (e.g., PPMO, PMOplus®, PMO-X®). These patents, and patent applications, if granted, expire through 2038, such expiration dates not accounting for any patent term extension, supplemental protection certificate or pediatric extensions that may be available.

Trademarks

Our trademarks are important to us and are generally filed to protect our corporate brand, our products and platform technologies. We typically file trademark applications and pursue their registration in the U.S., Europe and other markets in which we anticipate using such trademarks. We are the owner of multiple federal trademark registrations in the U.S. including, but not limited to, Sarepta®, Sarepta Therapeutics®, the Sarepta Therapeutics logo, EXONDYS®, and EXONDYS 51®. In addition, we have multiple pending trademark applications in the U.S. and in major foreign markets. Trademark protection varies in accordance with local law,

and continues in some countries as long as the trademark is used and in other countries as long as the trademark is registered. Trademark registrations generally are for fixed but renewable terms.

Government Regulation

The testing, manufacturing, labeling, advertising, promotion, distribution, exportation and marketing of our products are subject to extensive regulation by governmental authorities in the U.S. and in other countries. In the U.S., the FDA, under the Federal Food, Drug and Cosmetic Act and its implementing regulations, regulates pharmaceutical products. Failure to comply with applicable U.S. requirements may subject us to administrative or judicial sanctions, such as FDA refusal to approve pending marketing applications, withdrawal of approval of approved products, warning letters, untitled letters, product recalls, product seizures, total or partial suspension of production or distribution, injunctions, civil penalties and/or criminal prosecution.

U.S. Drug Approval Process

To obtain FDA approval of a product candidate, we must, among other things, submit clinical data providing substantial evidence of safety and efficacy of the product for its intended use, as well as detailed information on product composition, its manufacture and controls and proposed labeling. The testing and collection of data and the preparation of necessary applications are expensive and time-consuming. The FDA may not act quickly or favorably in reviewing these applications, and we may encounter significant difficulties or costs in our efforts to obtain FDA approvals that could delay or preclude us from marketing our products.

The steps required before a drug may be approved for marketing in the U.S. generally include the following:

- pre-clinical laboratory tests and animal toxicity testing;
- submission of an IND for conducting human clinical testing to the FDA, which must become effective before human clinical trials commence;
- adequate and well-controlled human clinical trials to establish the safety and efficacy of the drug product for each indication, including controlled studies or comparison of treated group from clinical trials to data from natural history data or studies;
- submission of a complete and compliant marketing application containing chemistry, manufacturing and control information for the drug substance and drug product, reports of nonclinical and clinical trials, product labeling and administrative information;
- satisfactory completion of an FDA inspection of the commercial manufacturing facilities at which the drug substance and drug product are made to assess compliance with cGMP;
- satisfactory FDA audit of the clinical trial site(s) that generated the pivotal safety and efficacy data included in the marketing application and also potentially the nonclinical trial site(s) in the form of pre-approval inspections; and
- FDA review and approval of the marketing application.

Pre-clinical trials may include laboratory evaluations of the product chemistry, pharmacology, toxicity and formulation, as well as animal studies to assess the pharmacokinetics, metabolism, bio-distribution, elimination and toxicity of the product candidate. The conduct of the pre-clinical tests and formulation of the compounds for testing must comply with federal regulations and requirements. The results of the pre-clinical trials, manufacturing information, analytical data and a proposed first in human clinical trial protocol are submitted to the FDA as part of the IND, which must become effective before clinical trials may be initiated. The IND will become effective approximately 30 days after receipt by the FDA, unless the FDA raises concerns or questions about the supportive data, or the study design, particularly regarding potential safety issues with conducting the clinical trial as described in the protocol. In this situation, the trials are placed on clinical hold and the IND sponsor must resolve any outstanding FDA concerns before clinical trials can proceed.

Clinical trials involve the administration of the product candidate to healthy volunteers or patient participants under the supervision of a qualified principal investigator. Clinical trials are conducted under protocols detailing the

objectives of the study, the administration of the investigational product, study procedures, parameters to be used in monitoring safety and the effectiveness criteria to be evaluated. Each protocol must be submitted to the FDA as a submission to the IND. Clinical trials must be conducted in accordance with the FDA's Good Clinical Practice ("GCP") requirements and federal and state laws and regulations protecting study subjects. Further, each clinical trial must be reviewed and approved by the Institutional Review Board ("IRB") at or servicing each institution in which the clinical trial will be conducted. The IRB will consider, among other things, rationale for conducting the trial, clinical trial design, participant informed consent, ethical factors, the safety and rights of human subjects and the possible liability of the institution. The FDA can temporarily or permanently halt a clinical trial at any time, or impose other sanctions, if it believes that the clinical trial is not being conducted in accordance with FDA requirements or presents an unacceptable risk to the clinical trial

subjects. The IRB may also require the clinical trial at a particular site be halted, either temporarily or permanently, for failure to comply with GCP or the IRB's requirements, or may impose other conditions.

Clinical trials typically are conducted in three sequential drug development phases (Phases 1, 2 and 3) prior to approval, and a portion of these phases may overlap. A fourth post-approval phase (Phase 4) may include additional clinical trials. A general description of clinical trials conducted in each phase of development is provided below. However, the number of study subjects involved in each phase of drug development for rare diseases can be significantly less than typically expected for more common diseases with larger patient populations:

- Phase 1. Phase 1 clinical trials involve the initial introduction of the drug into human subjects. These studies are usually designed to determine the safety of single and multiple doses of the compound and determine any dose limiting toxicities or intolerance, as well as the metabolism and pharmacokinetics of the drug in humans. Phase 1 studies usually involve less than 100 subjects and are conducted in healthy adult volunteers, unless it is unethical to administer the study drug to healthy volunteers, in which case they are tested in patients.
- Phase 2. Phase 2 clinical trials are usually conducted in a limited patient population to evaluate the safety and efficacy of the drug for a specific indication to determine optimal dosage and to identify possible adverse effects and safety risks. Phase 2 studies usually involve patients with the disease under investigation and may vary in size from several dozen to several hundred.
- Phase 3. If an investigational drug is found to be potentially effective and to have an acceptable safety profile in early phase studies, larger Phase 3 clinical trials are conducted to confirm clinical efficacy, dosage and safety in the intended patient population, which may involve geographically dispersed clinical trial sites. Generally, two adequate and well-controlled Phase 3 clinical trials which establish the safety and efficacy of the drug for a specific indication are required for approval of a marketing application. Phase 3 studies usually include several hundred to several thousand patients for larger, non-orphan drug indications/diseases. However, clinical trials for rare or orphan diseases generally have fewer patients due to their lower prevalence. For these orphan diseases, a company may also try to demonstrate efficacy and safety by comparing treated patients in clinical trials to untreated patients participating in placebo-controlled clinical trials or to observational natural history studies.
- Phase 4. Phase 4 trials are clinical trials conducted after the FDA has approved a product for marketing. Typically there are two forms of Phase 4 trials: those that are conducted to fulfill mandatory conditions of product approval and those that are voluntarily conducted to gain additional experience from the treatment of patients in the intended therapeutic indication. The mandatory studies are used to confirm clinical benefit in the case of drugs approved under the accelerated approval regulations or to provide additional clinical safety or efficacy data for "full" approvals. Failure to promptly conduct and complete mandatory Phase 4 clinical trials could result in withdrawal of approval for products approved under accelerated approval regulations.

A company seeking marketing approval for a new drug in the U.S. must submit the results of the pre-clinical and clinical trials to the FDA in the form of a marketing application, together with, among other things, detailed information on the manufacture and composition of the product candidate and proposed labeling, including payment of a user fee for FDA review of the application. The user fee is waived for an application for a product intended to treat an Orphan Indication. The FDA assesses all submitted marketing applications for completeness before it accepts them for filing. In some cases, the FDA may request additional information before accepting a marketing application for filing. Once the submission is accepted for filing, the FDA begins an in-depth review of the marketing application. Applications receive either standard or priority review. Under the current goals mandated under the Prescription Drug User Fee Act (the "PDUFA"), the FDA has ten months in which to complete its initial review of a standard marketing application and respond to the applicant, and six months for a priority marketing application. The FDA does not always meet its PDUFA goal dates for standard or priority marketing applications. The review process and the PDUFA goal date may be extended by three months if the FDA requests or the marketing application sponsor otherwise provides additional information or clarification regarding information already provided in the submission within the last three months before the PDUFA goal date. The FDA may refer an application to an advisory committee for review, evaluation and recommendation as to whether the application should be approved. Though the FDA is not bound by such recommendations, it considers them carefully when making decisions. If the FDA's evaluations of the marketing application and the clinical and manufacturing procedures and facilities are favorable, the FDA may issue

an approval letter. If the FDA finds deficiencies in the marketing application, it may issue a complete response letter, which defines the conditions that must be met in order to secure final approval of the marketing application. If and when those conditions have been met to the FDA's satisfaction, the FDA will issue an approval letter, authorizing commercial marketing of the drug. Sponsors that receive a complete response letter may submit to the FDA information that represents a complete response to the issues identified by the FDA. Resubmissions by the marketing application sponsor in response to a complete response letter trigger new review periods of varying length (typically two to six months) based on the content of the resubmission. If the FDA's evaluation of the marketing application and the commercial manufacturing procedures and facilities is not favorable, the FDA may not approve the marketing application.

A sponsor may also seek designation of its drug candidates under programs designed to accelerate the FDA's review and potential approval of marketing applications. For instance, a sponsor may seek FDA designation of a drug candidate as a "fast track product." Fast track products are those products intended for the treatment of a serious or life-threatening disease or condition and which demonstrate the potential to address unmet medical needs for such disease or condition. If fast track designation is obtained, the FDA may initiate early and frequent communication and begin reviewing sections of a marketing application before the application is complete. This "rolling review" is available if the applicant provides, and the FDA approves, a schedule for the remaining information. Eteplirsen was granted fast track status in 2007.

The Food and Drug Administration Safety and Innovation Act ("FDASIA") enacted and signed into law in 2012 amended the criteria for the fast track and accelerated approval pathways and, as a result, the pathways now share many common eligibility criteria. FDASIA provides both the sponsor companies and the FDA with greater flexibility and expedited regulatory mechanisms. The statute clarifies that a fast track product may be approved pursuant to an accelerated approval (Subpart – H) or under the traditional approval process. In addition, FDASIA codified the accelerated approval pathway as separate and apart from the fast track pathway, meaning that for drugs to be eligible for accelerated approval, they do not need to be designated under the fast track pathway. FDASIA reinforces the FDA's authority to grant accelerated approval of a drug that treats a serious condition and generally provides a meaningful advantage over available therapies and demonstrates an effect on 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 ("IMM") that is reasonably likely to predict an effect on IMM or other clinical benefit (i.e., an intermediate clinical endpoint). Approvals of this kind typically include requirements for appropriate post-approval Phase 4 clinical trials to confirm clinical benefit. FDASIA retains this requirement and further requires those studies to verify and describe the predicted effect on irreversible morbidity or mortality or other clinical benefit.

Additionally, FDASIA established a new, expedited regulatory mechanism referred to as breakthrough therapy designation. Breakthrough therapy designation, fast track, and accelerated approval are not mutually exclusive and are meant to serve different purposes. The breakthrough therapy designation is focused on expediting the development and review process and by itself does not create an alternate ground for product approval. A sponsor may seek FDA designation of a drug candidate as a breakthrough therapy if the drug is intended, alone or in combination with one or more other drugs, to treat a serious or life-threatening disease or condition and preliminary clinical evidence indicates that the drug may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. The FDA issued guidance entitled "Expedited Programs for Serious Conditions—Drugs and Biologics" in May 2014.

Finally, if a drug candidate demonstrates a significant benefit over existing therapy, it may be eligible for priority review, which means it will be reviewed within a six-month timeframe from the date a complete marketing application is accepted for filing. A Regenerative Medicine Advanced Therapy ("RMAT") designation is also designed to accelerate approval for regenerative advanced therapies such as our gene therapy product candidates, but the exact mechanisms have not yet been announced by FDA.

We cannot be sure that any of our drug candidates will qualify for any of these expedited development, review and approval programs, or that, if a drug does qualify, that the product candidates will be approved, will be accepted as part of any such program or that the review time will be shorter than a standard review.

Holders of an approved marketing application are required to:

- report serious adverse drug reactions to the FDA;
- submit annual and periodic reports summarizing product information and safety data;
- comply with requirements concerning advertising and promotional labeling;
- continue to have quality control and manufacturing procedures conform to cGMP after approval; and
- conduct any post-marketing study designated as a required condition of the marketing application approval.

The FDA periodically inspects the sponsor's records related to safety reporting and/or manufacturing; this latter effort includes assessment of compliance with cGMP. Accordingly, manufacturers must continue to expend time, money and effort in the area of production and quality control to maintain cGMP compliance. Discovery of problems with a product after approval may result in restrictions on a product, manufacturer, or holder of an approved marketing application, including withdrawal of the product from the market.

Foreign Regulatory Requirements

We are pursuing regulatory approval of eteplirsen in jurisdictions outside of the U.S. In November 2016, we submitted a marketing authorization application ("MAA") for eteplirsen to the EMA and the application was validated in December 2016. As we

announced on June 1, 2018, the CHMP of the EMA adopted a negative opinion for eteplirsen. In September 2018, the CHMP of the EMA confirmed its negative opinion for eteplirsen, and the European Commission adopted the CHMP opinion in December 2018. We plan to seek follow up EMA scientific advice in 2019 to explore a potential approach for EMA approval of eteplirsen. We have initiated key activities in support of the potential launch of eteplirsen in the EU, such as building out commercial infrastructure and scaling-up manufacturing. As of the date of this Annual Report, EXONDYS 51 has only been approved for sale and marketing in the U.S. by the FDA and in Israel by the Israeli Ministry of Health.

Thus, in addition to regulations in the U.S., our business is subject to a variety of foreign regulations governing clinical trials and commercial sales and distribution of our products. Irrespective of whether it is an FDA approved drug or an investigational drug, approvals by the comparable regulatory authorities of foreign countries are required before we can commence clinical trials or marketing of the product in those countries. For example, in the EU, the conduct of clinical trials is governed by the currently applicable Clinical Trials Directive 2001/20/EC concerning conduct of clinical trials in the EU and the Directive 2005/28/EC laying down the principles and guidelines on GCP, a system for the approval of clinical trials that has been implemented through national legislation in the member states in the EU. Under this system, a sponsor must obtain approval from the competent national authority of an EU member state in which the clinical trial is to be conducted, or in multiple member states if the clinical trial is to be conducted in a number of countries. Furthermore, the sponsor may only start a clinical trial at a specific study site after the competent ethics committee has issued a favorable opinion. The Clinical Trials Application ("CTA") must include the supporting information prescribed by Directive 2001/20/EC and Directive 2005/28/EC, corresponding national laws of the member states, and as further detailed in the applicable guidance documents.

In April 2014, the EU adopted a new Clinical Trials Regulation (EU) No 536/2014 to replace the current Clinical Trials Directive. The new Clinical Trials Regulation has come into force, but will come into application in all EU Member States in October 2018 without the need for any national implementing legislation. The new regulation provides an overhaul of the system to ensure greater consistency in the approval of clinical trials with the highest standards of patient safety in the EU. Specifically, the new legislation seeks to simplify and streamline approval. Under the new coordinated procedure for the approval, the sponsor of a clinical trial is required to submit a single application to a reporting EU Member State. The reporting Member State will consult and coordinate with all other Member States in which the clinical trial is planned to be conducted (concerned Member States). If the application is rejected, it can be amended and resubmitted through a central EU Portal. If an approval is issued, the sponsor can start the clinical trial in all concerned Member States. However, a concerned Member State can in certain cases declare an "opt-out" from the approval. In such a case, the clinical trial cannot be conducted in those Member State(s). The Clinical Trials Regulation also aims to streamline and simplify the rules on safety reporting for clinical trials.

In order to obtain marketing authorization for a medicinal product in the EU, applicants are required to submit an MAA to either the national Competent Authorities or the EMA for the Centralized authorization procedures, using the ICH Common Technical Document ("CTD"). Applicants are required to demonstrate the quality, safety and efficacy of the medicinal product in the application for marketing authorization. This includes the requirement to conduct human clinical trials to generate the necessary clinical data. Submission of data in compliance with an agreed Pediatric Investigation Plan ("PIP") is essential for the validation or acceptance of an MAA for review. Medicinal products are authorized in the EU through one of several different procedures, either by the national competent authorities of the EU Member States (through the decentralized, mutual recognition, or national procedures), or through the centralized authorization procedure administered by the EMA. Regulation (EC) No 726/2004 of the European Parliament and of the Council lays down the centralized procedure for the authorization of medicinal products, for which there is a single application, a single evaluation and a single approval allowing direct access to the single market of the EU. Approval via the Centralized Procedure is a two-step process whereby the CHMP first adopts an "Opinion" recommending grant of a marketing authorization following a review of the submitted data to inform an assessment of benefit/risk. The adopted Opinion can be positive or negative. A positive CHMP opinion is followed by European Commission ("EC") binding decision to grant a marketing authorization. The marketing authorization is valid throughout the EU and is automatically recognized in three of the four European Free Trade Association states

(Iceland, Liechtenstein and Norway). These countries collectively belong to the European Economic Area. The timeframe for the evaluation of an MAA leading to the CHMP opinion is 210 days (discounting procedural clock-stops) from receipt of a valid application for marketing authorization. This time period to complete the scientific review is generally longer than the 210 days as “clock stops” are required to respond to additional written or oral information requested by the EMA. Following a positive CHMP opinion, the EU Commission has 67 days to issue the EC Decision (i.e. the marketing authorization).

Article 3 of Regulation (EC) No 726/2004 defines the scope and eligibility of applications for evaluation under the centralized procedure through which medicinal products must ("mandatory scope") or may ("optional scope" or "Generic/Hybrid") be authorized by the Community. The centralized procedure is compulsory for certain medicinal products, including medicinal products derived from biotechnological processes, orphan medicinal products, advanced therapy medicinal products and products indicated for the treatment of certain diseases including treatment of neurodegenerative diseases. It is optional for new active substances and products that can demonstrate a significant therapeutic, scientific or technical innovation, where approval would be in the interest of public health. Our portfolio of innovative orphan products for neurodegenerative diseases is subject to the mandatory centralized procedure.

Accelerated evaluation may be granted in exceptional cases, following a justified request from the applicant, when a medicinal product is of a major public health interest, particularly from the point of view of therapeutic innovation. CHMP determines what constitutes a major public interest on a case by case basis. Justifications must include the major benefits expected and present the arguments to support the claim that the medicinal product introduces new methods of therapy or improves on existing methods, thereby addressing, to a significant extent, the greater unmet needs for maintaining and improving public health. During an accelerated assessment, the opinion of the CHMP is given, in principle, within 150 days. The EU Commission Decision is then issued according to the timetable described above.

Innovative medicinal products authorized in the EU on the basis of a full stand-alone MAA consisting of pharmaceutical and pre-clinical testing results and clinical trial data (as opposed to an application for a generic marketing authorization that relies on the results of pre-clinical and clinical trials available in the marketing authorization dossier for another, previously approved, reference medicinal product) are treated as reference medicinal products and accordingly entitled to eight years' data exclusivity. During this period, applicants for approval of generics of these innovative products cannot reference or rely upon data contained in the marketing authorization dossier submitted for the innovative medicinal product. Even if the generic product is approved, it cannot be placed on the market until the full 10-year period of market protection has elapsed from the initial authorization of the reference medicinal product. This period can be extended to a maximum of eleven years if, during the first eight years of those ten years, the MA holder for the innovative product obtains an authorization for 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 or as the result of significant pre-clinical or clinical trials.

In the EU, orphan medicinal product designation is considered by the EMA for drugs intended to diagnose, prevent or treat a life-threatening or very serious condition with a prevalence of no more than 5 in 10,000 people in the EU. In addition, the sponsor is required to demonstrate that there exists no satisfactory method of diagnosis, prevention or treatment of the condition that has been authorized in the EU or if such method exists, the medicinal product is of significant benefit to those affected by the condition as compared to approved methods. Medicinal products developed for treating serious and chronic conditions would likely not be marketed without incentives due to low market return on the sponsor's development investment. As such, they may also be eligible for an EU orphan drug designation. Benefits of being granted orphan designation are significant, including up to ten years of market exclusivity. During this ten-year period, the EMA may not accept a new marketing application for a similar medicinal product for the same therapeutic indication as the approved orphan medicinal product. Pursuant to Regulation (EC) 1901/2006 on medicinal products for pediatric use, the 10-year orphan market exclusivity can be extended to a maximum period of 12 years on the satisfactory completion of all the key elements of the agreed PIP. We have been granted orphan drug designation for eteplirsen in the EU.

Similar to the U.S., marketing authorization holders and manufacturers of medicinal products are subject to comprehensive regulatory oversight by the EMA and/or the national competent authorities of the EU Member States. This oversight applies both before and after the granting of manufacturing and marketing authorizations. It includes compliance with EU GMP and GDP rules in relation to such activities as distribution, importing and exporting of medicinal products, rules governing conduct of pharmacovigilance and requirements governing advertising, promotion and sale of medicinal products.

Failure to comply with the EU Member State laws implementing the EU Community Code on medicinal products, and EU rules governing the promotion of medicinal products, interactions with physicians, misleading and comparative advertising and unfair commercial practices, with the EU Member State laws that apply to the promotion of medicinal products, statutory health insurance, bribery and anti-corruption or with other applicable regulatory requirements can result in enforcement action by the relevant EU Member State authorities. This may include any of the following: fines, imprisonment, orders forfeiting products or prohibiting or suspending their supply to the market, orders to suspend, vary, or withdraw the marketing authorization or requiring the manufacturer to issue public warnings, or to conduct a product recall.

The collection and use of personal health data and other personal information in the EU is governed by the provisions of the Data Protection Directive as implemented into national laws by the EU Member States. This Directive imposes a number of strict obligations and restrictions on the ability to collect, analyze and transfer patient data, including sensitive health data from clinical trials and adverse event reporting. There is, moreover, a growing trend towards imposition of an obligation of public disclosure of clinical trial data in the EU, which adds to the complexity of obligations relating to the processing of health data from clinical trials. Such public disclosure obligations are provided in the new EU Clinical Trials Regulation, EMA disclosure initiatives, and voluntary commitments by industry. The Data Protection Directive also includes requirements relating to the consent of the individuals to whom the personal data relates, the information provided to the individuals prior to processing their personal data or personal health data, notification of data processing obligations to the competent national data protection authorities and the security and confidentiality of the personal data. The Data Protection Directive also prohibits the transfer of personal data to countries outside of the EU Member States that are not considered by the EU to provide an adequate level of data protection. These countries include the U.S. Failure to comply with the requirements of the Data Protection Directive and the related national data protection laws of the EU Member States may result in fines and other administrative penalties. Data protection authorities from the different EU Member States may interpret the EU Data Protection Directive and national laws differently, which adds to the complexity of processing personal data in the EU

Guidance developed at both EU level and at national level in individual EU Member States concerning implementation and compliance practices are often updated or otherwise revised.

In December 2015, a proposal for an EU General Data Protection Regulation, intended to replace the current EU Data Protection Directive, was agreed between the European Parliament, the Council of the European Union and the European Commission. The EU General Data Protection Regulation, which was officially adopted in April 2016 and will be applicable in May 2018, will introduce new data protection requirements in the EU, as well as substantial fines for breaches of the data protection rules. The EU General Data Protection Regulation will increase our responsibility and liability in relation to any personal data that we process, and we may be required to put in place additional mechanisms to ensure compliance with the new EU data protection rules.

The approval process in other countries outside the U.S. and the EU varies from country to country, and the time may be longer or shorter than that required for the FDA approval. In addition, the requirements governing the conduct of clinical trials, product licensing, pricing and reimbursement for market access vary greatly from country to country. In all cases, clinical trials are conducted in accordance with GCP and the applicable regulatory requirements and the ethical principles that have their origin in the Declaration of Helsinki.

Data and Market Exclusivities

In addition to patent exclusivities, the FDA and certain other foreign health authorities may grant data or market exclusivity for a newly approved chemical entity or biologic, which runs in parallel to any patent protection. Regulatory data protection or exclusivity prevents a potential generic competitor from relying on clinical trial data generated by the sponsor when establishing the safety and efficacy of its competing product. Market exclusivity prohibits any marketing of the same drug for the same indication.

In the U.S., the FDA will generally grant a NCE that is the subject of a NDA with five years of regulatory data exclusivity, during which time a competitor generally may not submit an application to the FDA based on a sponsor's clinical data. For a newly approved biologic that is the subject of a BLA, the FDA will generally grant 12 years of market exclusivity, during which time a competitor may not market the same drug for the same indication.

In addition, the FDA may provide six months of pediatric exclusivity to a sponsor of a marketing application, if the sponsor conducted a pediatric study or studies of a product. This process is applied to products developed for adult use and is initiated by the FDA as a written request for pediatric studies that applies to a sponsor's product. If the sponsor conducts qualifying studies and the studies are accepted by the FDA, then an additional six months of pediatric exclusivity will be added to previously granted exclusivity, such as orphan drug exclusivity and NCE exclusivity, as well as certain patent-based exclusivities.

Orphan Drug Designation and Exclusivity

In the U.S., the FDA may grant orphan drug designation to drugs intended to treat a rare disease or condition that affects fewer than 200,000 individuals in the U.S., or more than 200,000 individuals in the U.S. for which there is no reasonable expectation that the cost of developing and making available in the U.S. a drug for this type of disease or condition will be recovered from sales in the U.S. for that drug. An orphan drug designation must be requested before submitting an application for marketing approval. An orphan drug designation does not shorten the duration of the regulatory review and approval process. The approval of an orphan designation request does not alter the regulatory requirements and process for obtaining marketing approval. Safety and efficacy of a compound must be established through adequate and well-controlled studies. If a product which has an orphan drug designation subsequently receives FDA approval for the indication for which it has such designation, the product is generally entitled to an orphan drug exclusivity period, which means the FDA may not grant approval to any other application to market the same chemical entity for the same indication for a period of seven years, except in limited circumstances, such as where an alternative product demonstrates clinical superiority to the product with orphan exclusivity. In addition,

holders of exclusivity for orphan drugs are expected to assure the availability of sufficient quantities of their orphan drugs to meet the needs of patients. Failure to do so could result in the withdrawal of orphan exclusivity for the drug. Competitors may receive approval of different drugs or biologics for the indications for which a prior approved orphan drug has exclusivity.

In Europe, the EMA may grant orphan status to product candidates thereby providing such product candidates with ten years of marketing exclusivity, meaning that another application for marketing authorization of a later, similar medicinal product for the same therapeutic indication will generally not be approved in Europe during that time period.

Expanded / Early Access

In certain countries, drug products approved in the U.S. or the EU can be accessed by patients before the drug has obtained marketing approval in such country. There are various forms of this access including, but not limited to, the actual purchase of product by the purchaser, which is often times the government for patients, on a named patient basis, and providing the product free of charge

on a named patient basis for compassionate use. Each country has its own laws and regulations that apply to these forms of access and the extent and nature of such laws and regulations vary by country. For example, in 2018, the so-called Right to Try Act became law in the United States. The law, among other things, allows eligible patients to access certain investigational new drug products that have completed a Phase I clinical trial and that are undergoing investigation for FDA approval without enrolling in clinical trials and without obtaining FDA permission under the FDA expanded access program. There is no obligation for a pharmaceutical manufacturer to make its drug products available to such eligible patients as a result of the Right to Try Act.

We have initiated an EAP for eteplirsen in select countries in Europe, North America, South America and Asia where it currently has not been approved. The EAP provides a mechanism through which physicians can prescribe eteplirsen, within their professional responsibility, to patients who meet pre-specified medical and other criteria and can secure funding. We have commenced shipments through the EAP and continue to expand the EAP to include more countries. In addition, we contracted with third party distributors and service providers to distribute eteplirsen in certain areas outside the U.S., such as Brazil and certain countries in the Middle East, on a named patient basis.

Other Regulatory Requirements

In addition to regulations enforced by the FDA and foreign authorities relating to the clinical development and marketing of products, we are or may become subject to regulation under the Occupational Safety and Health Act, the Toxic Substances Control Act, the Resource Conservation and Recovery Act and other present and potential future foreign, federal, state and local laws and regulations. Although we believe that we are in material compliance with applicable environmental laws that apply to us, we cannot predict whether new regulatory restrictions will be imposed by state or federal regulators and agencies or whether existing laws and regulations will adversely affect us in the future.

Healthcare Fraud and Abuse Laws

We are subject to various federal, state and local laws targeting fraud and abuse in the healthcare industry, including anti-kickback and false claims laws. Violations of fraud and abuse laws may be punishable by crime or civil sanctions, including fines and civil monetary penalties, and/or exclusion from federal health care programs (including Medicare and Medicaid). Federal and state authorities are paying increased attention to enforcement of these laws within the pharmaceutical industry, and private individuals have been active in alleging violations of the laws and bringing suits on behalf of the government under the federal False Claims Act (“FCA”). Violations of international fraud and abuse laws could result in similar penalties, including exclusion from participation in health programs outside the U.S. If we were subject to allegations concerning, or were convicted of violating, these laws, our business could be harmed.

The federal Anti-Kickback Statute generally prohibits, among other things, a pharmaceutical manufacturer from directly or indirectly soliciting, offering, receiving, or paying any remuneration in cash or in kind where one purpose is either to induce the referral of an individual for, or the purchase or prescription of a particular drug that is payable by a federal health care program, including Medicare or Medicaid. A person or entity does not need to have actual knowledge of the statute or a specific intent to violate the statute. Violations of the federal Anti-Kickback Statute can result in exclusion from Medicare, Medicaid or other governmental programs as well as civil and criminal fines and penalties of up to $100,000 per violation and three times the amount of the unlawful remuneration. A claim arising from a violation of the federal Anti-Kickback Statute also constitutes a false or fraudulent claim for purposes of the FCA. A new federal anti-kickback statute enacted in 2018 prohibits certain payments related to referrals of patients to certain providers (such as clinical laboratories) and applies to services reimbursed by private health plans as well as government health care programs.

Federal and state false claims laws generally prohibit anyone from knowingly and willfully, among other activities, presenting, or causing to be presented for payment to third party payors (including Medicare and Medicaid) claims for drugs or services that are false or fraudulent (which may include claims for services not provided as claimed or claims

for medically unnecessary services). False or fraudulent claims for purposes of the FCA carry fines and civil penalties for violations ranging from $11,181 to $22,363 for each false claim, plus up to three times the amount of damages sustained by the federal government and, may provide the basis for exclusion from federally funded healthcare programs. There is also a criminal FCA statute by which individuals or entities that submit false claims can face criminal penalties. In addition, under the federal Civil Monetary Penalty Law, the Department of Health and Human Services Office of Inspector General has the authority to exclude from participation in federal health care programs or to impose civil penalties against any person who, among other things, knowingly presents, or causes to be presented, certain false or otherwise improper claims. Our activities relating to the sale and marketing of our products may be subject to scrutiny under these laws.

The majority of states also have anti-kickback, false claims, and similar fraud and abuse laws and although the specific provisions of these laws vary, their scope is generally broad, and there may not be regulations, guidance or court decisions that apply

the laws to particular industry practices. There is therefore a possibility that our practices might be challenged under the anti-kickback statutes or similar laws.

Laws and regulations have also been enacted by the federal government and various states to regulate the sales and marketing practices of pharmaceutical manufacturers. The laws and regulations generally limit financial interactions between manufacturers and health care providers; require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the U.S. federal government; and/or require disclosure to the government and/or public of financial interactions (so-called "sunshine laws"). State laws may also require disclosure of pharmaceutical pricing information and marketing expenditures. Manufacturers must also submit information to the FDA on the identity and quantity of drug samples requested and distributed by a manufacturer during each year. Many of these laws and regulations contain ambiguous requirements or require administrative guidance for implementation. Given the lack of clarity in laws and their implementation, our activities could be subject to the penalty provisions of the pertinent federal and state laws and regulations.

Pharmaceutical Pricing and Reimbursement

Our first commercial product in the U.S., EXONDYS 51, was granted accelerated approval by the FDA on September 19, 2016. We have an ongoing dialogue with payors globally with the goal of obtaining broad coverage for EXONDYS 51. To date, payors' policies on coverage for EXONDYS 51 have varied widely, including policies that allow broad coverage per the EXONDYS 51 prescribing information, policies that provide limited coverage, to policies that have denied coverage. The majority of payors have policies that provide for case-by-case coverage or restricted coverage. Our revenue depends, in part, upon the extent to which payors provide coverage for EXONDYS 51 and the amount that payors, including government authorities or programs, private health insurers and other organizations, reimburse patients and healthcare providers for the cost of EXONDYS 51.

Third Party Reimbursement and Pricing in the U.S.

Commercial Insurance. Coverage and reimbursement of our EXONDYS 51 varies from commercial payor to commercial payor. Many commercial payors, such as managed care plans, manage access to FDA approved products, and may use drug formularies and medical policies (which may include specific coverage requirements such as prior authorization, re-authorization and achieving performance metrics under value-based contracts) to control utilization. Exclusion from or restriction in coverage can reduce product usage.

Medicaid. Our product EXONDYS 51 is eligible to be reimbursed by Medicaid. Medicaid is a joint federal and state program that is administered by the states for low income and disabled beneficiaries. Under the Medicaid Drug Rebate Program, participating manufacturers are required to pay a rebate for each unit of product reimbursed under the state Medicaid programs. The amount of the rebate for each product is set by law and may be subject to an additional discount if certain pricing increases more than inflation. State Medicaid programs and Medicaid managed care plans can seek additional "supplemental" rebates from manufacturers in connections with favorable positioning on formularies.

Medicare. Medicare is a federal program that is administered by the federal government that covers individuals age 65 and over as well as those with certain disabilities. Our product EXONDYS 51 is eligible for reimbursement under Medicare Part B. Medicare Part B generally covers drugs that must be administered by physicians. Medicare Part B pays for such drugs under a payment methodology based on the average sales price ("ASP") of the drugs. Reimbursement levels and reimbursement methodologies have come under scrutiny and may be subject to change. The Centers for Medicare & Medicaid Services ("CMS") are also increasingly bundling drug reimbursement into procedure costs, which can severely decrease the reimbursement rates for some manufacturers' drugs.

Federal Purchasers. Drug products are subject to discounted pricing when purchased by federal agencies via the Federal Supply Schedule ("FSS"). FSS participation is required for a drug product to be covered and reimbursed by certain federal agencies and for coverage under Medicaid, Medicare Part B and the Public Health Service ("PHS") 340B drug pricing program. FSS pricing is negotiated periodically with the Department of Veterans Affairs. FSS pricing is intended not to exceed the price that a manufacturer charges its most-favored non-federal customer for its product. In addition, prices for drugs purchased by the Veterans Administration, Department of Defense (including drugs purchased by military personnel and dependents through the TRICARE retail pharmacy program), Coast Guard, and PHS are subject to a cap on pricing (known as the "federal ceiling price") and may be subject to an additional discount if pricing increases more than the rate of inflation.

PHS 340B Drug Pricing Program. To maintain coverage of drugs under the Medicaid Drug Rebate Program and Medicare Part B, manufacturers are required to extend discounts to certain purchasers under the PHS 340B drug pricing program. Purchasers eligible for discounts include hospitals that serve a disproportionate share of financially needy patients, community health clinics and other entities that receive health services grants from the PHS.

Healthcare and Other Reform. In the U.S., federal and state governments continue to propose and pass legislation designed to reform delivery of, or payment for, health care, which include initiatives to reduce the cost of healthcare. For example, in March 2010, the U.S. Congress enacted the Patient Protection and Affordable Care Act and the Health Care and Education Reconciliation Act, or the Healthcare Reform Act, which expanded health care coverage through Medicaid expansion, implemented the "individual mandate" for health insurance coverage (by imposing a tax penalty on individuals who did not obtain insurance) and changed the coverage and reimbursement of drug products under government healthcare programs. Under the Trump administration, there have been ongoing efforts to modify or repeal all or certain provisions of the Healthcare Reform Act. Tax reform legislation was enacted at the end of 2017 that includes provisions that will affect healthcare insurance coverage and payment, such as the elimination of the tax penalty for individuals who do not maintain sufficient health insurance coverage beginning in 2019. In a May 2018 report, the Congressional Budget Office estimated that, compared to 2018, the number of uninsured will increase by 3 million in 2019 and 6 million in 2028, in part due to the elimination of the individual mandate. The Healthcare Reform Act has also been subject to judicial challenge. In December 2018, a federal district court judge, in a challenge brought by a number of state attorneys general, found the Healthcare Reform Act unconstitutional in its entirety because once Congress repealed the "individual mandate" provision, there was no longer a basis to rely on Congressional taxing authority to support enactment of the law. The court reasoned that the "individual mandate" was not severable from the rest of the Healthcare Reform Act and found the entire Healthcare Reform Act was an unconstitutional exercise of Congressional authority. Pending appeals, which could take some time, the Healthcare Reform Act is still operational in all respects.

There have been other reform initiatives under the Trump Administration. For example, in May 2018, President Trump and the Secretary of the Department of Health and Human Services released a "blueprint" to lower prescription drug prices and out-of-pocket costs. Certain proposals in the blueprint, and related drug pricing measures proposed since the blueprint, could cause significant operational and reimbursement changes for the pharmaceutical industry. As another example, in October 2018, the Centers for Medicare & Medicaid Services solicited public comments on potential changes to payment for certain Medicare Part B drugs, including reducing the Medicare payment amount for selected Medicare Part B drugs to more closely align with international drug prices.

There have also been efforts by government officials or legislators to implement measures to regulate prices or payment for pharmaceutical products, including legislation on drug importation. Recently, there has been considerable public and government scrutiny of pharmaceutical pricing and proposals to address the perceived high cost of pharmaceuticals. There have also been recent state legislative efforts to address drug costs, which generally have focused on increasing transparency around drug costs or limiting drug prices. Certain state legislation has been subject to legal challenges. Adoption of new legislation regulating drug pricing at the federal or state level could further affect demand for, or pricing of, our products.

General legislative cost control measures may also affect reimbursement for our products. The Budget Control Act, as amended, resulted in the imposition of 2% reductions in Medicare (but not Medicaid) payments to providers in 2013 and will remain in effect through 2027 unless additional Congressional action is taken. Any significant spending reductions affecting Medicare, Medicaid or other publicly funded or subsidized health programs that may be implemented and/or any significant taxes or fees that may be imposed on us could have an adverse impact on our results of operations.

Third Party Reimbursement and Pricing outside the U.S.

We currently have no products approved for marketing outside the U.S., other than a marketing authorization for EXONDYS 51 in Israel. We may need to conduct expensive pharmacoeconomic studies in order to demonstrate the cost-effectiveness of our products. In the EU and certain other territories, price controls and Health Technology Assessments for new, highly priced medicines are expected. Uncertainty exists about the pricing and reimbursement status of newly approved products in the EU. Criteria such as cost-effectiveness, cost per quality-adjusted life year, budget impact, or others, in addition to the clinical benefit, are often required to demonstrate added value or benefit of

a drug and vary by country. Third party reimbursement limits may reduce the demand for our products. The pace of the application process in some countries could also delay commercial product launches. Gaining acceptance of our product pipeline and an economically viable reimbursement terms in the EU and other markets will require strong education and awareness efforts around DMD as well as strong data supporting its effectiveness and cost-effectiveness.

Competition

The pharmaceutical and biotechnology industries are intensely competitive, and any product candidate developed by us would likely compete with existing drugs and therapies. There are many pharmaceutical companies, biotechnology companies, public and private universities, government agencies and research organizations that compete with us in developing various approaches to the treatment of rare, neuromuscular and other diseases. Many of these organizations have substantially greater financial, technical, manufacturing and marketing resources than we have. Several of them have developed or are developing therapies that could be used for treatment of the same diseases that we are targeting. In addition, some of these competitors have significantly greater commercial infrastructures than we have. Our ability to compete successfully will depend largely on:

- our ability to complete clinical development and obtain regulatory approvals for our product candidates;
- the efficacy, safety and reliability of our product candidates;
- the timing and scope of regulatory approvals;
- product acceptance by physicians and other health-care providers;
- protection of our proprietary rights and the level of generic competition;
    - the ability to have freedom to operate to commercialize our product candidates;
- the speed at which we develop product candidates;
- our ability to supply commercial quantities of a product to the market;
- obtaining reimbursement for product use in approved indications;
- our ability to recruit and retain skilled employees; and
- the availability of substantial capital resources to fund development and commercialization activities, including the availability of funding from the U.S. government.

DMD Program Competition. Currently, other than EXONDYS 51, no disease-modifying product has been approved for the treatment of DMD in the U.S. Other companies, however, have product candidates or other interests in development for the treatment of DMD.

Wave Life Sciences (“Wave”) announced the selection of its exon 51 skipping product candidate, suvodirsen (WVE-210201). In November 2017, Wave announced the initiation of a global Phase 1 clinical trial for suvodirsen in DMD patients amenable to exon 51 skipping. In December 2018, Wave announced results from a Phase 1 study of suvodirsen. In January 2019, Wave announced its planned phase 2/3 study of suvodirsen was selected for the FDA pilot program for complex innovative trial designs (CID). Wave also announced the selection of its exon 53 skipping product candidate, WVE-N531.

Nippon Shinyaku Co. Ltd. (“Nippon”) has reported clinical data for its exon 53 skipping candidate, viltolarsen (NS-065/NCNP-01), from a Phase 1/2 study in Japan and a Phase 2 study in the U.S. Viltolarsen has been reported to have received an orphan drug designation in the U.S., was granted fast track designation by FDA and received a “SAKIGAKE designation” in Japan from the Japanese Ministry of Health, Labor, and Welfare. Nippon has reported in February 2019 that it has initiated a rolling NDA submission with the FDA with the intent to complete the submission by September 2019. Nippon’s intention to submit its marketing authorization application with the Pharmaceuticals and Medical Devices Agency (“PMDA”) in Japan for viltolarsen by the end of the Japanese fiscal year 2018 has also been reported.

Daiichi Sankyo (“Daiichi”) has reported a phase 1/2 clinical trial being underway in Japan for its exon 45 skipping candidate, DS-5141. In April 2018, Daiichi announced top-line results of the Phase 1/2 clinical trial in Japan of DS-5141 and that Daiichi will continue to develop DS-5141.

Solid Biosciences, LLC (“Solid”) has reported that its micro-dystrophin gene transfer product candidate for DMD, SGT-001 began a Phase 2 clinical study in December 2017. SGT-001 was granted fast track designation by the FDA in October 2018, orphan drug designation in August 2016, and rare pediatric disease designation in 2017. In Europe,

orphan designation was granted in September 2016. In February 2019, Solid reported micro-dystrophin expression data for the first three patients in its clinical trial and announced plans to continue the study at a higher dose pending FDA and IRB approval.

Pfizer Inc., following its acquisition of Bamboo Therapeutics, Inc., has initiated a Phase 1 clinical trial in January 2018 to test the safety and tolerability of its AAV-9 / micro-dystrophin gene transfer product candidate for DMD, PF-06939926/BMB-D001. The related orphan designation was granted in Europe in August 2016, and in the U.S. in May 2017. Rare pediatric disease designation was granted by the FDA in April 2018.

Other companies continue to pursue approval of products for the treatment of DMD and their products may or may not prove to be safer and/or more efficacious than the products and product candidates in our DMD pipeline. Regarding any of these competitors, it is unknown if further clinical development of these or other exon-skipping compounds is planned.

Additionally, companies such as Santhera, PTC Therapeutics, Summit, Catabasis, Pfizer, Fibrogen and Tivorsan have product candidates distinct from ours in different stages of development or approval in DMD which we believe could be seen as complementary to exon skipping and not a direct replacement of our product or product candidates at this time.

In addition, several companies and institutions have recently entered into collaborations or other agreements for the development of product candidates, including mRNA, gene (CRISPR, AAV, etc.) or small molecule therapies that are potential competitors for therapies being developed in the muscular dystrophy, neuromuscular, CNS and rare disease space, including but not limited to Biogen Inc., Ionis, Alexion Pharmaceuticals, Inc., Sanofi, Shire (now Takeda), Eli Lilly, Alnylam Pharmaceuticals, Inc., Moderna Therapeutics, Inc., Summit, Akashi, Catabasis, Capricor Therapeutics, Oxford University, Exonics Therapeutics, and Editas Medicine.

Platform Technology Competition. We believe that other biotechnology and pharmaceutical companies share a focus on RNA-targeted drug discovery and development. Competitors with respect to our RNA-targeted technologies include, but are not limited to, Alnylam, Tekmira Pharmaceuticals Corp., Ionis, BioMarin, Sanofi, Synthena AG, Santaris Pharma A/S (now Roche), Nippon, Daiichi Sankyo, Moderna Therapeutics and Wave.

Employees

As of December 31, 2018, we had 499 employees, 252 of whom hold advanced degrees. Of these employees, 255 are engaged directly in research and development activities and 244 are in selling, general and administration including 48 in the sales force. None of our employees are covered by collective bargaining agreements and we consider relations with our employees to be good.

General Corporate Information

We were originally incorporated in the State of Oregon on July 22, 1980, and on June 6, 2013, we reincorporated in the State of Delaware. Our principal executive offices are located at 215 First Street, Suite 415, Cambridge, MA 02142 and our telephone number is (617) 274-4000. On July 12, 2012, our common stock began trading under the symbol “SRPT” on the Nasdaq Global Market on a split-adjusted basis following a one-for-six reverse stock split that was effective on July 11, 2012. Our common stock is quoted on the Nasdaq Global Select Market under the same symbol.

While we achieve revenue from EXONDYS 51 in the U.S. and through distribution of eteplirsen on a named patient basis or through our EAP outside the U.S., we are likely to continue to incur operating losses in the near term associated with our ongoing operations, research and development activities and potential business development activities. For more information about our revenues and operating losses, see Item 7, Management’s Discussion and Analysis of Financial Condition and Results of Operations.

As of December 31, 2018, we had approximately $1,174.9 million of cash, cash equivalents and investments, consisting of $370.8 million of cash and cash equivalents, $803.1 million of short-term investments and $1.0 million of long-term restricted investment. We believe that our balance of cash, cash equivalents and investments is sufficient to fund our current operational plan for at least the next twelve months. In addition to pursuing additional cash resources through public or private financings, we may also seek to enter into contracts, including collaborations or licensing agreements with respect to our technologies, with third parties, including government entities.

Where You Can Find Additional Information

We make available free of charge through our corporate website, www.sarepta.com, our annual reports, quarterly reports, current reports, proxy statements and all amendments to those reports as soon as reasonably practicable after such material is electronically filed or furnished with the SEC. These reports may also be obtained without charge by submitting a written request via mail to Investor Relations, Sarepta Therapeutics, Inc., 215 First Street, Suite 415, Cambridge, MA 02142 or by e-mail to investorrelations@sarepta.com. Our internet website and the information contained therein or incorporated therein are not intended to be incorporated into this Annual Report on Form 10-K. In addition, the Securities and Exchange Commission (the "SEC") maintains an Internet site that contains reports, proxy and information statements, and other information regarding reports that we file or furnish electronically with the SEC at www.sec.gov.

We have adopted a Code of Business Conduct and Ethics and written charters for our Audit Committee, Compensation Committee and Nominating and Corporate Governance Committee. Each of the foregoing is available on our website at

www.sarepta.com under "For Investors—Corporate Governance." In accordance with SEC rules, we intend to disclose any amendment (other than any technical, administrative, or other non-substantive amendment) to the above code, or any waiver of any provision thereof with respect to any of the executive officers, on our website within four business days following such amendment or waiver. In addition, we may use our website as a means of disclosing material non-public information and for complying with our disclosure obligations under Regulation Fair Disclosure promulgated by the SEC. These disclosures will be included on our website under the "For Investors" section.

Item 1A. Risk Factors.

Set forth below and elsewhere in this report and in other documents we file with the SEC are descriptions of risks and uncertainties that could cause actual results to differ materially from the results contemplated by the forward-looking statements contained in this report. Because of the following factors, as well as other variables affecting our operating results, past financial performance should not be considered a reliable indicator of future performance and investors should not use historical trends to anticipate results or trends in future periods. The risks and uncertainties described below are not the only ones facing us. Other events that we do not currently anticipate or that we currently deem immaterial also affect our results of operations and financial condition.

Risks Related to Our Business

We are highly dependent on the commercial success of EXONDYS 51 in the U.S. We may not be able to meet expectations with respect to EXONDYS 51 sales or attain profitability and positive cash-flow from operations.

On September 19, 2016, the FDA granted accelerated approval for EXONDYS 51 as a therapeutic treatment for DMD in patients who have a confirmed mutation in the DMD gene that is amenable to exon 51 skipping. EXONDYS 51 is currently commercially available in the U.S. and Israel only, although it is available in certain additional countries outside of the U.S. on a named patient basis and through our EAP. The commercial success of EXONDYS 51 continues to depend on a number of factors, including, but not limited to:

- the effectiveness of our sales, managed markets, marketing efforts and support for EXONDYS 51;
- the consistency of any new data we collect and analyses we conduct with prior results, whether they support a favorable safety, efficacy and effectiveness profile of EXONDYS 51 and any potential impact on our FDA accelerated approval status and/or FDA package insert for EXONDYS 51;
- the effectiveness of our ongoing EXONDYS 51 commercialization activities, including negotiating and entering into any additional commercial, supply and distribution contracts, ongoing manufacturing efforts and hiring any additional personnel as needed to support commercial efforts;
- our ability to comply with FDA post-marketing requirements and commitments, including through successfully conducting additional studies that confirm clinical efficacy, effectiveness and safety of EXONDYS 51 and acceptance of the same by the FDA and medical community since continued approval for this indication may be contingent upon verification of a clinical benefit in confirmatory trials;
- the occurrence of any side effects, adverse reactions or misuse, or any unfavorable publicity in these areas;
- the cost-effectiveness of EXONDYS 51 and whether we can consistently manufacture at acceptable costs;
- the rate and consistency with which EXONDYS 51 is prescribed by physicians, which depends on physicians' views on the safety, effectiveness and efficacy of EXONDYS 51;
- our ability to secure and maintain adequate reimbursement for EXONDYS 51, including during re-authorization processes that may be required for patients who initially obtained coverage by third parties, including by government payors, managed care organizations and private health insurers;
- our ability to obtain and maintain patent protection for EXONDYS 51, to preserve our trade secrets, to prevent third parties from infringing on our proprietary rights and to operate without infringing on the proprietary rights of third parties;

- the development or commercialization of competing products or therapies for the treatment of DMD, or its symptoms, and the existence of competing clinical trials;
- our ability to increase awareness of the importance of genetic testing and knowing/understanding DMD mutations, and identifying and addressing procedural barriers to obtaining therapy;
- our ability to remain compliant with laws and regulations that apply to us and our commercial activities;

- the actual market-size, ability to identify patients and the demographics of patients eligible for EXONDYS 51, which may be different than expected;
- the sufficiency of our drug supply to meet commercial and clinical demands and standards, which could be negatively impacted for various reasons, including if our projections on the potential number of amenable patients and their average weight are inaccurate, we are subject to unanticipated regulatory requirements that increase our drug supply needs, our current drug supply is destroyed or negatively impacted at our manufacturing sites, storage sites or in transit, failure to meet cGMP requirements or it takes longer than we project for the number of patients we anticipate to get on EXONDYS 51 and any significant portion of our EXONDYS 51 supply expires before we are able to sell it;
- our ability to obtain regulatory approvals to commercialize EXONDYS 51 in markets outside of the U.S. and Israel; and
- the process leading to a patient's first infusion of EXONDYS 51 may be slower for certain patients. For example, the time to first infusion may take longer if a patient chooses to put in an intravenous port, which eases access to the vein. As the launch of EXONDYS 51 continues to progress, we expect the variation among patients to decline, leading to a faster time to infusion. However, delays in the process prior to first infusion could negatively impact the sales of EXONDYS 51.

We may experience significant fluctuations in sales of EXONDYS 51 from period to period and, ultimately, we may never generate sufficient revenues from EXONDYS 51 to reach or maintain profitability or sustain our anticipated levels of operations.

Even though EXONDYS 51 received accelerated approval by the FDA, it faces future post-approval development and regulatory requirements, which will present additional challenges we will need to successfully navigate.

On September 19, 2016, the FDA granted accelerated approval for EXONDYS 51 as a therapeutic treatment for patients with DMD who have a confirmed mutation in the DMD gene that is amenable to exon 51 skipping. This indication is based on an increase in the surrogate biomarker of dystrophin in skeletal muscles observed in some patients treated with EXONDYS 51. EXONDYS 51 will be subject to ongoing FDA requirements governing the labeling, packaging, storage, advertising, promotion and recordkeeping of EXONDYS 51, and we are required to submit additional safety, efficacy and other post-marketing information to the FDA.

Under the accelerated approval pathway, continued approval for this indication may be contingent upon verification of a clinical benefit in confirmatory trials. These post-approval requirements and commitments may not be feasible and/or could impose significant burdens and costs on us; could negatively impact our development, manufacturing and supply of EXONDYS 51; and could negatively impact our financial results. Failure to meet post-approval commitments and requirements, including completion of enrollment and in particular, any failure to obtain positive safety and efficacy data from our ongoing and planned EXONDYS 51 studies, would lead to negative regulatory action from the FDA and/or withdrawal of regulatory approval of EXONDYS 51.

Manufacturers of drug products and their facilities are subject to continual review and periodic inspections by the FDA and other regulatory authorities for compliance with cGMP regulations. Drug product manufacturers are required to continuously monitor and report adverse events from clinical trials and commercial use of the product. If we or a regulatory agency discover previously unknown adverse events or events of unanticipated severity or frequency, a regulatory agency may require labeling changes implementation of risk evaluation and mitigation strategy program, or additional post-marketing studies or clinical trials. If we or a regulatory agency discover previously unknown problems with a product, such as problems with a facility where the API or drug product is manufactured or tested, a regulatory agency may impose restrictions on that product and/or the manufacturer, including removal of specific product lots from the market, withdrawal of the product from the market, or suspension of manufacturing. Sponsors of drugs approved under FDA accelerated approval provisions also are required to submit to FDA, at least 30 days before initial use, all promotional materials intended for use after the first 120 days following marketing approval. If we or the manufacturing facilities for EXONDYS 51 fail to comply with applicable regulatory requirements, a regulatory agency may:

- issue warning letters or untitled letters;
- seek an injunction or impose civil or criminal penalties or monetary fines;
- suspend or withdraw or alter the conditions of our marketing approval;
- mandate modifications to promotional materials or require us to provide corrective information to healthcare practitioners;
- suspend any ongoing clinical trials;
- require us to enter into a consent decree, which can include imposition of various fines, reimbursements for inspection costs, required due dates for specific actions and penalties for noncompliance;
- refuse to approve pending applications or supplements to applications submitted by us;
- suspend or impose restrictions on operations, including costly new manufacturing requirements;

- seize or detain products, refuse to permit the import or export of products or require us to initiate a product recall; or
- refuse to allow us to enter into supply contracts, including government contracts.

We are subject to uncertainty relating to reimbursement policies which, if not favorable, could hinder or prevent the commercial success of EXONDYS 51 and/or our product candidates.

Our ability to successfully maintain and/or increase EXONDYS 51 sales in the U.S. depends in part on the coverage and reimbursement levels set by governmental authorities, private health insurers and other third-party payors. Third party payors are increasingly challenging the effectiveness of and prices charged for medical products and services. We may not be able to obtain or maintain adequate third-party coverage or reimbursement for EXONDYS 51, and/or we may be required to provide discounts or rebates on EXONDYS 51 in order to obtain or maintain adequate coverage.

We expect that private insurers will continue to consider the efficacy, effectiveness, cost-effectiveness and safety of EXONDYS 51, including any new data and analyses that we are able to collect and make available in a compliant manner, in determining whether to approve reimbursement for EXONDYS 51 and at what levels. If any new data and information we collect is not favorable, third party insurers may make coverage decisions that negatively impact sales of EXONDYS 51. We continue to have discussions with payors, some of which may eventually deny coverage. We may not receive approval for reimbursement of EXONDYS 51 from additional insurers on a satisfactory rate or basis, in which case our business would be materially adversely affected. In addition, obtaining these approvals can be a time consuming and expensive process. Our business would be materially adversely affected if we are not able to maintain favorable coverage decisions and/or fail to receive additional favorable coverage decisions from third party insurers, in particular during re-authorization processes for patients that have already initiated therapy. Our business could also be adversely affected if government health programs, private health insurers, including managed care organizations, or other reimbursing bodies or payors limit the indications for which EXONDYS 51 will be reimbursed or fail to recognize accelerated approval and surrogate endpoints as clinically meaningful.

In some foreign countries, particularly Canada and the countries of Europe, Latin America and Asia Pacific, the pricing of prescription pharmaceuticals is subject to strict governmental control. In these countries, pricing negotiations with governmental authorities can take 12 to 24 months or longer after the receipt of regulatory approval and product launch. In order to obtain favorable reimbursement for the indications sought or pricing approval in some countries, we may be required to collect additional data, including conducting additional studies. Furthermore, several European countries have implemented government measures to either freeze or reduce pricing of pharmaceutical products. If reimbursement for our products is unavailable in any country in which reimbursement is sought, limited in scope or amount, or if pricing is set at unsatisfactory levels, our business could be materially harmed. In addition, many foreign countries are referencing to other countries' official public price, hence an unsatisfactory price level in one country could consequently impinge negatively upon overall revenue.

We expect to experience pricing pressures in connection with the sale of EXONDYS 51 and our future products due to a number of factors, including current and future healthcare reforms and initiatives by government health programs and private insurers (including managed care plans) to reduce healthcare costs, the scrutiny of pharmaceutical pricing, the ongoing debates on reducing government spending and additional legislative proposals. These healthcare reform efforts or any future legislation or regulatory actions aimed at controlling and reducing healthcare costs, including through measures designed to limit reimbursement, restrict access or impose unfavorable pricing modifications on pharmaceutical products, could impact our and our partners' ability to obtain or maintain reimbursement for our products at satisfactory levels, or at all, which could materially harm our business and financial results.

Additionally, our gene therapy product candidates represent novel approaches to treatment that will call for new levels of innovation in both pricing and drug access strategies. Current reimbursement models may not accommodate the unique factors of our gene therapy product candidates, including potentially curative efficacy, high up-front costs, lack of long-term efficacy and safety data and fees associated with complex administration, dosing and patient monitoring requirements. Hence, it may be necessary to restructure approaches to payment, pricing strategies and traditional

payment models to support these therapies.

The downward pressure on healthcare costs in general has become intense. As a result, increasingly high barriers are being erected to the entry of new products. If we are unable to obtain adequate levels of reimbursement, our ability to successfully market and sell our product candidates will be harmed. The manner and level at which reimbursement is provided for services related to our product candidates (e.g., for administration of our product to patients) is also important. Inadequate reimbursement for such services may lead to physician resistance and limit our ability to market or sell our products.

Healthcare reform and other governmental and private payor initiatives may have an adverse effect upon, and could prevent commercial success of EXONDYS 51 and our other product candidates.

The U.S. government and individual states have aggressively pursued healthcare reform, as evidenced by the passing of the Healthcare Reform Act and the ongoing efforts to modify or repeal that legislation. The Healthcare Reform Act substantially changed the way healthcare is financed by both governmental and private insurers and contains a number of provisions that affect coverage and reimbursement of drug products and/or that could potentially reduce the demand for pharmaceutical products such as increasing drug rebates under state Medicaid programs for brand name prescription drugs and extending those rebates to Medicaid managed care and assessing a fee on manufacturers and importers of brand name prescription drugs reimbursed under certain government programs, including Medicare and Medicaid. Other aspects of healthcare reform, such as expanded government enforcement authority and heightened standards that could increase compliance-related costs, could also affect our business. Modifications have been implemented under the Trump Administration and additional modifications or repeal may occur. There are, and may continue to be, judicial challenges. See "GOVERNMENT REGULATION- Pharmaceutical Pricing and Reimbursement- Third Party Reimbursement and Pricing in the U.S.-Healthcare and Other Reform." We cannot predict the ultimate content, timing or effect of any changes to the Healthcare Reform Act or other federal and state reform efforts. There is no assurance that federal or state health care reform will not adversely affect our future business and financial results, and we cannot predict how future federal or state legislative, judicial or administrative changes relating to healthcare reform will affect our business.

The U.S. government, state legislatures and foreign governments have shown significant interest in implementing cost-containment programs to limit the growth of government-paid healthcare costs, including price controls, waiver from Medicaid drug rebate law requirements, restrictions on reimbursement and requirements for substitution of generic products for branded prescription drugs. We anticipate that the U.S. Congress, state legislatures and the private sector will continue to consider and may adopt healthcare policies intended to curb rising healthcare costs. These cost containment measures may include implementation or modification of:

- controls on government funded reimbursement for drugs;
- caps or mandatory discounts under certain government sponsored programs;
- controls on healthcare providers;
- challenges to the pricing of drugs or limits or prohibitions on reimbursement for specific products through other means;
- reform of drug importation laws;
- delegation of decision making to state Medicaid agencies and waiver of reimbursement requirements;
- expansion of use of managed care systems in which healthcare providers contract to provide comprehensive healthcare for a fixed cost per person; and
- prohibition on direct-to-consumer advertising or drug marketing practices.

We are unable to predict what additional legislation, regulations or policies, if any, relating to the healthcare industry or third party coverage and reimbursement may be enacted in the future or what effect such legislation, regulations or policies would have on our business. Any cost containment measures, including those listed above, or other healthcare system reforms that are adopted, could significantly decrease the available coverage and the price we might establish for EXONDYS 51 and our other potential products, which would have an adverse effect on our net revenues and operating results.

EXONDYS 51 may not be widely adopted by patients, payors or healthcare providers, which would adversely impact our potential profitability and future business prospects.

EXONDYS 51's commercial success, particularly in the near term in the U.S., depends upon its level of market adoption by patients, payors and healthcare providers. If EXONDYS 51 does not achieve an adequate level of market adoption for any reason, or if market adoption does not persist, our potential profitability and our future business prospects will be severely adversely impacted. The degree of market acceptance of EXONDYS 51 depends on a

number of factors, including:

- our ability to demonstrate to the medical community, including specialists who may purchase or prescribe EXONDYS 51, the clinical efficacy, effectiveness and safety of EXONDYS 51 as the prescription product of choice for DMD amenable to exon-51 skipping in the U.S.;
- the effectiveness of our sales and marketing organizations and distribution networks;
- the ability of patients or providers to be adequately reimbursed for EXONDYS 51 in a timely manner from government and private payors;

- the actual and perceived efficacy and safety profile of EXONDYS 51, particularly if unanticipated adverse events related to EXONDYS 51 treatment arise and create safety concerns among potential patients or prescribers or if new data and analyses we obtain for eteplirsen do not support, or are interpreted by some parties to not support, the efficacy of EXONDYS 51; and
- the efficacy and safety of our other exon-skipping product candidates, including our exon 45 and exon 53 product candidates (casimersen and golodirsen, respectively), and third parties' competitive therapies.

We may not be able to expand the global footprint of EXONDYS 51 outside of the U.S.

Even though EXONDYS 51 was approved for marketing in the U.S. and in Israel, we may not receive approval to commercialize EXONDYS 51 in additional countries. In November 2016, we submitted a MAA for eteplirsen to the EMA and the application was validated in December 2016. As we announced on June 1, 2018, the CHMP of the EMA adopted a negative opinion for eteplirsen. In September 2018, the CHMP of the EMA confirmed its negative opinion for eteplirsen, and the European Commission adopted the CHMP opinion in December 2018. We plan to seek follow up EMA scientific advice in 2019 to explore a potential approach for EMA approval of eteplirsen.

In order to market any product in a foreign country, we must comply with numerous and varying regulatory requirements for approval in those countries regarding demonstration of evidence of the product's safety and efficacy and governing, among other things, labeling, distribution, advertising, and promotion, as well as pricing and reimbursement of the product. Obtaining marketing approval in a foreign country is an extensive, lengthy, expensive and uncertain process, and the regulatory authority may reject an application or delay, limit or deny approval of eteplirsen for many reasons, including:

- we may not be able to demonstrate to the satisfaction of foreign regulatory authorities that eteplirsen is safe and effective for the treatment of patients with DMD who have a confirmed mutation in the DMD gene that is amenable to exon 51 skipping;
- the results of clinical trials may not meet the level of statistical or clinical significance required for approval by foreign regulatory authorities;
- foreign regulatory authorities may disagree with the adequacy (number, design, size, controls, conduct or implementation) of our clinical trials prior to granting approval, and we may not be able to generate the required data on a timely basis, or at all;
- regulatory authorities may conclude that data we submit to them fail to demonstrate an appropriate level of safety or efficacy of eteplirsen or that eteplirsen's clinical benefits outweigh its safety risks;
- regulatory authorities outside the U.S. may not accept data generated at our clinical trial sites or require us to generate additional data or information;
- regulatory authorities outside the U.S. may impose limitations or restrictions on the approved labeling of eteplirsen, thus limiting intended users or providing an additional hurdle for market acceptance of the product;
- regulatory authorities outside the U.S. may identify deficiencies in the manufacturing processes, or may require us to change our manufacturing process or specifications; and
- regulatory authorities outside the U.S. may adopt new or revised approval policies and regulations.

Approval procedures vary among countries, and can involve additional product testing and additional administrative review periods. The time required to obtain approval in other countries might differ significantly from that required to obtain approval in the U.S. In particular, in many foreign countries, it is required that a product receives pricing and reimbursement approval before the product can be distributed commercially. Many foreign countries undertake cost-containment measures that could affect pricing or reimbursement of eteplirsen. This can result in substantial delays, and the price that is ultimately approved in some countries may be lower than the price for which we expect to offer EXONDYS 51.

Marketing approval in one country does not ensure marketing approval in another, but a failure or delay in obtaining marketing approval in one country may have a negative effect on the approval process in others. Failure to obtain marketing approval in other countries or any delay or setback in obtaining such approval would impair our ability to develop foreign markets for eteplirsen and could adversely affect our business and financial condition. In addition,

failure to obtain approval in one country or area may affect sales under the EAP in other countries or areas. Even if we are successful in obtaining regulatory approval of eteplirsen in additional countries, our revenue earning capacity will depend on commercial and medical infrastructure, pricing and reimbursement negotiations and decisions with third party payors, including government payors.

We cannot predict whether historical revenues from eteplirsen on a named patient basis or through our EAP outside the U.S. will continue or whether we will be able to continue to distribute eteplirsen on a named patient basis or through our EAP.

In certain countries outside the U.S., reimbursement for products that have not yet received marketing authorization may be provided through national managed access programs. We have contracted with third party distributors to distribute eteplirsen in certain countries outside the U.S. on a named patient basis and launched an ex-U.S. eteplirsen EAP, which we plan to expand to other jurisdictions in the future. While we generate revenue from the distribution of eteplirsen through named patient programs and our EAP, we cannot predict whether historical revenues from these programs will continue, whether we will be able to continue to distribute our products on a named patient basis or through EAP in these countries, whether we will be able to commercialize our products in countries where the products have historically been available on a named patient basis, or whether commercial revenues will exceed revenues historically generated from sales on a named patient basis or through our EAP. Reimbursement through national early access programs may cease to be available if authorization for a named patient program and/or EAP expires or is terminated. For example, healthcare providers in EAP jurisdictions may not be convinced that their patients can benefit from eteplirsen or may prefer to wait until such time as eteplirsen is approved by a regulatory authority in their country before prescribing eteplirsen. Even if a healthcare provider is interested in obtaining access to eteplirsen for its patient through the EAP, the patient will not be able to obtain access to eteplirsen if payment for the drug is not secured.

Any failure to maintain revenues from sales of eteplirsen on a named patient basis or through our EAP and/or to generate revenues from commercial sales of eteplirsen exceeding historical sales on a named patient basis or through our EAP could have a material adverse effect on our business, financial condition, results of operations and growth prospects.

If we are unable to successfully maintain and further develop internal commercialization capabilities, sales of EXONDYS 51 may be negatively impacted.

We have hired and trained a commercial team and put in the organizational infrastructure we believe we need to support the commercial success of EXONDYS 51 in the U.S. Factors that may inhibit our efforts to maintain and further develop commercial capabilities include:

- an inability to retain an adequate number of effective commercial personnel;
- an inability to train sales personnel, who may have limited experience with our company or EXONDYS 51, to deliver a consistent message regarding EXONDYS 51 and be effective in convincing physicians to prescribe EXONDYS 51;
- an inability to equip sales personnel with compliant and effective materials, including medical and sales literature to help them educate physicians and our healthcare providers regarding EXONDYS 51 and its proper administration and educate payors on the safety, efficacy and effectiveness profile of EXONDYS 51 to support favorable coverage decisions; and
- unforeseen costs and expenses associated with maintaining and further developing an independent sales and marketing organization.

If we are not successful in maintaining an effective commercial, sales and marketing infrastructure, we will encounter difficulty in achieving, maintaining or increasing projected sales of EXONDYS 51 in the U.S., which would adversely affect our business and financial condition.

If we are unable to execute effectively our sales and marketing activities outside the U.S., we may be unable to generate sufficient product revenue.

EXONDYS 51 is our first commercial product. As a result, our sales, marketing, managerial and other non-technical capabilities are relatively new in the U.S. We have built a commercial sales force in Europe and we are currently in

the process of building commercial infrastructure in other key countries in order to be ready to launch eteplirsen with a relatively small specialty sales force in the event eteplirsen is ultimately approved in those jurisdictions. The establishment and development of our commercial infrastructure will continue to be expensive and time consuming, and we may not be able to successfully develop this capability in a timely manner or at all. We anticipate building sales, medical, marketing, managerial, distribution and other capabilities across multiple jurisdictions to prepare for potential approvals ex-U.S. Doing so will require a high degree of coordination and compliance with laws and regulations in such jurisdictions. If we are unable to effectively coordinate such activities or comply with such laws and regulations, our ability to commercialize eteplirsen in such jurisdictions will be adversely affected. Even if we are able to effectively hire a sales force and develop a marketing and sales capabilities, our sales force may not be successful in commercializing eteplirsen or any other product candidate that we develop. If we are unable to establish adequate manufacturing, sales, marketing, supply and distribution capabilities, whether independently or with third parties, we may not be able to generate product revenue and may not become profitable outside of the U.S.

If we fail to obtain or maintain regulatory exclusivity for our products, then we may not be able to protect our products from competition and our business may be adversely impacted. If a competitor obtains an authorization to market the same or substantially same product before a product of ours is authorized in a given country and is granted regulatory exclusivity, then our product may not be authorized for sale as a result of the competitor's regulatory exclusivity and as a result, our investment in the development of that product may not be returned.

In addition to any patent protection, we rely on various forms of regulatory exclusivity to protect our products. During the development of our products, we anticipate regulatory exclusivities available upon approval of our products. Implementation and enforcement of regulatory exclusivity, which may consist of regulatory data protection and market protection, varies widely from country to country. Failure to qualify for regulatory exclusivity, or failure to obtain or maintain the extent or duration of such protections that we expect in each of the markets for our products due to challenges, changes or interpretations in the law or otherwise, could affect our revenues for our products or our decision on whether to market our products in a particular country or countries or could otherwise have an adverse impact on our results of operations. We are not guaranteed to receive or maintain regulatory exclusivity for our current or future products, and if our products that are granted orphan status were to lose their status as orphan drugs or the data or marketing exclusivity provided for orphan drugs, our business and operations could be adversely affected.

Due to the nature of EXONDYS 51 and product candidate pipeline, in addition to new biologic exclusivity, orphan drug exclusivity is especially important for our products that are eligible for orphan drug designation. For eligible products, we plan to rely on orphan drug exclusivity to maintain a competitive position. If we do not have adequate patent protection for our products, then the relative importance of obtaining regulatory exclusivity is even greater. While orphan status for any of our products, if granted or maintained, would provide market exclusivity for the time periods specified above upon approval, we would not be able to exclude other companies from obtaining regulatory approval of products using the same or similar active ingredient for the same indication beyond the exclusivity period applicable to our product on the basis of orphan drug status (e.g., seven years in the U.S.). Orphan drug designation neither shortens the development time or regulatory review time of a drug, nor gives the drug any advantage in the regulatory review or approval process.

In addition, we may face risks with maintaining regulatory exclusivities for our product, and our protection may be circumvented, even if maintained. For instance, orphan drug exclusivity in the U.S. may be rescinded if (i) an alternative, competing product demonstrates clinical superiority to our product with orphan exclusivity; (ii) we are unable to assure the availability of sufficient quantities of our orphan product to meet the needs of patients. Moreover, competitors may receive approval of different drugs or biologics for indications for which our prior approved orphan product has exclusivity. Orphan drug exclusivity in Europe may be modified for several reasons, including a significant change to the orphan medicinal product designations or status criteria after-market authorization of the orphan product (e.g., product profitability exceeds the criteria for orphan drug designation), problems with the production or supply of the orphan drug, or a competitor drug, although similar, is safer, more effective or otherwise clinically superior than the initial orphan drug. Thus, we cannot guarantee that another company will not receive approval to market a product candidate that is granted orphan drug exclusivity for the same drug or similar drug and same orphan indication as any of our product candidates for which we plan to file an NDA, Biologics License Application ("BLA") or MAA. If that were to happen, any pending NDA, BLA or MAA for our product candidate for that indication may not be approved until the competing company's period of exclusivity has expired in the U.S. or the EU, as applicable.

Even though we have obtained orphan drug designation for certain of our product candidates and even if we obtain orphan drug designation for these or 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's orphan drug exclusivity period on its product expires (e.g., seven years in the U.S.). Moreover, with respect to antisense oligonucleotides and gene therapy, it is uncertain how

similarity between product candidates designed to treat the same rare disease or condition may be determined on a country-by-country basis and whether the orphan drug exclusivity of a previously approved product can block the approval of a chemically distinct product candidate under regulatory review.

The patient population suffering from DMD, LGMDs, Pompe disease and MPS IIIA is small and has not been established with precision. If the actual number of patients is smaller than we estimate, our revenue and ability to achieve profitability may be adversely affected.

DMD, LGMD, Pompe disease, CMT and MPS IIIA are rare, fatal genetic neuromuscular disorders. DMD affects an estimated one in approximately every 3,500 to 5,000 males born worldwide, of which up to 13% are estimated to be amenable to exon-51 skipping. LGMDs as a class affect an estimated range of approximately one in every 14,500 to one in every 123,000 individuals. Pompe disease affects an estimated one in approximately every 40,000 individuals. CMT is a group of peripheral nerve disorders affecting approximately one in every 2,500 individuals. CMT type 1A affects approximately 50,000 patients in the U.S. MPS IIIA affects approximately 1 in 100,000 newborns. Our estimates of the size of these patient populations are based on published studies as well as internal analyses. Various factors may decrease the market size of our product and product candidates, including the

severity of the disease, patient demographics and the response of patients' immune systems to our product candidates. If the results of these studies or our analysis of them do not accurately reflect the relevant patient population, our assessment of the market may be inaccurate, making it difficult or impossible for us to meet our revenue goals, or to obtain and maintain profitability.

We face intense competition and rapid technological change, which may result in other companies discovering, developing or commercializing competitive products.

The biotechnology and pharmaceutical industries are highly competitive and subject to significant and rapid technological change. We are aware of many pharmaceutical and biotechnology companies that are actively engaged in research and development in areas in which our product and product candidates are aimed. Some of these competitors are developing or testing product candidates that now, or may in the future, compete directly with our product or our product candidates. For example, we face competition in the field of DMD by third parties who are developing or who had once developed: (i) exon skipping product candidates, such as Wave Life Sciences (notably for exons 51 and 53), Nippon Shinyaku (notably for exon 53), Daiichi Sankyo (notably for exon 45); (ii) gene therapies that express microdystrophin or mini-dystrophin, such as Pfizer and Solid Biosciences; (iii) CRISPR/Cas 9 approaches, such as Exonics Therapeutics and Editas Medicine; (iv) other disease modifying approaches, such as PTC Therapeutics, which has a small molecule candidate, ataluren, that targets nonsense mutations; and (v) other approaches that may be palliative in nature or potentially complementary with our product and product candidates and that are being developed by Santhera, Summit, Catabasis, Pfizer, Fibrogen and Tivorsan. Although BioMarin announced on May 31, 2016 its intent to discontinue clinical and regulatory development of drisapersen as well as its other clinical stage candidates, BMN 044, BMN 045 and BMN 053, then-currently in Phase 2 studies for distinct forms of DMD, it further announced its intent to continue to explore the development of next generation oligonucleotides for the treatment of DMD.

In addition, we are aware of many pharmaceutical and biotechnology companies that are actively engaged in research and development using platform technologies that may be viewed as competing with ours beyond and including those companies mentioned immediately above, such as Alnylam Pharmaceuticals, Inc., Ionis Pharmaceuticals, Inc., Roche Innovation Center Copenhagen (formerly Santaris Pharma A/S), Shire plc (now Takeda), Biogen, Sanofi Additionally, several companies and institutions have entered into collaborations or other agreements for the development of product candidates, including mRNA, gene therapy and gene editing (CRIPSR and AAV, among others) and small molecule therapies that are potential competitors for therapies being developed in the muscular dystrophy, neuromuscular and rare disease space, including, but not limited to, Biogen Inc., Ionis, Alexion Pharmaceuticals, Inc., Sanofi, Shire (now Takeda), Eli Lilly, Alnylam Pharmaceuticals, Inc., Moderna Therapeutics, Inc., Summit, Akashi, Catabasis, Capricor Therapeutics, Oxford University, Exonics Therapeutics, and Editas Medicine.

If any of our competitors are successful in obtaining regulatory approval for any of their product candidates, it may limit our ability to enter into the market, gain market share or maintain market share in the DMD space or other diseases targeted by our platform technologies, product and product candidate pipeline.

It is possible that our competitors will succeed in developing technologies that limit the market size for our product or product candidates, impact the regulatory approval and post-marketing process for our product and product candidates, are more effective than our product candidates or would render our technologies obsolete or noncompetitive. Our competitors may, among other things:

- develop safer or more effective products;
- implement more effective approaches to sales and marketing;
- develop less costly products;
- obtain regulatory approval more quickly;
- have access to more manufacturing capacity;

- develop products that are more convenient and easier to administer;
- form more advantageous strategic alliances; or
- establish superior intellectual property positions.

We may engage in future acquisitions or collaborations with other entities that complement or expand our business. We may not be able to complete such transactions, and such transactions, if executed, may increase our capital requirements, dilute our stockholders, cause us to incur debt or assume contingent liabilities and subject us to other risks.

In order to achieve our long-term business objectives, we actively evaluate various strategic transactions on an ongoing basis, including licensing or acquiring complementary products, technologies or businesses. We may face competition from other companies

in pursuing acquisitions and similar transactions in the biotechnology industry. This competition is most intense for approved drugs and late-stage drug candidates, which have the lowest risk and would have the most immediate effect on our financial performance. Our ability to complete transactions may also be limited by applicable antitrust and trade regulation laws and regulations in the U.S. and foreign jurisdictions in which we or the operations or assets we seek to acquire carry on business.

To the extent that we are successful in undertaking acquisitions or collaborations with other entities, we may not realize the anticipated benefits of such transaction, each of which involves numerous risks, including:

- failure to successfully develop the acquired or licensed drugs or technology or to achieve strategic objectives, including successfully developing and commercializing the drugs, drug candidates or technologies that we acquire or license;
- entry into markets in which we have no or limited direct prior experience or where competitors in such markets have stronger market positions;
- disruption of our ongoing business, distraction of our management and employees from other opportunities and challenges and retention of key employees;
- potential failure of the due diligence processes to identify significant problems, liabilities or other shortcomings or challenges of an acquired company, or acquired or licensed product or technology, including but not limited to, problems, liabilities or other shortcomings or challenges with respect to intellectual property, product quality, safety, accounting practices, employee, customer or third party relations and other known and unknown liabilities;
- liability for activities of the acquired company or licensor before the acquisition or license, including intellectual property infringement claims, violations of laws, commercial disputes, tax liabilities, and other known and unknown liabilities;
- exposure to litigation or other claims in connection with, or inheritance of claims or litigation risk as a result of an acquisition or license, including but not limited to, claims from terminated employees, customers, former equity holders or other third-parties;
- difficulty in integrating the drugs, drug candidates, technologies, business operations and personnel of an acquired asset or company; and
- difficulties in the integration of the acquired company’s departments, systems, including accounting, human resource and other administrative systems, technologies, books and records, and procedures, as well as in maintaining uniform standards, controls, including internal control over financial reporting required by the Sarbanes-Oxley Act of 2002 and related procedures and policies.

In addition, even if we achieve the long-term benefits associated with strategic transactions, our expenses and short-term costs may increase materially and adversely affect our liquidity and short-term net income (loss). Future licenses or acquisitions could result in potentially dilutive issuances of equity securities, the incurrence of debt, the creation of contingent liabilities, impairment expenses related to goodwill, and impairment or amortization expenses related to other intangible assets, which could harm our financial condition.

Risks Related to the Development of our Product Candidates

We may find it difficult to enroll patients in our clinical trials, which could delay or prevent clinical trials of our product candidates.

Identifying and qualifying patients to participate in clinical trials of our product candidates is critical to our success. The timing of our clinical trials depends on the speed at which we can recruit eligible patients to participate in testing our product candidates. We have experienced delays in some of our clinical trials, and we may experience similar delays in the future. These delays could result in increased costs, delays in advancing our product development, delays in testing the effectiveness of our technology or termination of the clinical trials altogether.

We may not be able to identify, recruit and enroll a sufficient number of patients, or those with required or desired characteristics to achieve diversity in a study, to complete our clinical trials in a timely manner. Patient enrollment is

affected by factors including:

- design of the study protocol;
- size of the patient population;
- eligibility criteria for the study in question;
- manufacturing of product candidates;

- perceived risks and benefits of the product candidate under study, including as a result of adverse effects observed in similar or competing therapies;
- proximity and availability of clinical trial sites for prospective patients;
- availability of competing therapies and clinical trials;
- efforts to facilitate timely enrollment in clinical trials;
- patient referral practices of physicians;
- activities of patient advocacy groups;
- ability to monitor patients adequately during and after treatment; and
- severity of the disease under investigation.

In particular, each of the conditions for which we plan to evaluate our product candidates are rare genetic diseases with limited patient pools from which to draw for clinical trials. Further, because newborn screening for these diseases is not widely adopted, and it can be difficult to diagnose these diseases in the absence of a genetic screen, we may have difficulty finding patients who are eligible to participate in our studies. The eligibility criteria of our clinical trials will further limit the pool of available study participants. Additionally, the process of finding and diagnosing patients may prove costly. The treating physicians in our clinical trials may also use their medical discretion in advising patients enrolled in our clinical trials to withdraw from our studies to try alternative therapies.

We may not be able to initiate or continue clinical trials if we cannot enroll a sufficient number of eligible patients to participate in the clinical trials required by the FDA or the EMA or other regulatory agencies. Our ability to successfully initiate, enroll and complete a clinical trial in any foreign country is subject to numerous risks unique to conducting business in foreign countries, including:

- difficulty in establishing or managing relationships with contract research organizations ("CROs") and physicians;
- different standards for the conduct of clinical trials;
- our inability to locate qualified local consultants, physicians and partners; and
- the potential burden of complying with a variety of foreign laws, medical standards and regulatory requirements, including the regulation of pharmaceutical and biotechnology products and treatment.

If we have difficulty enrolling a sufficient number of patients to conduct our clinical trials as planned, we may need to delay, limit or terminate ongoing or planned clinical trials, any of which would have an adverse effect on our business.

Failures or delays in the commencement or completion of our ongoing and planned clinical trials of our product candidates could cause us not to meet our expected timelines or result in increased costs to us, and could delay, prevent or limit our ability to gain regulatory approval of any product candidate and to generate revenue and continue our business.

Successful completion of clinical trials at each applicable stage of development is a prerequisite to submitting a marketing application to the regulatory agencies and, consequently, the ultimate approval and commercial marketing of any of our product candidates for the indications in which we develop them. We do not know whether any of our clinical trials will begin or be completed, and results announced, as planned or expected, if at all, as the commencement and completion of clinical trials and announcement of results can be delayed or prevented for a number of reasons, including, among others:

- denial by the regulatory agencies of permission to proceed with our planned clinical trials or any other clinical trials we may initiate, or placement of a clinical trial on hold;
- delays in filing or receiving approvals of additional INDs that may be required;
- negative results from our ongoing non-clinical trials or clinical trials;
- challenges in identifying, recruiting, enrolling and retaining patients to participate in clinical trials
- timely and effectively contract with (under reasonable terms), manage and work with investigators, institutions, hospitals and the CROs involved in the clinical trial;
- negotiate contracts and other related documents with clinical trial parties and institutional review boards, such as informed consents, CRO agreements and site agreements, which can be subject to extensive negotiations that could

cause

- significant delays in the clinical trial process, with terms possibly varying significantly among different trial sites and CROs and possibly subjecting the Company to various risks;
- inadequate quantity or quality of supplies of a product candidate or other materials necessary to conduct clinical trials, for example as a result of delays in defining and implementing the manufacturing process for materials used in pivotal trials or for the manufacture of larger quantities or other delays or issues arising in the manufacturing of sufficient supply of finished drug product;
- difficulties obtaining IRB approval, and equivalent approval for sites outside the U.S., to conduct a clinical trial at a prospective site or sites;
- ensure adherence to trial designs and protocols agreed upon and approved by regulatory authorities and applicable legal and regulatory guidelines;
- delays or problems in analyzing data, or the need for additional analysis or data or the need to enroll additional patients;
- the occurrence of serious adverse events or unexpected drug-related side effects experienced by patients in a clinical trial or unexpected results in ongoing non-clinical trials;
- delays in validating endpoints utilized in a clinical trial;
- our inability to satisfy the requirements of the regulatory agencies to commence clinical trials, including CMC requirements, or other regulatory requirements prior to the initiation of a clinical trial;
- the regulatory agencies disagreeing with our clinical trial design and our interpretation of data from clinical trials, or changing the requirements for approval even after the regulatory authority has reviewed and commented on the design for our clinical trials;
- reports from non-clinical or clinical testing of competing therapies that raise safety or efficacy concerns; and
- the recruitment and retention of employees, consultants or contractors with the required level of expertise.

Any inability to successfully complete preclinical and clinical development could result in additional costs to us or impair our ability to generate revenues from product sales, regulatory and commercialization milestones and royalties. In addition, if we make manufacturing or formulation changes to our product candidates, we may need to conduct additional studies to demonstrate comparability of our modified product candidates to earlier versions. Clinical study delays could also shorten any periods during which we may have the exclusive right to commercialize our product candidates or allow our competitors to bring products to market before we do, which could impair our ability to successfully commercialize our product candidates and may harm our business and results of operations.

Results from pre-clinical and early stage clinical trials may not be indicative of efficacy in late stage clinical trials, and our pre-clinical and clinical trials may fail to demonstrate acceptable levels of safety, efficacy, and quality of our product candidates, which could prevent or significantly delay their regulatory approval.

To obtain the requisite regulatory approvals to market and sell any of our product candidates, we must demonstrate, through extensive pre-clinical and clinical trials, that the product candidate is safe and effective in humans. Ongoing and future pre-clinical and clinical trials of our product candidates may not show sufficient safety, efficacy or adequate quality to obtain or maintain regulatory approvals. For example, although we believe the pre-clinical data for PPMO SRP-5051 collected to date is positive, the additional data we collect, including in the clinic, may not be consistent with the pre-clinical data or show a safe benefit that warrants further development or pursuit of a regulatory approval for PPMO product candidates.

Furthermore, success in pre-clinical and early clinical trials does not ensure that the subsequent trials will be successful, nor does it predict final results of a confirmatory trial. Some of our clinical trials were conducted with small patient populations and were not blinded or placebo-controlled, making it difficult to predict whether the favorable results that we observed in such trials will be repeated in larger and more advanced clinical trials. For example, on October 3, 2018, Nationwide presented positive results from a Phase 1/2a micro-dystrophin gene therapy clinical trial in four individuals with DMD enrolled in the trial. In addition, on February 27, 2019, we announced positive expression and biomarker data from the first three-patient cohort dosed in the MYO-101 gene therapy trial to treat LGMD type 2E, or beta-sarcoglycanopathy. The early data is based on small patient samples and therefore may not be predictive of future results. In addition, we cannot assure that the results of additional data or data from any

future trial will yield results that are consistent with the early data presented, that we will be able to demonstrate the safety and efficacy of AAVrh.74, that later trial results will support further development, or even if such later results are favorable, that we will be able to successfully complete the development of, obtain accelerated, conditional or standard regulatory approval for, or successfully commercialize AAVrh74.MHCK7.micro-Dystrophin. Similarly, we cannot provide assurances that data from our studies with respect to EXONDYS 51, golodirsen, casimersen and other gene therapy-based product candidates will be positive and consistent through the study periods

or that the interpretation by regulators, such as the FDA or EMA, of the data we collect for our product or product candidates will be consistent with our interpretations.

Our product candidates may cause undesirable side effects or have other properties that could delay or prevent regulatory approval of product candidates, limit the commercial potential or result in significant negative consequences following any potential marketing approval.

Our product candidates may cause undesirable side effects. In addition to side effects caused by product candidates, the administration process or related procedures also can cause adverse side effects. If any such adverse events occur in our trials, we may decide, or the FDA, the EMA or other regulatory authorities could order us, to halt, delay or amend preclinical development or clinical development of our product candidates or we may be unable to receive regulatory approval of our product candidates for any or all targeted indications. Even if we are able to demonstrate that all future serious adverse events are not product-related, such occurrences could affect patient recruitment or the ability of enrolled patients to complete the trial. Moreover, if we elect, or are required, to delay, suspend or terminate any clinical trial of any of our product candidates, the commercial prospects of such product candidates may be harmed and our ability to generate product revenues from any of these product candidates may be delayed or eliminated. Any of these occurrences may harm our ability to develop other product candidates and may harm our business, financial condition and prospects significantly.

Our gene therapy product candidates may be perceived as unsafe or may result in unforeseen adverse events. Negative public opinion and increased regulatory scrutiny of gene therapy may damage public perception of the safety of our gene therapy product candidates and harm our ability to conduct our business or obtain regulatory approvals for our gene therapy product candidates.

Gene therapy remains a newly applied technology, with only a few gene therapy products approved to date in the U.S., the EU or elsewhere. Public perception may be influenced by claims that gene therapy is unsafe, and gene therapy may not gain the acceptance of the public or the medical community. In particular, our success will depend upon physicians who specialize in the treatment of genetic diseases targeted by our product candidates, prescribing treatments that involve the use of our product candidates in lieu of, or in addition to, existing treatments with which they are familiar and for which greater clinical data may be available.

In addition, ethical, social and legal concerns about gene therapy, genetic testing and genetic research could result in additional regulations or prohibiting the processes we may use. Federal and state agencies, congressional committees and foreign governments have expressed their intentions to further regulate biotechnology. More restrictive regulations or claims that our product candidates are unsafe or pose a hazard could prevent us from commercializing any products. New government requirements may be established that could delay or prevent regulatory approval of our product candidates under development. It is impossible to predict whether legislative changes will be enacted, regulations, policies or guidance changed, or interpretations by agencies or courts changed, or what the impact of such changes, if any, may be.

More restrictive government regulations or negative public opinion would harm our business, financial condition, results of operations and prospects and may delay or impair the development and commercialization of our gene therapy product candidates or demand for any products we may develop. For example, earlier gene therapy trials led to several well-publicized adverse events, including death. Serious adverse events related to clinical trials we, our strategic partners or other companies conduct, even if such adverse events are not ultimately attributable to the relevant product candidates or products, may result in increased government regulation, unfavorable public perception, potential regulatory delays in the testing or approval of our product candidates, stricter labeling requirements for those product candidates that are approved and a decrease in demand for any such product candidates.

If there are significant delays in obtaining or we are unable to obtain or maintain required regulatory approvals, we will not be able to commercialize our product candidates in a timely manner or at all, which could impair our ability to generate sufficient revenue and have a successful business.

The research, testing, manufacturing, labeling, approval, commercialization, marketing, selling and distribution of drug products are subject to extensive regulation by applicable local, regional and national regulatory authorities and regulations may differ from jurisdiction to jurisdiction. In the U.S., approvals and oversight from federal (e.g., FDA), state and other regulatory authorities are required for these activities. Sale and marketing of our product candidates in the U.S. or other countries is not permitted until we obtain the required approvals from the applicable regulatory authorities. Of the large number of drugs in development in the biopharmaceutical industry, only a small percentage result in the submission of a marketing application to the FDA or an MAA to the EMA and even fewer are approved for commercialization.

Our ability to obtain the government or regulatory approvals required to commercialize any of our product candidates in any jurisdiction, including in the U.S. or the EU, cannot be assured, may be significantly delayed or may never be achieved for various reasons including the following:

- Our non-clinical, clinical, chemistry, manufacturing and controls and other data and analyses from past, current and future studies for any of our product candidates may not be sufficient to meet regulatory requirements for marketing application approvals. The regulatory authorities could disagree with our interpretations and conclusions regarding data we provide in connection with NDA, BLA or MAA submissions for one or more of our product candidates, and may delay, reject or refuse to accept for review, or approve any submission we make or identify additional requirements for product approval to be submitted upon completion, if ever. In addition, in the U.S., an FDA advisory committee could determine that our data are insufficient to provide a positive recommendation for approval of any NDA or BLA we submit to the FDA. Even if we meet FDA requirements and an advisory committee votes to recommend approval of an NDA or BLA submission, the FDA could still disagree with the advisory committee's recommendation and deny approval of a product candidate based on their review.
- The regulatory approval process for product candidates targeting orphan diseases, such as DMD, that use new technologies and processes, such as antisense oligonucleotide therapies, gene therapy and other alternative approaches or endpoints for the determination of efficacy is uncertain due to, among other factors, evolving interpretations of a new therapeutic class, the broad discretion of regulatory authorities, lack of precedent, small safety databases, varying levels of applicable expertise of regulators or their advisory committees, scientific developments, changes in the competitor landscape, shifting political priorities and changes in applicable laws, rules or regulations and interpretations of the same. As a result of uncertainty in the approval process for products intended to treat serious rare diseases, we may not be able to anticipate, prepare for or satisfy requests or requirements from regulatory authorities, including completing and submitting planned NDAs, BLAs and MAAs for our product candidates, in a timely manner, or at all. Examples of such requests or requirements could include, but are not limited to, conducting additional or redesigned trials and procedures (e.g., additional safety data, patient muscle biopsies, dystrophin analyses and using different assays), repeating or completing additional analysis of our data, or providing additional supportive data. In addition, in the U.S., an FDA advisory committee or regulators may disagree with our data analysis, interpretations and conclusions at any point in the approval process, which could negatively impact the approval of our NDA or BLA or result in a decision by the Company not to proceed with an NDA or BLA submission for a product candidate based on feedback from regulators.
- We may not have the resources required to meet regulatory requirements and successfully navigate what is generally a lengthy, expensive and extensive approval process for commercialization of drug product candidates.

Any failure on our part to respond to these requirements in a timely and satisfactory manner could significantly delay or negatively impact confirmatory study timelines and/or the development plans we have for golodirsen, casimersen, PPMO, gene therapy-based product candidates or other product candidates. Responding to requests from regulators and meeting requirements for clinical trials, submissions and approvals may require substantial personnel, financial or other resources, which, as a small biopharmaceutical company, we may not be able to obtain in a timely manner or at all. In addition, our ability to respond to requests from regulatory authorities that involve our agents, third party vendors and associates may be complicated by our own limitations and those of the parties we work with. It may be difficult or impossible for us to conform to regulatory guidance or successfully execute our product development plans in response to regulatory guidance, including guidance related to clinical trial design with respect to any NDA, BLA or MAA submissions.

Even if our product candidates demonstrate safety and efficacy in clinical studies, the regulatory agencies may not complete their review processes in a timely manner, or we may not be able to obtain regulatory approval. Additional delays may result if an FDA Advisory Committee or other regulatory advisory group or authority recommends non-approval or restrictions on approval. In addition, we may experience delays or rejections based upon additional government regulation from future legislation or administrative action, or changes in regulatory agency policy during the period of product development, clinical studies and the review process. Regulatory agencies also may approve a treatment candidate for fewer or more limited indications than requested or may grant approval subject to the performance of post-marketing studies. Finally, regulatory agencies may not approve the labeling claims that are

necessary or desirable for the successful commercialization of our treatment candidates. Even after approval and commercialization of a product candidate, we remain subject to ongoing regulatory compliance and oversight to maintain our approval. Conducting our confirmatory studies could take years to complete, could yield negative or uninterpretable results or could result in an FDA determination that the studies do not provide the safety and efficacy requirements to maintain regulatory approval. If we or any of our strategic partners are unable to develop, or obtain regulatory approval for, or, if approved, maintain regulatory compliance and successfully commercialize, our product candidates, our business will be materially harmed.

We are investing significant resources in the development of our novel gene therapy product candidates. Only a few gene therapy products have been approved in the U.S. and EU. If we are unable to show the safety and efficacy of these product

candidates, experience delays in doing so or are unable to successfully commercialize at least one of these drugs, our business would be materially harmed.

We are investing significant resources in the development of our gene therapy product candidates. We believe that a significant portion of the long-term value attributed to our company by investors is based on the commercial potential of these product candidates. There can be no assurance that any development problems we experience in the future related to our gene therapy programs will not cause significant delays or unanticipated costs, or that such development problems can be solved. Initial results from ongoing clinical trials may differ materially from final results from such clinical trials. The results from preclinical and early clinical studies do not always accurately predict results in later, large-scale clinical trials. We may also experience delays in developing a sustainable, reproducible and commercial-scale manufacturing process or transferring that process to commercial partners, which may prevent us from completing our clinical trials or commercializing our products on a timely or profitable basis, if at all.

In addition, the clinical trial requirements of the FDA, the EMA, and other regulatory agencies and the criteria these regulators use to determine the safety and efficacy of a product candidate vary substantially according to the type, complexity, novelty and intended use and market of the potential products. The regulatory approval process for novel product candidates such as ours can be more expensive and take longer than for other, better known or more extensively studied pharmaceutical or other product candidates. Currently, only a few gene therapy products have been approved in the Western world. Novartis's and Gilead's CAR-T therapies both received approval from the FDA in 2017. Given the few precedents of approved gene therapy products, 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 the U.S., the EU or other jurisdictions. Approvals by the EMA and the European Commission may not be indicative of what the FDA may require for approval.

Regulatory requirements governing gene therapy products have evolved and may continue to change in the future. For example, on July 11, 2018, the FDA released draft guidance documents intended to reflect recent advances in the field, and to update the framework for the development, review and approval of gene therapies. These draft guidance documents pertain to the development of gene therapies for the treatment of specific disease categories, including rare diseases, and to manufacturing and long-term follow up issues relevant to gene therapy, among other topics. Furthermore, the FDA has established the Office of Cellular, Tissue and Gene Therapies within its Center for Biologics Evaluation and Research, or CBER, to consolidate the review of gene therapy and related products, and the Cellular, Tissue and Gene Therapies Advisory Committee to advise CBER on its review. Gene therapy clinical trials conducted at institutions that receive funding for recombinant DNA research from the U.S. National Institutes of Health ("NIH"), are also subject to review by the NIH Office of Biotechnology Activities' Recombinant DNA Advisory Committee ("RAC"). Although the FDA decides whether individual gene therapy protocols may proceed, the RAC review process can impede the initiation of a clinical trial, even if the FDA has reviewed the study and approved its initiation. Clinical trial sites in the U.S. that receive NIH funding for research involving recombinant or synthetic nucleic acid molecules are required to follow RAC recommendations, or risk losing NIH funding for such research or needing NIH pre-approval before conducting such research. In addition, the FDA can put an IND, on clinical hold if the information in an IND is not sufficient to assess the risks in pediatric patients. Before a clinical trial can begin at any institution, that institution's institutional review board ("IRB"), and its Institutional Biosafety Committee will have to review the proposed clinical trial to assess the safety of the study. Moreover, serious adverse events or developments in clinical trials of gene therapy product candidates conducted by others may cause the FDA or other regulatory bodies to initiate a clinical hold on our clinical trials or otherwise change the requirements for approval of any of our product candidates.

These regulatory review agencies, committees and advisory groups 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 these treatment candidates or lead to significant post-approval studies, limitations or restrictions. As we advance our product candidates, we will be required to consult with these regulatory and advisory groups and

comply with applicable requirements and guidelines. If we fail to do so, we may be required to delay or discontinue development of our product candidates.

If the anticipated or actual timing of marketing approvals for our gene therapy product candidates, or the market acceptance of these product candidates, if approved, including treatment reimbursement levels agreed to by third-party payors, do not meet the expectations of investors or public market analysts, the market price of our common stock would likely decline.

Because we are developing product candidates for the treatment of certain diseases in which there is little clinical experience and we are using new endpoints or methodologies, there is increased risk that the FDA, the EMA or other regulatory

authorities may not consider the endpoints of our clinical trials to provide clinically meaningful results and that these results may be difficult to analyze.

During the FDA review process, we will need to identify success criteria and endpoints such that the FDA will be able to determine the clinical efficacy and safety profile of our product candidates. As we are developing novel treatments for diseases in which there is little clinical experience with new endpoints and methodologies, such as gene therapy, there is heightened risk that the FDA, the EMA or other regulatory bodies may not consider the clinical trial endpoints to provide clinically meaningful results (reflecting a tangible benefit to patients). In addition, the resulting clinical data and results may be difficult to analyze. Even if the FDA does find our success criteria to be sufficiently validated and clinically meaningful, we may not achieve the pre-specified endpoints to a degree of statistical significance. Different methodologies, assumptions and applications we utilize to assess particular safety or efficacy parameters may yield different statistical results. Even if we believe the data collected from clinical trials of our product candidates are promising, these data may not be sufficient to support approval by the FDA or foreign regulatory authorities. Pre-clinical and clinical data can be interpreted in different ways. Accordingly, the FDA or foreign regulatory authorities could interpret these data in different ways from us or our partners, which could delay, limit or prevent full or accelerated regulatory approval.

If our study data do not consistently or sufficiently demonstrate the safety or efficacy of any of our product candidates, the regulatory approvals for such product candidates could be significantly delayed as we work to meet approval requirements, or, if we are not able to meet these requirements, such approvals could be withheld or withdrawn.

Fast track product, breakthrough therapy, priority review, or Regenerative Medicine Advanced Therapy (“RMAT”) designation by the FDA, or access to the PRIME scheme by the EMA, for our product candidates may not lead to faster development or regulatory review or approval process, and it does not increase the likelihood that our product candidates will receive marketing approval.

We may seek fast track, breakthrough therapy designation, RMAT designation, PRIME scheme access or priority review designation for our product candidates if supported by the results of clinical trials. A fast track product designation is designed to facilitate the clinical development and expedite the review of drugs intended to treat a serious or life-threatening condition which demonstrate the potential to address an unmet medical need. A breakthrough therapy is defined as a drug that is intended, alone or in combination with one or more other drugs, 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, such as substantial treatment effects observed early in clinical development. A RMAT designation is designed to accelerate approval for regenerative advanced therapies such as our gene therapy product candidates. Priority review designation is intended to speed the FDA marketing application review timeframe for drugs that treat a serious condition and, if approved, would provide a significant improvement in safety or effectiveness. PRIME is a scheme provided by the EMA to enhance support for the development of medicines that target an unmet medical need.

For drugs and biologics that have been designated as fast track products or breakthrough therapies, or granted access to the PRIME schema, interaction and communication between the regulatory agency and the sponsor of the trial can help to identify the most efficient path for clinical development. Sponsors of drugs with fast track products or breakthrough therapies may also be able to submit marketing applications on a rolling basis, meaning that the FDA may review portions of a marketing application before the sponsor submits the complete application to the FDA, if the sponsor pays the user fee upon submission of the first portion of the marketing application. For products that receive a priority review designation, the FDA's marketing application review goal is shortened to six months, as opposed to ten months under standard review. This review goal is based on the date the FDA accepts the marketing application for review, this application validation period typically adds approximately two months to the timeline for review and decision from the date of submission. RMAT designations will accelerate approval but the exact mechanisms have not yet been announced by FDA.

Designation as a fast track product, breakthrough therapy, RMAT, PRIME, or priority review product is within the discretion of the regulatory agency. Accordingly, even if we believe one of our product candidates meets the criteria for designation as a fast track product, breakthrough therapy, RMAT, PRIME, or priority review product, the agency may disagree and instead determine not to make such designation. In any event, the receipt of such a designation for a product candidate may not result in a faster development process, review or approval compared to drugs considered for approval under conventional regulatory procedures and does not assure ultimate marketing approval by the agency. In addition, regarding fast track products and breakthrough therapies, the FDA may later decide that the products no longer meet the conditions for qualification as either a fast track product, RMAT, or a breakthrough therapy or, for priority review products, decide that period for FDA review or approval will not be shortened.

We may not be able to advance all of our programs, and we may use our financial and human resources to pursue particular programs and fail to capitalize on programs that may be more profitable or for which there is a greater likelihood of success.

As of December 31, 2018, our pipeline included 25 programs in various stages of development for a broad range of diseases and disorders. We plan to expand our pipeline in 2019 through internal research and development and through strategic transactions. Because we have limited resources, we may not be able to advance all of our programs. We may also forego or delay pursuit of opportunities with certain programs or for indications that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities. Our spending on current and future research and development programs for product candidates may not yield any commercially viable products. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through strategic collaboration, licensing or other royalty arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate, or we may allocate internal resources to a product candidate in a therapeutic area in which it would have been more advantageous to enter into a partnering arrangement.

Risks Related to Third Parties

If we are unable to maintain our agreements with third parties to distribute EXONDYS 51 to patients, our results of operations and business could be adversely affected.

We rely on third parties to commercially distribute EXONDYS 51 to patients in the U.S. We have contracted with a third-party logistics company to warehouse EXONDYS 51 and with distributors and specialty pharmacies to sell and distribute it to patients. A specialty pharmacy is a pharmacy that specializes in the dispensing of medications for complex or chronic conditions that require a high level of patient education and ongoing management.

This distribution network requires significant coordination with our sales and marketing and finance organizations. In addition, failure to coordinate financial systems could negatively impact our ability to accurately report product revenue from EXONDYS 51. If we are unable to effectively manage the distribution process, the sales of EXONDYS 51, as well as any future products we may commercialize, could be delayed or severely compromised and our results of operations may be harmed.

In addition, the use of third parties involves certain risks, including, but not limited to, risks that these organizations will:

- not provide us with accurate or timely information regarding their inventories, the number of patients who are using EXONDYS 51 or serious adverse events and/or product complaints regarding EXONDYS 51;
- not effectively sell or support EXONDYS 51;
- reduce or discontinue their efforts to sell or support EXONDYS 51;
- not devote the resources necessary to sell EXONDYS 51 in the volumes and within the time frame we expect;
- be unable to satisfy financial obligations to us or others; or
- cease operations.

Any such events may result in decreased product sales, lower product revenue, loss of revenue, and/or reputational damage, which would harm our results of operations and business.

With respect to the pre-commercial distribution of eteplirsen to patients outside of the U.S., we have contracted with third party distributors and service providers to distribute eteplirsen in certain countries on a named patient basis and through our EAP. We will need to continue building out our network for commercial distribution in jurisdictions in which eteplirsen is approved, which will also require third party contracts. The use of distributors and service providers involves certain risks, including, but not limited to, risks that these organizations will not comply with

applicable laws and regulations, or not provide us with accurate or timely information regarding serious adverse events and/or product complaints regarding eteplirsen. Any such events may result in regulatory actions that may include suspension or termination of the distribution and sale of eteplirsen in a certain country, loss of revenue, and/or reputational damage, which could harm our results of operations and business.

We rely on third parties to conduct some aspects of our early stage research and pre-clinical and clinical development. The inadequate performance by or loss of any of these third parties could affect the development and commercialization of our product candidate development.

We have relied upon, and plan to continue to rely upon, third parties to conduct some aspects of our early stage research and pre-clinical and clinical development with respect to certain of our product candidates, including our follow-on exon-skipping product candidates, PPMO and gene therapy product candidates. Our third-party collaborators may not commit sufficient resources or adequately develop our programs for these candidates. If our third-party collaborators fail to commit sufficient resources to any of our product candidates or to carry out their contractual duties or obligations, our programs related to any particular product candidate could be delayed, terminated, or unsuccessful. Furthermore, if we fail to make required payments to these third-party collaborators, including up-front, milestone, reimbursement or royalty payments, or to observe other obligations in our agreements with them, these third parties may not be required to perform their obligations under our respective agreements with them and may have the right to terminate such agreements.

We also have relied upon and plan to continue to rely upon third-party CROs to monitor and manage data for our ongoing pre-clinical and clinical programs. We rely on these parties for execution of our pre-clinical and clinical trials, and we control only certain aspects of their activities. Nevertheless, we are responsible for ensuring that each of our studies is conducted in accordance with the applicable protocol and legal, regulatory and scientific standards, and our reliance on collaborators and CROs does not relieve us of our regulatory responsibilities.

The individuals at our third-party collaborators and CROs who conduct work on our behalf, including their sub-contractors, are not always our employees, and although we participate in the planning of our early stage research and pre-clinical and clinical programs, we cannot control whether or not they devote sufficient time and resources or exercise appropriate oversight of these programs, except for remedies available to us under our agreements with such third parties. If our collaborators and CROs do not successfully carry out their contractual duties or obligations or if the quality or accuracy of the data they obtain is compromised due to the failure to adhere to our pre-clinical and clinical protocols, regulatory requirements or for other reasons, our clinical trials may be extended, delayed or terminated, and we may not be able to obtain regulatory approval for or successfully commercialize our product candidates. As a result, our results of operations and the commercial prospects for our product candidates would be harmed, our costs could increase and our ability to generate revenues could be delayed.

Our reliance on third parties requires us to share our proprietary information, which increases the possibility that a competitor will discover them or that our proprietary information will be misappropriated or inadvertently disclosed.

The use of third-party service providers requires us to disclose our proprietary information to these parties, which could increase the risk that a competitor will discover this information or that this information will be misappropriated or disclosed without our intent to do so. Furthermore, if these third parties cease to continue operations and we are not able to quickly find a replacement provider or we lose information or items associated with our product candidates, our development programs may be delayed. Although we carefully manage our relationships with our third-party collaborators and CROs, there can be no assurance that we will not encounter challenges or delays in the future or that these delays or challenges will not have a material adverse impact on our business, financial condition and prospects.

Risks Related to Manufacturing

We currently rely on third parties to manufacture EXONDYS 51 and to produce our product candidates; our dependence on these parties, including any inability on our part to accurately anticipate product demand and timely secure manufacturing capacity to meet commercial, EAP, clinical and pre-clinical product demand may impair the availability of product to successfully support various programs, including research and development and the potential commercialization of our product candidates.

We currently do not have the internal ability to undertake the manufacturing process for EXONDYS 51 or our product candidates in the quantities needed to meet commercial, clinical or early access programs demand for eteplirsen, or to conduct our research and development programs and conduct clinical trials for our product candidates. Therefore, we rely on, and expect to continue relying on for the foreseeable future, a limited number of third parties to manufacture and supply materials (including raw materials and subunits), API and drug product, as well as to perform additional steps in the manufacturing process, such as labeling and packaging of vials and storage of EXONDYS 51 and our product candidates. There are a limited number of third parties with facilities and capabilities suited for the manufacturing process of EXONDYS 51 and our product candidates, which creates a heightened risk that we may not be able to obtain materials and APIs in the quantity and purity that we require.

In addition, the process for adding new manufacturing capacity can be lengthy and could cause delays in our development efforts. Any interruption of the development or operation of those facilities due to, among other reasons, events such as order delays for equipment or materials, equipment malfunction, quality control and quality assurance issues, regulatory delays and possible

negative effects of such delays on supply chains and expected timelines for product availability, production yield issues, shortages of qualified personnel, discontinuation of a facility or business or failure or damage to a facility by natural disasters such as earthquake or fire, could result in the cancellation of shipments, loss of product in the manufacturing process or a shortfall in available EXONDYS 51, product candidates or materials.

If these third parties were to cease providing quality manufacturing and related services to us, and we are not able to engage appropriate replacements in a timely manner, our ability to manufacture EXONDYS 51 or our product candidates in sufficient quality and quantity required for our planned commercial, pre-clinical and clinical or early access programs use of eteplirsen would adversely affect our various product research, development and commercialization efforts.

Furthermore, any problems in our manufacturing process or the facilities with which we contract could make us a less attractive collaborator for potential partners, including larger pharmaceutical companies and academic research institutions, which could limit our access to additional attractive development programs. Problems in third-party manufacturing processes or facilities also could restrict our ability to meet market demand for our products.

We have, through our third-party manufacturers, produced or are in the process of producing supply of our product candidates and EXONDYS 51, respectively, based on our current understanding of market demands and our anticipated needs for our research and development efforts, clinical trials, early access programs and commercial sales. In light of the limited number of third parties with the expertise to produce EXONDYS 51 and our product candidates, the lead time needed to manufacture them, and the availability of underlying materials, we may not be able to, in a timely manner or at all, establish or maintain sufficient commercial and other manufacturing arrangements on the commercially reasonable terms necessary to provide adequate supply of EXONDYS 51 and our other product candidates to meet demands that meet or exceed our projected needs. Furthermore, we may not be able to obtain the significant financial capital that may be required in connection with such arrangements. Even after successfully engaging third parties to execute the manufacturing process for EXONDYS 51 and our product candidates, such parties may not comply with the terms and timelines they have agreed to for various reasons, some of which may be out of their or our control, which could impact our ability to execute our business plans on expected or required timelines in connection with the commercialization of EXONDYS 51 and the continued development of our product candidates. We may also be required to enter into long-term manufacturing agreements that contain exclusivity provisions and /or substantial termination penalties, which could have a material adverse effect on our business prior to and after commercialization.

The third parties we use in the manufacturing process for EXONDYS 51 and our product candidates may fail to comply with current GMP (“cGMP”) regulations.

Our contract manufacturers are required to produce our materials, APIs and drug products under cGMP. We and our contract manufacturers are subject to periodic inspections by the FDA, EMA and corresponding state and foreign authorities to ensure strict compliance with cGMP and other applicable government regulations. In addition, before we can begin to commercially manufacture our product candidates in third-party or our own facilities, we must obtain regulatory approval from the FDA, which includes a review of the manufacturing process and facility. A manufacturing authorization must also be obtained from the appropriate European Union regulatory authorities and may be required by other foreign regulatory authorities. The timeframe required to obtain such approval or authorization is uncertain. In order to obtain approval, we will need to ensure that all of our processes, methods and equipment are compliant with cGMP, and perform extensive audits of vendors, contract laboratories and suppliers. In complying with cGMP, we will be obligated to expend time, money and effort in production, record keeping and quality control to assure that the product meets applicable specifications and other requirements.

While we work diligently with all contract manufacturers to maintain full compliance, we do not have direct control over a third-party manufacturer’s compliance with these regulations and requirements. In addition, changes in cGMP could negatively impact the ability of our contract manufacturers to complete the manufacturing process of

EXONDYS 51 and our product candidates in a compliant manner on the schedule we require for commercial and clinical trial use, respectively. The failure to achieve and maintain compliance with cGMP and other applicable government regulations, including failure to detect or control anticipated or unanticipated manufacturing errors, could result in product recalls, clinical holds, delayed or withheld approvals, patient injury or death.

This risk is particularly heightened as we optimize manufacturing for our product candidates. For example, we were notified by the Research Institute at Nationwide that they received a letter from the FDA on July 24, 2018, stating that their Phase 1/2a DMD micro-dystrophin gene therapy trial had been placed on clinical hold due to the presence of a trace amount of DNA fragment in research-grade third-party supplied plasmid (the “Clinical Hold”). The Research Institute, working with us, developed an action plan with immediate plans to submit for review by the FDA, which included the use of GMP-s plasmid for the program. On September 24, 2018, we announced that the FDA had lifted the Clinical Hold and that we do not anticipate any material delay to this program.

If our contract manufacturers fail to adhere to applicable cGMP and other applicable government regulations, or experience manufacturing problems, we will suffer significant consequences, including product seizures or recalls, postponement or cancellation

of clinical trials, loss or delay of product approval, fines and sanctions, loss of revenue, termination of the development of a product candidate, reputational damage, shipment delays, inventory shortages, inventory write-offs and other product-related charges and increased manufacturing costs. If we experience any of these results, the success of our commercialization of EXONDYS 51 and/or our development efforts for our product candidates could be significantly delayed, fail or otherwise be negatively impacted.

We may not be able to successfully scale up manufacturing of EXONDYS 51 or our product candidates in sufficient quality and quantity or within sufficient timelines, or be able to secure ownership of intellectual property rights developed in this process, which could negatively impact the commercial success of EXONDYS 51 and/or the development of our product candidates.

We are working to increase manufacturing capacity and scale up production of some of the components of our drug products. Our focus remains on (i) achieving larger-scale manufacturing capacity for EXONDYS 51 and other product candidates throughout the manufacturing supply chain (ii) continuing to increase material and API production capacity to provide the anticipated amounts of drug product needed for our planned studies for our product candidates and (iii) optimizing manufacturing for our follow-on exon skipping product candidates and other programs, including PPMO and gene therapy. We may not be able to successfully increase manufacturing capacity or scale up the production of materials, APIs and drug products, whether in collaboration with third party manufacturers or on our own, in a manner that is safe, compliant with cGMP conditions or other applicable legal or regulatory requirements, in a cost-effective manner, in a time frame required to meet our timeline for commercialization, clinical trials and other business plans, or at all.

Compliance with cGMP requirements and other quality issues may arise during our efforts to increase manufacturing capacity and scale up production with our current or any new contract manufacturers. These issues may arise in connection with the underlying materials, the inherent properties of EXONDYS 51 or a product candidate, EXONDYS 51 or a product candidate in combination with other components added during the manufacturing and packaging process or during shipping and storage of the APIs or finished drug product. In addition, in order to release EXONDYS 51 for commercial use and demonstrate stability of product candidates for use in clinical trials (and any subsequent drug products for commercial use), our manufacturing processes and analytical methods must be validated in accordance with regulatory guidelines. We may not be able to successfully validate, or maintain validation of, our manufacturing processes and analytical methods or demonstrate adequate purity, stability or comparability of EXONDYS 51 or our product candidates in a timely or cost-effective manner, or at all. If we are unable to successfully validate our manufacturing processes and analytical methods or to demonstrate adequate purity, stability or comparability, the commercial availability of EXONDYS 51 and the continued development and/or regulatory approval of our product candidates may be delayed or otherwise negatively impacted, which could significantly harm our business.

During our work with our third-party manufacturers to increase and optimize manufacturing capacity and scale up production, it is possible that they could make proprietary improvements in the manufacturing and scale-up processes for EXONDYS 51 or our product candidates. We may not own or be able to secure ownership of such improvements or may have to share the intellectual property rights to those improvements. Additionally, it is possible that we will need additional processes, technologies and validation studies, which could be costly and which we may not be able to develop or acquire from third parties. Any failure to secure the intellectual property rights required for the manufacturing process needed for large-scale clinical trials or commercialization of EXONDYS 51 or the continued development of our product candidates could cause significant delays in our business plans or otherwise negatively impact the commercialization of EXONDYS 51 or the continued development of our product candidates.

Products intended for use in gene therapies are novel, complex and difficult to manufacture. We could experience production problems that result in delays in our development or commercialization of gene therapy programs, limit the supply of our products or otherwise harm our business.

We currently have development, manufacturing and testing agreements with third parties to manufacture supplies of our gene therapy product candidates. Several factors could cause production interruptions, including equipment malfunctions, facility contamination, raw material shortages or contamination, natural disasters, disruption in utility services, human error or disruptions in the operations of suppliers.

The physical and chemical properties of biologics such as ours generally cannot be fully characterized. As a result, assays of the finished product may not be sufficient to ensure that the product will perform in the intended manner. Accordingly, we employ multiple steps to control our manufacturing process to assure that the process works and the product candidate is made strictly and consistently in compliance with the process. Problems with the manufacturing process, even minor deviations from the normal process, could result in product defects or manufacturing failures that result in lot failures, product recalls, product liability claims or insufficient inventory. We may encounter problems achieving adequate quantities and quality of clinical-grade materials that meet FDA, EMA or other applicable foreign standards or specifications with consistent and acceptable production yields and costs.

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

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

Furthermore, no manufacturer currently has the experience or ability to produce our vectors or gene therapy product candidates at commercial levels. Even if we timely develop a manufacturing process and successfully transfer it to the third-party vector and product manufacturers or successfully and timely develop our internal capacity, if we or such third-party manufacturers are unable to produce the necessary quantities of viral vectors and our product candidates, or in compliance with GMP or other pertinent regulatory requirements, and within our planned time frame and cost parameters, it may result in delays in our development plans or increased capital expenditures, and the development and sales of our products, if approved, may be materially harmed.

Risks Related to our Intellectual Property

Our success, competitive position and future revenue depend in part on our ability and the abilities of our licensors and other collaborators to obtain, maintain and defend the patent protection for our product, product candidates, and platform technologies, to preserve our trade secrets, and to prevent third parties from infringing on our proprietary rights.

We currently directly hold various issued patents and patent applications, or have exclusive license or option rights to issued patents and patent applications, in each case in the U.S. as well as other countries that protect our product, product candidates and platform technologies. We anticipate filing additional patent applications both in the U.S. and in other countries. Our success will depend, in significant part, on our ability to obtain, maintain and defend our U.S. and foreign patents covering our product, product candidates and platform technologies as well as preserving our trade secrets for these assets. The patent process is subject to numerous risks and uncertainties, and we can provide no assurance that we will be successful in obtaining, maintaining, or defending our patents. Even when our patent claims are allowed, the claims may not issue, or in the event of issuance, may not be sufficient to protect our product, product candidates or platform technologies.

The patent positions of pharmaceutical, biotechnology and other life sciences companies can be highly uncertain and involve complex legal and factual questions for which important legal principles remain unresolved. This uncertainty is heightened for our PMO-based product and product candidates and gene therapy-based product candidates for which there has been little patent litigation involving such technologies. No consistent policy regarding the breadth of claims allowed in biotechnology patents has emerged to date in the U.S. and tests used for determining the patentability of patent claims in all technologies are in flux. The USPTO and patent offices in other jurisdictions have often required that patent applications concerning pharmaceutical and/or biotechnology-related inventions be limited or narrowed substantially to cover only the specific innovations exemplified in the patent application, thereby limiting the scope of protection against competitive challenges. Accordingly, even if we or our licensors are able to obtain patents, the patents might be substantially narrower than anticipated. Thus, there is no assurance as to the degree and range of protections any of our patents, if issued, may afford us or whether patents will be issued. Patents which may be issued to us may be subjected to further governmental review that may ultimately result in the reduction of their scope of protection, and pending patent applications may have their requested breadth of protection significantly

limited before being issued, if issued at all. The pharmaceutical, biotechnology and other life sciences patent situation outside the U.S. can be even more uncertain.

As a matter of public policy, there might be significant pressure on governmental bodies to limit the scope of patent protection or impose compulsory licenses for disease treatments that prove successful, particularly as a tactic to impose a price control. Additionally, jurisdictions other than the U.S. might have less restrictive patent laws than the U.S., giving foreign competitors the ability to exploit these laws to create, develop and market competing products.

We may be able to assert that certain activities engaged in by our competitors infringe on our current or future patent rights. To the extent that we enforce our patents, an alleged infringer may deny infringement and/or counter-claim that our patents are not valid, and if successful, could negatively impact our patent estate. We may not be able to successfully defend patents necessary to prevent competitors from commercializing competing product candidates. Our patent rights might be challenged, invalidated, circumvented or otherwise not provide any competitive advantage. Defending our patent positions may require significant financial resources and could negatively impact other Company objectives.

Under the Hatch-Waxman Act, one or more motivated third parties may file an Abbreviated New Drug Application, seeking approval of a generic copy of an innovator product approved under the NDA pathway such as our PMO product, or a New Drug Application under Section 505(b)(2), which may be for a new or improved version of the original innovator product. The third parties are allowed to rely on the safety and efficacy data of the innovator's product, may not need to conduct clinical trials and can market a competing version of a product after the expiration or loss of patent exclusivity or the expiration or loss of regulatory exclusivity and often charge significantly lower prices. Upon the expiration or loss of patent protection or the expiration or loss of regulatory exclusivity for a product, the major portion of revenues for that product may be dramatically reduced in a very short period of time. If we are not successful in defending our patents and regulatory exclusivities, we will not derive the expected benefit from them.

The DMD patent landscape is continually evolving, and we may be able to assert that certain activities engaged in by third parties infringe our current or future patent rights. There has been, and we believe that there will continue to be, significant litigation in the biopharmaceutical and pharmaceutical industries regarding patent and other intellectual property rights. As such, the patents and patent applications that we own, license, have optioned, and rely on for exclusivity for our product candidates may be challenged.

Uncertainty over intellectual property in the pharmaceutical and biotechnology industry has been the source of litigation and other disputes, which is inherently costly and unpredictable.

Litigation, interferences, oppositions, inter partes reviews, administrative challenges or other similar types of proceedings are, have been and may in the future be necessary in some instances to determine the validity and scope of certain of our proprietary rights, and in other instances to determine the validity, scope or non-infringement of certain patent rights claimed by third parties to be pertinent to the manufacture, use or sale of our products. We may also face challenges to our patent and regulatory exclusivities covering our products by third parties, including manufacturers of generics and biosimilars that may choose to launch or attempt to launch their products before the expiration of our patent or regulatory exclusivity. Litigation, interference, oppositions, inter partes reviews, administrative challenges or other similar types of proceedings are unpredictable and may be protracted, expensive and distracting to management. The outcome of such proceedings could adversely affect the validity and scope of our patent or other proprietary rights, hinder our ability to manufacture and market our products, require us to seek a license for the infringed product or technology or result in the assessment of significant monetary damages against us that may exceed amounts, if any, accrued in our financial statements. An adverse determination in a judicial or administrative proceeding or a failure to obtain necessary licenses could prevent us from manufacturing or selling our products. Furthermore, payments under any licenses that we are able to obtain would reduce our profits derived from our products. Any of these circumstances could result in financial, business or reputational harm to us or could cause a decline or volatility in our stock price.

On September 16, 2011, the Leahy-Smith America Invents Act (the "Leahy-Smith Act"), was signed into law. The Leahy-Smith Act includes a number of significant changes to U.S. patent law, including provisions that affect the way patent applications will be prosecuted, and may also affect patent litigation. The USPTO has issued regulations and procedures to govern administration of the Leahy-Smith Act, but many of the substantive changes to patent law associated with the Leahy-Smith Act have only recently become effective. Accordingly, it is not clear what, if any, impact the Leahy-Smith Act will have on the operation of our business. However, the Leahy-Smith Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, all of which could have a material adverse effect on our business and financial condition. For instance, a third party may petition the Patent Trial and Appeal Board ("PTAB") seeking to challenge the validity of some or all of the claims in any of our patents through an inter partes review or other post-grant proceeding. Should the PTAB institute an inter partes review or other proceeding and decide that some or all of the claims in the challenged patent are invalid, such a decision, if upheld on appeal, could have a material adverse effect on our business and financial condition.

Our business prospects will be impaired if third parties successfully assert that our product, product candidates, or platform technologies infringe proprietary rights of such third parties.

Similar to us, competitors continually seek intellectual property protection for their technology. Several of our development programs, particularly gene therapy programs, focus on therapeutic areas that have been the subject of extensive research and development by third parties for many years and have been protected with third party patent rights. Due to the amount of intellectual property in our various fields 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. Our competitors might have or obtained patents that limit, interfere with or eliminate our ability to make, use and sell our product, product candidates or platform technologies in important commercial markets.

In order to maintain or obtain freedom to operate for our products and product candidates, we may incur significant expenses, including those associated with entering into agreements with third parties that require milestone and royalty payments. Additionally, if we were to challenge the patent rights of our competitors, we might not be successful.

If our product, product candidates, or platform technologies infringe enforceable proprietary rights of others, we could incur substantial costs and may have to:

- obtain rights or licenses from others, which might not be available on commercially reasonable terms or at all;
- abandon development of an infringing product candidate, or cease commercialization of an infringing product;
- redesign our product, product candidates or processes to avoid infringement;
- pay damages; and/or
- defend litigation or administrative proceedings which might be costly whether we win or lose, and which could result in a substantial diversion of financial and management resources.

Any of these events could result in product and product candidate development delays or cessation, and as such substantially harm our potential earnings, financial condition and operations. The patent landscape of our product candidates is continually evolving and multiple parties, including both commercial entities and academic institutions, may have rights to claims or may be pursuing additional claims that could provide these parties a basis to assert that our product, product candidates or platform technologies infringe on the intellectual property rights of such parties. There has been, and we believe that there will continue to be, significant litigation in the biopharmaceutical and pharmaceutical industries regarding patent and other intellectual property rights.

Risks Related to our Business Operations

If we fail to comply with healthcare and other regulations, we could face substantial penalties and our business, operations and financial condition could be adversely affected.

As a manufacturer of pharmaceuticals, within the United States, certain federal and state healthcare laws and regulations will apply to or affect our business. The laws and regulations include:

- federal healthcare program anti-kickback laws, which prohibit, among other things, persons from soliciting, receiving or providing remuneration, directly or indirectly, to induce either the referral of an individual, for an item or service or the purchasing or ordering of a good or service, for which payment may be made under federal healthcare programs such as Medicare and Medicaid;
- federal false claims laws which prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, information or claims for payment from Medicare, Medicaid or other third party payors that are false or fraudulent;
- the Federal Food, Drug and Cosmetic Act, which among other things, strictly regulates drug product and medical device marketing, prohibits manufacturers from marketing such products for off-label use and regulates the distribution of samples;
- federal laws that require pharmaceutical manufacturers to report certain calculated product prices to the government or provide certain discounts or rebates to government authorities or private entities, often as a condition of reimbursement under government healthcare programs;
- the so-called “federal sunshine” law, which requires pharmaceutical and medical device companies to monitor and report certain financial interactions with physicians and teaching hospitals to the federal government for re-disclosure to the public; and
- state law equivalents of the above federal laws, such as anti-kickback and false claims laws which may apply to items or services reimbursed by any third party payor, including commercial insurers, state laws regulating interactions between pharmaceutical manufactures and health care providers, and state laws governing the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and often are not preempted by federal laws, thus complicating compliance efforts.

The number and complexity of both federal and state laws continues to increase, and additional governmental resources are being used to enforce these laws and to prosecute companies and individuals who are believed to be violating them. We anticipate that government scrutiny of pharmaceutical sales and marketing practices will continue for the foreseeable future and subject us to the risk of government investigations and enforcement actions.

In connection with the commercial launch of EXONDYS 51, we are in the process of expanding our compliance program, which is based on industry best practices and is designed to ensure that our commercialization of EXONDYS 51 complies with all applicable laws, regulations and industry standards. As the requirements in this area are constantly evolving, we cannot be certain that

our program will eliminate all areas of potential exposure. Although compliance programs can mitigate the risk of investigation and prosecution for violations of these laws, the risks cannot be entirely eliminated. If our operations are found to be in violation of any of the laws described above or any other laws, rules or regulations that apply to us, we will be subject to penalties, including civil and criminal penalties, damages, fines and the curtailment or restructuring of our operations. Any penalties, damages, fines, curtailment or restructuring of our operations could adversely affect our ability to operate our business and our financial results. Responding to government investigations, defending any claims raised, and any resulting fines, restitution, damages and penalties, settlement payments or administrative actions, as well as any related actions brought by stockholders or other third parties, could have a material impact on our reputation, business and financial condition and divert the attention of our management from operating our business. Even if we successfully defend against an action against us for violation of a law, the action and our defense could nonetheless cause us to incur significant legal expenses and divert our management's attention from the operation of our business. Moreover, achieving and sustaining compliance with applicable federal and state privacy, security, fraud and reporting laws may prove costly.

We may be subject to product liability claims and our insurance may not be adequate to cover damages.

The current and future use of our product candidates by us and our collaborators in clinical trials, expanded access programs, the sale of EXONDYS 51 and future products, or the use of our products under emergency use vehicles may expose us to liability claims inherent to the manufacture, clinical testing, marketing and sale of medical products. These claims might be made directly by consumers or healthcare providers or indirectly by pharmaceutical companies, our collaborators or others selling such products. Regardless of merit or eventual outcome, we may experience financial losses in the future due to such product liability claims. We have obtained commercial general liability insurance coverage for our clinical trials and the sale of commercial products in connection with the FDA's approval of EXONDYS 51. However, we may not be able to maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against all losses. If a successful product liability claim or series of claims is brought against us for uninsured liabilities or in excess of insured liabilities, our assets may not be sufficient to cover such claims and our business operations could be impaired.

If we, our collaborators, or any third-party manufacturers engaged by us or our collaborators fail to comply with environmental, health and safety laws and regulations, we could become subject to fines or penalties or incur costs that could harm our business.

We, our collaborators, and any third-party manufacturers we engage are subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the generation, handling, use, storage, treatment, manufacture, transportation and disposal of, and exposure to, hazardous materials and wastes, as well as laws and regulations relating to occupational health and safety, including those governing laboratory procedures, exposure to blood-borne pathogens and the handling of bio-hazardous materials. Our operations involve the use of hazardous materials, including organic and inorganic solvents and reagents. Although we believe that our activities conform in all material respects with such environmental laws, there can be no assurance that violations of these laws will not occur in the future as a result of human error, accident, equipment failure or other causes. Liability under environmental, health and safety laws can be joint and several and without regard to fault or negligence. The failure to comply with past, present or future laws could result in the imposition of substantial fines and penalties, remediation costs, property damage and personal injury claims, loss of permits or a cessation of operations, and any of these events could harm our business and financial condition. We expect that our operations will be affected by other new environmental, health and workplace safety laws on an ongoing basis, and although we cannot predict the ultimate impact of any such new laws, they may impose greater compliance costs or result in increased risks or penalties, which could harm our business.

Further, with respect to the operations of any current or future collaborators or third party contract manufacturers, it is possible that if they fail to operate in compliance with applicable environmental, health and safety laws and regulations or properly dispose of wastes associated with our product or product candidates, we could be held liable

for any resulting damages, suffer reputational harm or experience a disruption in the manufacture and supply of our product or product candidates.

The EU has enacted a new data privacy regulation, the General Data Protection Regulation, a violation of which could subject us to significant fines.

In May 2018, a new privacy regime, the General Data Protection Regulation ("GDPR") will take effect and immediately be binding across all member states of the European Economic Area ("EEA"). The GDPR increases our obligations with respect to clinical trials conducted in the EEA by expanding the definition of personal data to include coded data, and requiring changes to informed consent practices and more detailed notices for clinical trial subjects and investigators. In addition, the GDPR increases the scrutiny that clinical trial sites located in the EEA should apply to transfers of personal data from such sites to countries that are considered to lack an adequate level of data protection, such as the U.S. The GDPR imposes substantial fines for breaches of data protection requirements, which can be up to four percent of global revenue or 20 million Euros, whichever is greater, and it also confers a private right of action on data subjects for breaches of data protection requirements. Compliance with these directives will be

a rigorous and time-intensive process that may increase our cost of doing business, and despite those efforts, there is a risk that we may be subject to fines and penalties, litigation and reputational harm in connection with our European activities.

If we fail to retain our key personnel or are unable to attract and retain additional qualified personnel, our future growth and our ability to compete would suffer.

We are highly dependent on the efforts and abilities of the principal members of our senior management. Additionally, we have scientific personnel with significant and unique expertise in RNA-targeted therapeutics and gene therapy technologies. The loss of the services of any one of the principal members of our managerial team or staff may prevent us from achieving our business objectives.

The competition for qualified personnel in the biotechnology field is intense, and our future success depends upon our ability to attract, retain and motivate such personnel. In order to develop and commercialize our products successfully, we will be required to retain key management and scientific employees. In certain instances, we may also need to expand or replace our workforce and our management ranks. In addition, we rely on certain consultants and advisors, including scientific and clinical advisors, to assist us in the formulation and advancement of our research and development programs. Our consultants and advisors may be employed by other entities or have commitments under consulting or advisory contracts with third parties that limit their availability to us, or both. If we are unable to attract, assimilate or retain such key personnel, our ability to advance our programs would be adversely affected.

We expect to expand our organization and may experience difficulties in managing this growth, which could disrupt our operations.

As of December 31, 2018, we had 499 full-time employees. As our business activities expand, we expect to expand our full-time employee base and to hire more consultants and contractors. Our management may need to divert a disproportionate amount of its attention away from our day-to-day activities and devote a substantial amount of time to managing these growth activities. Our ability to manage our growth properly and maintain compliance with all applicable rules and regulations will require us to continue to improve our operational, legal, financial and management controls, as well as our reporting systems and procedures. We may not be able to effectively manage the expansion of our operations, which may result in weaknesses in our infrastructure, operational mistakes, loss of business opportunities, loss of employees and reduced productivity among remaining employees. Our expected growth could require significant capital expenditures and may divert financial resources from other projects, such as the development of additional product candidates. If our management is unable to effectively manage our growth, our expenses may increase more than expected, our ability to generate and/or grow revenues could be reduced, and we may not be able to implement our business strategy.

Our sales and operations are subject to the risks of doing business internationally.

We are increasing our presence in international markets, including emerging markets, subjecting us to many risks that could adversely affect our business and revenues, such as:

- the inability to obtain necessary foreign regulatory or pricing approvals of products in a timely manner;
- uncertainties regarding the collectability of accounts receivable;
- fluctuations in foreign currency exchange rates that may adversely impact our revenues, net income and value of certain of our investments;
- difficulties in staffing and managing international operations;
- the imposition of governmental controls;
- less favorable intellectual property or other applicable laws;
- increasingly complex standards for complying with foreign laws and regulations that may differ substantially from country to country and may conflict with corresponding U.S. laws and regulations;

- the far-reaching anti-bribery and anti-corruption legislation in the U.K., including the U.K. Bribery Act 2010, and elsewhere and escalation of investigations and prosecutions pursuant to such laws;
- compliance with complex import and export control laws;
- restrictions on direct investments by foreign entities and trade restrictions; and
- changes in tax laws and tariffs.

In addition, our international operations are subject to regulation under U.S. law. For example, the Foreign Corrupt Practices Act (FCPA) prohibits U.S. companies and their representatives from paying, offering to pay, promising to pay or authorizing the payment of anything of value to any foreign government official, government staff member, political party or political candidate for the purpose of obtaining or retaining business or to otherwise obtain favorable treatment or influence a person working in an official capacity. In many countries, the health care professionals we regularly interact with may meet the FCPA's definition of a foreign government official. Failure to comply with domestic or foreign laws could result in various adverse consequences, including: possible delay in approval or refusal to approve a product, recalls, seizures or withdrawal of an approved product from the market, disruption in the supply or availability of our products or suspension of export or import privileges, the imposition of civil or criminal sanctions, the prosecution of executives overseeing our international operations and damage to our reputation. Any significant impairment of our ability to sell products outside of the U.S. could adversely impact our business and financial results.

Unfavorable global economic conditions could harm our business, financial condition or results of operations.

Our results of operations could be harmed by general conditions in the global economy and in the global financial markets. A severe or prolonged economic downturn could result in a variety of risks to our business, including weakened demand for our product candidates and our ability to raise additional capital when needed on acceptable terms, if at all. For example, the global financial crisis of 2007-2008 and the ongoing European economic crisis caused extreme volatility and disruptions in the capital and credit markets. A weak or declining economy could strain our manufacturers, possibly resulting in manufacturing disruption, or cause delays in payments for our services by third-party payors or our future collaborators. Any of the foregoing could harm our business and we cannot anticipate all of the ways in which the current economic climate and financial market conditions could harm our business.

Additionally, in June 2016, a majority of United Kingdom (UK) voters voted for the UK to exit the European Union (Brexit) and in March 2017, the UK government provided official legal notification to the European Union that the UK will exit the European Union. The timing and completion of Brexit is subject to judicial and parliamentary developments in the UK, as well as any legal challenges. The economic effects of Brexit will depend on any agreements the UK makes to retain access to European Union markets either during a transitional period or more permanently. Brexit could adversely affect European and worldwide economic or market conditions and could contribute to instability in global financial markets. Brexit is likely to lead to legal uncertainty and potentially divergent national laws and regulations as the UK determines which European Union laws to replace or replicate. Any of these effects of Brexit, and any other effects we cannot anticipate, could adversely affect our business, business opportunities, results of operations, financial condition and cash flows.

We rely significantly on information technology and any failure, inadequacy, interruption or security lapse of that technology, including any cyber security incidents, could harm our ability to operate our business effectively.

In the ordinary course of our business, we collect and store sensitive data, including intellectual property, our proprietary business information and that of our suppliers, as well as personally identifiable information of EXONDYS 51 patients, clinical trial participants and employees. Similarly, our third-party providers possess certain of our sensitive data. The secure maintenance of this information is critical to our operations and business strategy. Despite our security measures, our information technology and infrastructure may be vulnerable to attacks by hackers or breached due to employee error, malfeasance or other disruptions. Any such breach could compromise our networks and the information stored there could be accessed, publicly disclosed, lost or stolen. Any such access, disclosure or other loss of information, including our data being breached at third party providers, could result in legal claims or proceedings, liability under laws that protect the privacy of personal information, disrupt our operations and damage our reputation, which could adversely affect our business.

We may incur substantial costs in connection with litigation and other disputes.

In the ordinary course of business we may, and in some cases have, become involved in lawsuits and other disputes such as securities claims, intellectual property challenges, including interferences declared by the USPTO, and employee matters. It is possible that we may not prevail in claims made against us in such disputes even after expending significant amounts of money and company resources in defending our positions in such lawsuits and disputes. The outcome of such lawsuits and disputes is inherently uncertain and may have a negative impact on our business, financial condition and results of operations.

Comprehensive tax reform in the United States could adversely affect our business and financial condition.

The Tax Cuts and Jobs Act (the "TCJA") was enacted on December 22, 2017 in the United States. The TCJA contains significant changes to corporate taxation, including reduction of the U.S. corporate tax rate from 35% to 21%, elimination of U.S. tax on foreign earnings (subject to certain important exceptions), one-time taxation of offshore earnings at reduced rates regardless of whether they are repatriated, limitation of the tax deduction for interest expense, immediate deductions for certain new investments instead of deductions for depreciation expense over time, and modifying or repealing many business deductions and credits.

We continue to evaluate the overall impact of the TCJA on our business. There is continued uncertainty in the TCJA, and although changes or challenges cannot be predicted, we believe we have used reasonable assumptions and interpretations in applying TCJA. We continue to monitor for legislative developments, issuance of regulations and technical memorandum to provide further clarification and/or interpretations of the TCJA and will adjust our financial statements as needed.

Our ability to use net operating loss carryforwards and other tax attributes to offset future taxable income may be limited as a result of future transactions involving our common stock.

In general, under Section 382 of the Internal Revenue Code, a corporation that undergoes an ‘‘ownership change’’ is subject to limitations on its ability to utilize its pre-change net operating losses and certain other tax assets to offset future taxable income. In general, an ownership change occurs if the aggregate stock ownership of certain stockholders increases by more than 50 percentage points over such stockholders’ lowest percentage ownership during the testing period, which is generally three years. An ownership change could limit our ability to utilize our net operating loss and tax credit carryforwards for taxable years including or following such “ownership change.” Limitations imposed on the ability to use net operating losses and tax credits to offset future taxable income could require us to pay U.S. federal income taxes earlier than we estimated or than would have otherwise been required if such limitations were not in effect and could cause such net operating losses and tax credits to expire unused, in each case reducing or eliminating the benefit of such net operating losses and tax credits and potentially adversely affecting our financial position. Similar rules and limitations may apply for state income tax purposes.

We are winding down our expired U.S. government contracts, and the U.S. government may deny payment of some or all of the currently outstanding amounts owed to us. In addition, further development of our infectious disease programs may be limited by the intellectual property and other rights retained by the U.S. government.

We have historically relied on U.S. government contracts and awards to fund and support certain infectious disease development programs. These contracts are expired and we are currently involved in contract close-out activities. The U.S. government has the right to perform additional audits prior to making final payment of costs and fees. If we are not able to adequately support costs incurred or other government requirements, the government may deny payment of some or all of the currently outstanding amounts owed to us. In addition, the U.S. government may have the right to develop all or some parts of product candidates that we have developed under a U.S. government contract after such contract has terminated or expired.

Our employees, principal investigators, consultants and strategic partners may engage in misconduct or other improper activities, including non-compliance with regulatory standards and requirements and insider trading.

We are exposed to the risk of fraud or other misconduct by our employees, principal investigators, consultants and strategic partners. Misconduct by these parties could include intentional failures to comply with the regulations of the FDA and non-U.S. regulators, provide accurate information to the FDA and non-U.S. regulators, comply with healthcare fraud and abuse laws and regulations in the United States and abroad, report financial information or data accurately or disclose unauthorized activities to us. We adopted a code of conduct applicable to all of our employees, but it is not always possible to identify and deter employee misconduct, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to comply with these laws or regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could have a significant impact on our business, including the imposition of significant fines or other sanctions.

The increasing use of social media platforms presents new risks and challenges.

Social media is increasingly being used to communicate about our product, technologies and programs, and the diseases our product and product candidates are designed to treat. Social media practices in the biopharmaceutical industry continue to evolve and regulations relating to such use are not always clear. This evolution creates uncertainty and risk of noncompliance with regulations applicable to our business. For example, patients may use social media channels to comment on the effectiveness of a product or to report an alleged adverse event. When such disclosures occur, there is a risk that we fail to monitor and comply with applicable adverse event reporting obligations or we may not be able to defend the Company or the public's legitimate interests in the face of the political and market pressures generated by social media due to restrictions on what we may say about our product and/or product candidates. There is also a risk of inappropriate disclosure of sensitive information or negative or inaccurate posts or comments about us on any social networking website. If any of these events were to occur or we otherwise fail to comply with applicable regulations, we could incur liability, face overly restrictive regulatory actions or incur other harm to our business.

We or the third parties upon whom we depend may be adversely affected by natural disasters and our business continuity and disaster recovery plans may not adequately protect us from a serious disaster.

Natural disasters could severely disrupt our operations, and have a material adverse effect on our business, results of operations, financial condition and prospects. If a natural disaster, power outage or other event occurred that prevented us from using all or a significant portion of our office, manufacturing and/or lab spaces, that damaged critical infrastructure, such as the manufacturing facilities of our third-party contract manufacturers, or that otherwise disrupted operations, it may be difficult or, in certain cases, impossible for us to continue our business for a substantial period of time. The disaster recovery and business continuity plans we have in place may prove inadequate in the event of a serious disaster or similar event. We may incur substantial expenses as a result of the limited nature of our disaster recovery and business continuity plans, which could have a material adverse effect on our business.

Risks Related to our Financial Condition and Capital Requirements

We have incurred operating losses since our inception and we may not achieve or sustain profitability.

We incurred an operating loss of $343.6 million for the year ended December 31, 2018, respectively. Our accumulated deficit was $1.6 billion as of December 31, 2018. Although we launched EXONDYS 51 in the U.S. in September 2016, we believe that it will take us some time to attain profitability and positive cash flow from operations. Since EXONDYS 51 and our product candidates target small patient populations, the per-patient drug pricing must be high in order to recover our development and manufacturing costs, fund adequate patient support programs, fund additional research and achieve profitability. We may be unable to maintain or obtain sufficient sales volumes at a price high enough to justify our product development efforts and our sales, marketing and manufacturing expenses.

We have generally incurred expenses related to research and development of our technologies and product candidates and from general and administrative expenses that we have incurred while building our business infrastructure. We anticipate that our expenses will increase substantially if and/or as we:

- continue our launch and commercialization of EXONDYS 51 in the U.S.;
- expand the global footprint of EXONDYS 51 outside of the U.S.;
- establish our sales, marketing and distribution capabilities;
- continue our research, pre-clinical and clinical development of our product candidates;
- respond to and satisfy requests and requirements from regulatory authorities in connection with development and potential approval of our product candidates;
- initiate additional clinical trials for our product candidates;
- seek marketing approvals for our product candidates that successfully complete clinical trials;
- acquire or in-license other product candidates;
- maintain, expand and protect our intellectual property portfolio;
- increase manufacturing capabilities including capital expenditures related to our real estate facilities and entering into manufacturing agreements;
- hire additional clinical, quality control and scientific personnel; and
- add operational, financial and management information systems and personnel, including personnel to support our product development and planned future commercialization efforts.

As a result, we expect to continue to incur significant operating losses at least through 2018. Because of the numerous risks and uncertainties associated with developing pharmaceutical products, we are unable to predict the extent of any future losses or when, or if, we will become profitable.

We will need to raise additional funding, which may not be available on acceptable terms, or at all. Failure to obtain this necessary capital when needed may force us to delay, limit or terminate our product development efforts or other operations.

We will likely require additional capital from time to time in the future in order to meet FDA post-marketing approval requirements and market and sell EXONDYS 51 as well as to continue the development of product candidates in our pipeline, to prepare for potential commercialization of our product candidates, to expand our product portfolio and to continue or enhance our

business development efforts. The actual amount of funds that we may need and the sufficiency of the capital we have or are able to raise will be determined by many factors, some of which are in our control and others that are beyond our control.

While we are currently well capitalized, we may use available capital resources sooner than we expect under our current operating plan. In addition, our operating plan may change. We may need or choose to seek additional funds sooner than planned, through equity or debt financings, government or other third-party funding, marketing and distribution arrangements and other collaborations, strategic alliances and licensing arrangements or a combination of these approaches. In any event, we expect to require additional capital to expand future development efforts, obtain regulatory approval for, and to commercialize, our product candidates. Raising funds in the current economic environment may present additional challenges. Even if we believe we have sufficient funds for our current or future operating plans, we may seek additional capital if market conditions are favorable or in light of specific strategic considerations.

Any additional fundraising efforts may divert our management from their day-to-day activities, which may adversely affect our ability to develop and commercialize our product candidates. In addition, we cannot guarantee that future financing will be available in sufficient amounts or on terms acceptable to us, if at all. In the event we receive negative data from our key clinical programs or encounter other major setbacks in our development or regulatory activities or in our commercialization efforts, if any of our product candidates are approved, our stock price is likely to decline which would make a future financing more difficult. Moreover, the terms of any financing may adversely affect the holdings or the rights of our stockholders. The issuance of additional securities, whether equity or debt, by us, or the possibility of such issuance, may cause the market price of our shares to decline. The sale of additional equity or convertible securities would dilute all of our stockholders. The incurrence of indebtedness would result in increased fixed payment obligations and we may be required to agree to certain restrictive covenants, such as limitations on our ability to incur additional debt, limitations on our ability to acquire, sell or license intellectual property rights and other operating restrictions that could adversely impact our ability to conduct our business. We could also be required to seek funds through arrangements with collaborative partners or otherwise at an earlier stage than otherwise would be desirable and we may be required to relinquish rights to some of our technologies or product candidates or otherwise agree to terms unfavorable to us, any of which may have a material adverse effect on our business, operating results and prospects.

If we are unable to obtain funding on a timely basis, we may be required to significantly curtail, delay or discontinue one or more of our research or development programs or the commercialization of any product, if approved, or be unable to expand our operations or otherwise capitalize on our business opportunities, as desired, which could materially affect our business, financial condition and results of operations.

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

We may seek additional capital through a combination of private and public equity offerings, debt financings, collaborations and strategic and licensing arrangements. To the extent that we raise additional capital through the sale of common stock or securities convertible or exchangeable into common stock, the ownership interest of our stockholders in our company will be diluted. In addition, the terms of any such securities may include liquidation or other preferences that materially adversely affect the rights of our stockholders. Debt financing, if available, would increase our fixed payment obligations and may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional funds through collaboration, strategic partnerships and licensing arrangements with third parties, we may have to relinquish valuable rights to our product candidates, our intellectual property, future revenue streams or grant licenses on terms that are not favorable to us.

The estimates and judgments we make, or the assumptions on which we rely, in preparing our consolidated financial statements could prove inaccurate.

Our consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the U.S. The preparation of these consolidated financial statements requires us to make estimates and judgments that affect the reported amounts of our assets, liabilities, revenues and expenses, the amounts of charges accrued by us and related disclosure of contingent assets and liabilities. Such estimates and judgments include revenue recognition, inventory, valuation of stock-based awards, research and development expenses and income tax. We base our estimates on historical experience, facts and circumstances known to us and on various other assumptions that we believe to be reasonable under the circumstances. We cannot provide assurances, however, that our estimates, or the assumptions underlying them, will not change over time or otherwise prove inaccurate. If this is the case, we may be required to restate our consolidated financial statements, which could, in turn, subject us to securities class action litigation. Defending against such potential litigation relating to a restatement of our consolidated financial statements would be expensive and would require significant attention and resources of our management. Moreover, our insurance to cover our obligations with respect to the ultimate resolution of any such litigation may be inadequate. As a result of these factors, any such potential litigation could have a

material adverse effect on our financial results and cause our stock price to decline, which could in turn subject us to securities class action litigation.

Risks Related to Our Common Stock

Our stock price is volatile and may fluctuate due to factors beyond our control.

The market prices for and trading volumes of securities of biotechnology companies, including our securities, has historically been volatile. Our stock has had significant swings in trading prices, in particular in connection with our public communications regarding feedback received from regulatory authorities. For example, over the last thirty eight months, our stock has increased as much as 74% in a single day or decreased as much as 55% in a single day. The market has from time to time experienced significant price and volume fluctuations unrelated to the operating performance of particular companies. The market price of our common stock may fluctuate significantly due to a variety of factors, including but not limited to:

- the commercial performance of EXONDYS 51 in the U.S.;
- the timing of our submissions to regulatory authorities and regulatory decisions and developments;
- positive or negative clinical trial results or regulatory interpretations of data collected in clinical trials conducted by us, our strategic partners, our competitors or other companies with investigational drugs targeting the same, similar or related diseases to those targeted by us;
- delays in beginning and completing pre-clinical and clinical trials for potential product candidates;
- delays in entering or failing to enter into strategic relationships with respect to development and/or commercialization of EXONDYS 51 or our product candidates or entry into strategic relationships on terms that are not deemed to be favorable to our Company;
- technological innovations, product development or additional commercial product introductions by ourselves or competitors;
- changes in applicable government regulations or regulatory requirements in the approval process;
- developments concerning proprietary rights, including patents and patent litigation matters, such as developments in the interferences declared by the USPTO, including in the near term any outcomes of ongoing interference proceedings and over the longer term the outcomes from any related appeals;
- public concern relating to the commercial value, efficacy or safety of any of our products;
- our ability to obtain funds, through the issuance of equity or equity linked securities or incurrence of debt, or other corporate transactions;
- comments by securities analysts;
- developments in litigation such as the stockholder lawsuits against us;
- changes in senior management; or
- general market conditions in our industry or in the economy as a whole.

Broad market and industry factors may seriously affect the market price of a company’s stock, including ours, regardless of actual operating performance. In addition, in the past, following periods of volatility in the overall market and the market price of a particular company’s securities, securities class action litigation has often been instituted against these companies. Such litigation could result in substantial costs and a diversion of our management’s attention and resources.

Our revenues and operating results could fluctuate significantly, which may adversely affect our stock price.

Our revenues and operating results may vary significantly from year-to-year and quarter-to-quarter as well as in comparison to the corresponding quarter of the preceding year. Variations my result from one or more factors, including, without limitation:

- timing of purchase orders;
-

changes in coverage and reimbursement policies of health plans and other health insurers, especially in relation to those products that are currently manufactured, under development or identified for future development by us;

- re-authorizations processes that may be required for patients who initially obtained coverage by third parties, including government payors, managed care organizations and private health insurers;

- transition from temporary billing codes established by the Centers for Medicare & Medicaid Services (CMS) to permanent medical codes;
- timing of approval of applications filed with the FDA;
- timing of product launches and market acceptance of products launched;
- changes in the amounts spent to research, develop, acquire, license or promote new and existing products;
- results of clinical trial programs;
- serious or unexpected health or safety concerns with our product or product candidates;
- introduction of new products by others that render our product obsolete or noncompetitive;
- the ability to maintain selling prices and gross margin on our product;
- increases in the cost of raw materials contained within our product;
- manufacturing and supply interruptions, including product rejections or recalls due to failure to comply with manufacturing specifications;
- timing of revenue recognition relating to our distribution agreements;
- the ability to protect our intellectual property from being acquired by other entities;
- the ability to avoid infringing the intellectual property of others; and
- the addition or loss of customers.

In addition, in one or more future periods, our results of operations may fall below the expectations of securities analysts and investors. In that event, the market price of our common stock could decline.

Provisions of our certificate of incorporation, bylaws and Delaware law might deter acquisition bids for us that might be considered favorable and prevent or frustrate any attempt to replace or remove the then-current management and board of directors.

Certain provisions of our certificate of incorporation and bylaws may make it more difficult for a third party to acquire control of us or effect a change in our board of directors and management. These provisions include:

- when the board is comprised of six or more directors, classification of our board of directors into two classes, with one class elected each year;
- directors may only be removed for cause by the affirmative vote of a majority of the voting power of all the then-outstanding shares of voting stock;
- prohibition of cumulative voting of shares in the election of directors;
- right of the board of directors to elect directors to fill a vacancy created by the expansion of the board of directors or the resignation, death, disqualification or removal of a director;
- express authorization of the board of directors to make, alter or repeal our bylaws;
- prohibition on stockholder action by written consent;
- advance notice requirements for nominations for election to our board or for proposing matters that can be acted upon by stockholders at stockholder meetings;
- the ability of our board of directors to authorize the issuance of undesignated preferred stock, the terms and rights of which may be established and shares of which may be issued without stockholder approval, including rights superior to the rights of the holders of common stock; and
- a super-majority (66 2/3%) of the voting power of all of the then-outstanding shares of capital stock are required to amend, rescind, alter or repeal our bylaws and certain provisions of our certificate of incorporation.

In addition, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which may prohibit certain business combinations with stockholders owning 15% or more of our outstanding voting stock. These and other provisions in our certificate of incorporation and our bylaws and in the Delaware General Corporation Law could make it more difficult for

stockholders or potential acquirers to obtain control of our board of directors or initiate actions that are opposed by the then-current board of directors.

A significant number of shares of our common stock are issuable pursuant to outstanding stock awards, and we expect to issue additional stock awards and shares of common stock in the future. Exercise of these awards and sales of shares will dilute the interests of existing security holders and may depress the price of our common stock.

As of December 31, 2018, there were approximately 71.1million shares of common stock outstanding and outstanding awards to purchase 9.1 million shares of common stock under various incentive stock plans. Additionally, as of December 31, 2018, there were approximately 4.4 million shares of common stock available for future issuance under our 2018 Equity Incentive Plan, approximately 0.2 million shares of common stock available for issuance under our 2013 Employee Stock Purchase Plan, and approximately 0.9 million shares of common stock available for issuance under our 2014 Employment Commencement Incentive Plan. We may issue additional common stock and warrants from time to time to finance our operations. We may also issue additional shares to fund potential acquisitions or in connection with additional stock options or other equity awards granted to our employees, officers, directors and consultants under our 2018 Equity Incentive Plan, our 2013 Employee Stock Purchase Plan or our 2014 Employment Commencement Incentive Plan. The issuance of additional shares of common stock or warrants to purchase common stock and the perception that such issuances may occur or exercise of outstanding warrants or stock options may have a dilutive impact on other stockholders and could have a material negative effect on the market price of our common stock.

Future sales of our common stock in the public market could cause our share price to fall.

Sales of a substantial number of our common stock in the public market, including sales by members of our management or board of directors, or the perception that these sales might occur, could depress the market price of our common stock and could impair our ability to raise capital through the sale of additional equity or equity-related securities.

Risks Related to Our Convertible Senior Notes

Servicing our 1.50% notes due 2024 (the “Notes”) requires a significant amount of cash, and we may not have sufficient cash flow to pay our debt.

In 2017, we issued $570 million aggregate principal amount of Notes. Our ability to make scheduled payments of the principal of, to pay interest on, or to refinance our indebtedness, including the Notes, depends on our future performance, which is subject to many factors, including, economic, financial, competitive and other, beyond our control. We do not expect our business to be able to generate cash flow from operations, in the foreseeable future, sufficient to service our debt and make necessary capital expenditures and may therefore be required to adopt one or more alternatives, such as selling assets, restructuring debt or obtaining additional equity capital on terms that may be onerous or highly dilutive. Our ability to refinance our Notes, which are non-callable and mature in 2024, will depend on the capital markets and our financial condition at such time. We may not be able to engage in any of these activities or engage in these activities on desirable terms, which could result in a default on our debt obligations, and limit our flexibility in planning for and reacting to changes in our business.

We may not have the ability to raise the funds necessary to repurchase the Notes as required upon a fundamental change, and our future debt may contain limitations on our ability to repurchase the Notes.

Holders of the Notes will have the right to require us to repurchase their Notes for cash upon the occurrence of a fundamental change at a fundamental change repurchase price equal to 100% of the principal amount of the Notes to be repurchased, plus accrued and unpaid interest, if any. A fundamental change may also constitute an event of default or prepayment under, and result in the acceleration of the maturity of, our then-existing indebtedness. We cannot

assure you that we will have sufficient financial resources, or will be able to arrange financing, to pay the fundamental change repurchase price in cash with respect to any Notes surrendered by holders for repurchase upon a fundamental change. In addition, restrictions under our then existing credit facilities or other indebtedness, if any, may not allow us to repurchase the Notes upon a fundamental change. Our failure to repurchase the Notes upon a fundamental change when required would result in an event of default with respect to the Notes which could, in turn, constitute a default under the terms of our other indebtedness, if any. If the repayment of the related indebtedness were to be accelerated after any applicable notice or grace periods, we may not have sufficient funds to repay the indebtedness and repurchase the Notes.

Capped call transactions entered into in connection with our Notes may impact the value of our common stock.

In connection with the Notes, we entered into capped call transactions (the “capped call transactions”) with certain financial institutions. The capped call transactions are expected to generally reduce the potential dilution upon conversion of the Notes into shares of our common stock.

In connection with establishing their initial hedges of the capped call transactions, these financial institutions or their respective affiliates entered into various derivative transactions with respect to our common stock and/or to purchase our common stock. The financial institutions, or their respective affiliates, may modify their hedge positions by entering into or unwinding various derivatives with respect to our common stock and/or purchasing or selling our common stock or other securities of ours in secondary market transactions prior to the maturity of the Notes. This activity could also cause or avoid an increase or a decrease in the market price of our common stock or the Notes, which could affect the value of our common stock.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

A description of the facilities we own and/or occupy is included in the following table. We believe that our current facilities in Cambridge, Andover and Burlington, Massachusetts and Dublin and Columbus, Ohio are suitable and will provide sufficient capacity to meet the projected needs of our business for the next 12 months. Except as noted below, all of our properties are currently being used in the operation of our business.

Location of Property	Square Footage	Lease Expiration Date	Purpose	Other Information
215 First Street, Cambridge, MA	163,842	September 2025	Laboratory and office space	Corporate headquarters
100 Federal Street, Andover, MA	62,000	N/A – facility is owned	Laboratory and office space	Primarily laboratory space
300 Federal Street, Andover, MA	23,102	December 2020	Office space	Office space
55 Network Drive, Burlington, MA	44,740	January 2022	Laboratory and office space	Primarily laboratory space
5200 Blazer Parkway, Dublin, OH	22,600	November 2019	Laboratory and office space	Primarily laboratory space
3435 Stelzer Road, Columbus, OH[(1)]	77,679	June 2026	Laboratory and office space	Primarily laboratory space

[(1)] As of December 31, 2018, the Company did not yet occupy 3435 Stelzer Road, Columbus, OH.

Item 3. Legal Proceedings.

For material legal proceedings, please read Note 21, Commitments and Contingencies - Litigation to our consolidated financial statements included in this Annual Report.

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.

Market Information

Our common stock is quoted on the NASDAQ Global Select Market under the same symbol "SRPT".

Holders

As of February 22, 2019, we had 196 stockholders of record of our common stock.

Dividends

We did not declare or pay cash dividends on our common stock in 2018, 2017 or 2016. We currently expect to retain future earnings, if any, to finance the operation and expansion of our business, and we do not anticipate paying any cash dividends in the foreseeable future. Any future determination related to our dividend policy will be made at the discretion of our board of directors.

Performance Graph

The following graph compares the performance of our Common Stock for the periods indicated with the performance of the NASDAQ Composite Index, NASDAQ Biotechnology Index and the NYSE ARCA Biotechnology Index. This graph assumes an investment of $100 on December 31, 2011 in each of our common stock, the NASDAQ Composite Index, NASDAQ Biotechnology Index and the NYSE ARCA Biotechnology Index, and assumes reinvestment of dividends, if any. The stock price performance shown on the graph below is not necessarily indicative of future stock price performance. This graph is not "soliciting material," is not deemed "filed" with the SEC and is not to be incorporated by reference into any of our filings under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

Recent Sales of Unregistered Securities.

In September 2018, we issued 10,500 restricted stock awards to three employees. These restricted stock awards will vest and become exercisable as to 100% of the total number of shares of restricted common stock of the Company on the three-year anniversary of the grant date, subject to the continued employment with the Company of each employee through such vesting date. Such issuance was exempt under Section 4(a)(2) of the Securities Act of 1933, as amended.

Purchases of Equity Securities by the Issuer and Affiliated Purchasers.

None.

Item 6. Selected Financial Data.

The following selected financial data are derived from our consolidated financial statements and should be read in conjunction with, and is qualified in its entirety by, Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations, and Item 8, Financial Statements and Supplementary Data.

	For the Year Ended December 31,				
	2018	2017	2016	2015	2014
	(in thousands, except per share amounts)				
Operations data:					
Revenues	$301,034	$154,584	$5,421	$1,253	$9,757
Cost of sales (excluding amortization of in-licensed rights)	34,193	7,353	101	—	—
Research and development	401,843	166,707	188,272	146,394	94,231
Selling, general and administrative	207,761	122,682	83,749	75,043	49,315
Settlement and license charges	—	28,427	—	—	—
Amortization of in-licensed rights	865	1,053	29	—	—
Operating loss	(343,628)	(171,638)	(266,730)	(220,184)	(133,789)
Interest (expense) income and other, net	(18,982)	(1,990)	(535)	154	779
Gain from sale of Priority Review Voucher	—	125,000	—	—	—
Loss on change in warrant valuation	—	—	—	—	(2,779)
Loss before income tax expense	(362,610)	(48,628)	(267,265)	(220,030)	(135,789)
Income tax (benefit) expense	(692)	2,060	—	—	—
Net loss	$(361,918)	$(50,688)	$(267,265)	$(220,030)	$(135,789)
Net loss per share—basic and diluted	$(5.46)	$(0.86)	$(5.49)	$(5.20)	$(3.39)
Balance sheet data:					
Cash and cash equivalents	$370,829	$599,691	$122,420	$80,304	$73,551
Marketable securities	803,083	489,349	195,425	112,189	136,793
Working capital	1,252,493	1,140,312	298,054	162,249	210,929
Total assets	1,642,075	1,307,964	424,104	273,782	295,033
Long-term debt	420,554	431,051	16,150	20,905	6,328
Stockholders' equity	1,032,276	789,217	336,691	190,347	247,653

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

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with our consolidated financial statements and related notes included elsewhere in this Annual Report on Form 10-K. This discussion contains forward-looking statements that involve risks and uncertainties. Please review our legend titled "Forward-Looking Information" at the beginning of this Annual Report on Form 10-K which is incorporated herein by reference. Our actual results could differ materially from those discussed below. Factors that could cause or contribute to such differences include, but are not limited to, those identified below, and those discussed in the section titled "Risk Factors" included elsewhere in this Annual Report on Form 10-K. Throughout this discussion, unless the context specifies or implies otherwise, the terms "Sarepta", "we", "us" and "our" refer to Sarepta Therapeutics, Inc. and its subsidiaries.

Overview

We are a commercial-stage biopharmaceutical company focused on helping patients through the discovery and development of unique RNA-targeted therapeutics, gene therapy and other genetic therapeutic modalities for the treatment of rare diseases. Applying our proprietary, highly-differentiated and innovative technologies, and through collaborations with our strategic partners, we are developing potential therapeutic candidates for a broad range of diseases and disorders, including DMD, LGMDs, CMT, MPS IIIA and Pompe.

Our first commercial product in the U.S., EXONDYS 51, was granted accelerated approval by the FDA on September 19, 2016. EXONDYS 51 is indicated for the treatment of DMD in patients who have a confirmed mutation of the DMD gene that is amenable to exon 51 skipping. EXONDYS 51 uses our PMO chemistry and exon-skipping technology to skip exon 51 of the dystrophin gene. EXONDYS51 is designed to bind to exon 51 of dystrophin pre-messenger RNA ("mRNA"), resulting in exclusion of this exon during mRNA processing in patients with genetic mutations that are amenable to exon 51 skipping. Exon skipping is intended to promote the production of an internally truncated but functional dystrophin protein.

A summary description of our main product candidates, including those in collaboration with our strategic partners, is as follows:

- Golodirsen (SRP-4053) uses our PMO chemistry and exon-skipping technology to skip exon 53 of the DMD gene. Golodirsen is designed to bind to exon 53 of dystrophin pre-mRNA, resulting in exclusion, or "skipping", of this exon during mRNA processing in patients with genetic mutations that are amenable to exon 53 skipping. We are enrolling and dosing patients in ESSENCE (4045-301), our Phase 3 placebo controlled confirmatory trial in patients who have a confirmed mutation of the DMD gene that is amenable to exon 45 or 53 skipping using casimersen and golodirsen, respectively. Golodirsen is also being evaluated in a Phase 1/2 trial having two parts. Part I of the Phase 1/2 trial has been completed, and Part II, an open-label portion of the trial, is expected to be completed in 2019 (Study 4053-101). In September 2017, we announced positive results of an analysis that included biopsies of the bicep muscle at baseline and on-treatment at the Part II, Week 48 time point. The 4053-101 interim trial results demonstrated statistical significance on all primary and secondary biological endpoints. In December 2018, we completed the submission of our rolling NDA to the FDA seeking accelerated approval for golodirsen. The FDA accepted the NDA and granted priority review status for golodirsen with a targeted regulatory action date of August 19, 2019. The FDA also indicated that it does not intend to conduct an advisory board for golodirsen.
- Casimersen (SRP-4045) uses our PMO chemistry and exon-skipping technology to skip exon 45 of the DMD gene. Casimersen is designed to bind to exon 45 of dystrophin pre-mRNA, resulting in exclusion, or "skipping", of this exon during mRNA processing in patients with genetic mutations that are amenable to exon 45 skipping. We are enrolling and dosing patients in ESSENCE, further described above. We have completed a dose titration portion (Phase 1) and the open-label portion (Phase 2) of a Sarepta sponsored Phase 1/2 the trial clinical trial studying casimersen (4045-101). We anticipate submitting an NDA to the FDA for casimersen in 2019 if we believe the results of an interim dystrophin analysis in the ESSENCE study are positive.

- SRP-5051 uses our next-generation chemistry platform, PPMO, and our exon-skipping technology to skip exon 51 of the DMD gene. SRP-5051, a peptide conjugated PMO, is designed to bind to exon 51 of dystrophin pre-mRNA, resulting in exclusion of this exon during mRNA processing in patients with genetic mutations that are amenable to exon 51 skipping. Exon skipping is intended to promote the production of an internally truncated but functional dystrophin protein. In the fourth quarter of 2017, we received clearance from the FDA and commenced a first-in-human, single ascending dose, study for the treatment of DMD in patients who are amenable to exon 51 skipping. We expect to complete this study in 2019.
- SRP-9001 (micro-dystrophin gene therapy program), in collaboration with Nationwide, aims to express micro-dystrophin – a smaller but still functional version of dystrophin. A unique, engineered micro-dystrophin is used because naturally-occurring dystrophin is too large to fit in an AAV vector. In the fourth quarter of 2017, an IND application for the micro-

dystrophin gene therapy program was cleared by the FDA, and a Phase 1/2a clinical trial in individuals with DMD was initiated. On October 3, 2018, Nationwide presented positive results from the Phase 1/2a clinical trial in four individuals with DMD enrolled in the trial. In the fourth quarter of 2018, we commenced a placebo-controlled trial with the goal to establish the functional benefits of micro-dystrophin expressions. We plan to conduct a confirmatory trial using commercial supply of SRP-9001 by the end of 2019, pending regulatory feedback.

- MYO-101. Myonexus, one of our strategic partners, develops gene therapy programs for various forms of LGMDs. The most advanced of Myonexus' product candidates, MYO-101, is designed to transfer a gene that codes for and restores beta-sarcoglycan protein with the goal of restoring the dystrophin associated protein complex. It utilizes the AAVrh.74 vector system, the same vector used in the micro-dystrophin gene therapy program we are developing with Nationwide. Myonexus commenced a Phase 1/2a trial of MYO-101 in the fourth quarter of 2018, and on February 27, 2019, we announced positive two-month data from the first three-patient cohort dosed in the MYO-101 trial.
- GALGT2. An additional gene therapy program for DMD and other muscular dystrophies, also in collaboration with Nationwide, aims to express the enzyme GALGT2 from an AAV vector. In the fourth quarter of 2017, the IND application for GALGT2 was cleared by the FDA, and a Phase 1/2a clinical trial testing GALGT2 for the treatment of DMD was initiated.
- LYS-SAF 302. We are collaborating with Lysogene to develop a gene therapy, LYS-SAF302, to treat MPS IIIA. The first patient has been dosed in AAVance, a global Phase 2/3 clinical trial of LYS-SAF302, aiming at evaluating the effectiveness of a one-time delivery of a AAVrh10 virus carrying the N-SGSH gene.
- Neutrophin 3 (CMT Type 1A). A gene therapy program in collaboration with Nationwide that aims to express NT-3 encoding the NTF3 gene to treat CMT neuropathies, including CMT type 1A. A clinical trial to test NT-3 gene therapy is planned to commence dosing in 2019 for CMT type 1A, pending regulatory feedback. We believe that the delivery of NT-3 gene may have applicability to other sub-types of CMT in addition to other muscle-wasting diseases.

Our pipeline includes 25 programs in various stages of pre-clinical and clinical development, reflecting our aspiration to apply our multifaceted approach and expertise in precision genetic medicine to make a profound difference in the lives of patients suffering from rare diseases.

We have developed proprietary state-of-the-art CMC and manufacturing capabilities that allow synthesis and purification of our product candidates to support both clinical development as well as commercialization. Our current main focus in manufacturing is to continue scaling up production of our PMO-based therapies and optimizing manufacturing for PPMO and gene therapy-based product candidates. We have entered into certain manufacturing and supply arrangements with third-party suppliers which will in part utilize these capabilities to support production of certain of our product candidates and their components. In 2017, we opened a facility in Andover, Massachusetts, which significantly enhances our research and development manufacturing capabilities. However, we currently do not have internal large scale GMP manufacturing capabilities to produce our product and product candidates for commercial and/or clinical use.

As of December 31, 2018, we had approximately $1,174.9 million of cash, cash equivalents and investments, consisting of $370.8 million of cash and cash equivalents, $803.1 million of short-term investments and $1.0 million of long-term restricted investment. We believe that our balance of cash, cash equivalents and investments is sufficient to fund our current operational plan for at least the next twelve months.

The likelihood of our long-term success must be considered in light of the expenses, difficulties and delays frequently encountered in the development and commercialization of new pharmaceutical products, competitive factors in the marketplace and the complex regulatory environment in which we operate. We may never achieve significant revenue or profitable operations.

Critical Accounting Policies and Estimates

The discussion and analysis of our financial condition and results of operations are based upon our consolidated financial statements included elsewhere in this Annual Report on Form 10-K. The preparation of our consolidated financial statements in accordance with accounting principles generally accepted in the U.S. requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues and expenses and related disclosure of contingent assets and liabilities for the periods presented. Some of these judgments can be subjective and complex, and, consequently, actual results may differ from these estimates. We believe that the estimates and judgments upon which we rely are reasonable based upon historical experience and information available to us at the time that we make these estimates and judgments. To the extent there are material differences between these estimates and actual results, our consolidated financial statements will be affected. Although we believe that our judgments and

estimates are appropriate, actual results may differ from these estimates. We believe the following accounting policies to be most critical to the judgments and estimates used in the preparation of our consolidated financial statements:

- revenue recognition;
- inventory;
- stock-based compensation; and
- income tax.

Revenue Recognition

To determine revenue recognition for arrangements within the scope of ASC 606, we perform the following five steps: (1) identify the contracts with a customer; (2) identify the performance obligations in the contract; (3) determine the transaction price; (4) allocate the transaction price to the performance obligations in the contract; and (5) recognize revenue when or as we satisfy a performance obligation.

Variable Consideration

Product revenues are recorded at the net sales price (transaction price) which includes estimated reserves for variable consideration, such as Medicaid rebates, governmental chargebacks, including Public Health Service ("PHS") chargebacks, prompt payment discounts, co-pay assistance and distribution fees. 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 no payment is required by us) or a current liability (if a payment is required by us). These reserves reflect our best estimates of the amount of consideration to which we are entitled based on the terms of the contracts. Additional details relating to variable consideration follows:

- Medicaid rebates relate to our estimated obligations to states under established reimbursement arrangements. Rebate reserves are recorded in the same period the related revenue is recognized, resulting in a reduction of product revenue and the establishment of a liability which is included in accrued expenses.
- Governmental chargebacks, including PHS chargebacks, relate to our estimated obligations resulting from contractual commitments to sell products to qualified healthcare providers at prices lower than the list prices that we charge to wholesalers. The wholesaler charges us for the difference between what the wholesaler pays for the products and the ultimate selling price to the qualified healthcare providers. Chargeback reserves are recorded in the same period the related revenue is recognized, resulting in a reduction of product revenue and accounts receivable. Chargeback amounts are generally determined at the time of resale to the qualified healthcare provider from the wholesaler, and we generally issue credits for such amounts within a few weeks of receiving notification of resale from the wholesaler.
- Prompt payment discounts relate to our estimated obligations for credits to be granted to a specialty pharmacy for remitting payment on its purchases within established incentive periods. Reserves for prompt payment discounts are recorded in the same period the related revenue is recognized, resulting in a reduction of product revenue and accounts receivable.
- Co-pay assistance relates to financial assistance provided to qualified patients, whereby we may assist them with prescription drug co-payments required by the patient's insurance provider. Reserves for co-pay assistance are recorded in the same period the related revenue is recognized, resulting in a reduction of product revenue and the establishment of a liability which is included in accrued expenses.
- Distribution fees relate to fees paid to Customers in the distribution channel that provide us with inventory management, data and distribution services and are generally accounted for as a reduction of revenue. To the extent that the services received are distinct from our sale of products to the Customer, these payments are accounted for as selling, general and administrative expenses. Reserves for distribution fees result in an increase in a liability if

payments are required of us or a reduction of accounts receivable if no payments are required of us.

Please read Note 7, Accounts Receivable and Reserves for Product Sales to the consolidated financial statements included elsewhere in this Annual Report on Form 10-K for a further discussion of revenue recognition.

Inventory Valuation

We periodically analyze our inventory levels, and write down inventory that has become obsolete, inventory that has a cost basis in excess of its estimated net realizable value and inventory in excess of expected sales requirements as cost of sales. The determination of whether inventory costs will be realizable requires estimates by management. If actual market conditions are less favorable than projected by management, additional write-downs of inventory may be required.

Stock Compensation Expense

For stock awards with performance conditions, determining the appropriate amount to expense based on the anticipated achievement of performance targets requires judgment, including forecasting the achievement of future financial targets. The estimate of expense is revised periodically based on the probability of achieving the required performance targets and adjustments are made throughout the term as appropriate. The cumulative impact of any revision is reflected in the period of change.

Please read Note 16, Stock-Based Compensation to the consolidated financial statements included elsewhere in this Annual Report on Form 10-K for a further discussion of stock-based compensation.

Income Tax

The Company recognizes the effect of income tax positions only if those positions are more likely than not of being sustained upon an examination. The calculation of our tax liabilities resulting from uncertain tax positions can involve significant judgment. Further, the calculation may involve the application of complex tax regulations in a foreign jurisdiction. Although we believe that we have adequately provided for tax liabilities resulting from uncertain tax positions, the actual amounts paid, if any, could have a material impact on our results of operations. Interest and penalties associated with uncertain tax positions are classified as a component of income tax expense.

Please read Note 2, Summary Of Significant Accounting Policies and Recent Accounting Pronouncements to the consolidated financial statements included elsewhere in this Annual Report on Form 10-K for a further discussion of our critical accounting policies and estimates.

The following table sets forth selected consolidated statements of operations data for each of the periods indicated:

	For the Year Ended December 31			
	2018	2017	Change	Change
	(in thousands, except per share amounts)		$	%
Revenues:				
Product, net	$301,034	$154,584	$146,450	95 %
Total revenues	301,034	154,584	146,450	95 %
Cost and expenses:				
Cost of sales (excluding amortization of in-licensed rights)	34,193	7,353	26,840	365 %
Research and development	401,843	166,707	235,136	141 %
Selling, general and administrative	207,761	122,682	85,079	69 %
EXONDYS 51 settlement and license charges	—	28,427	(28,427)	(100)%
Amortization of in-licensed rights	865	1,053	(188)	(18)%
Total cost and expenses	644,662	326,222	318,440	98 %
Operating loss	(343,628)	(171,638)	(171,990)	100 %
Other (loss) income:				
Interest expense and other, net	(18,982)	(1,990)	(16,992)	NM*
Gain from sale of Priority Review Voucher	—	125,000	(125,000)	(100)%
Loss before income tax (benefit) expense	(362,610)	(48,628)	(313,982)	NM*
Income tax (benefit) expense	(692)	2,060	(2,752)	(134)%
Net loss	$(361,918)	$(50,688)	$(311,230)	NM*
Net loss per share — basic and diluted	$(5.46)	$(0.86)	$(4.60)	NM*

	For the Year Ended December 31			
	2017	2016	Change	Change
	(in thousands, except per share amounts)		$	%
Revenues:				
Product, net	$154,584	$5,421	$149,163	NM*
Total revenues	154,584	5,421	149,163	NM*
Cost and expenses:				
Cost of sales (excluding amortization of in-licensed rights)	7,353	101	7,252	NM*
Research and development	166,707	188,272	(21,565)	(11)%
Selling, general and administrative	122,682	83,749	38,933	46 %
EXONDYS 51 settlement and license charges	28,427	—	28,427	NM*
Amortization of in-licensed rights	1,053	29	1,024	NM*
Total cost and expenses	326,222	272,151	54,071	20 %
Operating loss	(171,638)	(266,730)	95,092	(36)%

Other (loss) income:					
Interest expense and other, net	(1,990)	(535)	(1,455)	272	%
Gain from sale of Priority Review Voucher	125,000	—	125,000	NM*	
Loss before income tax expense	(48,628)	(267,265)	$218,637	(82)%	
Income tax expense	2,060	—	$2,060	NM*	
Net loss	$(50,688)	$(267,265)	$216,577	(81)%	
Net loss per share — basic and diluted	$(0.86)	$(5.49)	$4.63	(84)%	

*NM: not meaningful

Revenues

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 Medicaid rebates, governmental chargebacks, including PHS chargebacks, prompt pay discounts, co-pay assistance and distribution fees. 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 no payments are required of us) or a current liability (if a payment is required of us). These reserves are based on estimates of the amounts earned or to be claimed on the related sales. Our estimates take into consideration current contractual and statutory requirements. The amount of variable consideration that is included in the transaction price may be constrained, and is included in the net sales price only to the extent that it is probable that a significant reversal in the amount of the cumulative revenue recognized will not occur in a future period. Actual amounts of consideration ultimately received or paid may differ from our estimates. If actual results in the future vary from our estimates, we will adjust these estimates, which would affect net product revenue and earnings in the period such variances become known.

Net product revenues for EXONDYS 51 for 2018 increased by $146.5 million compared with 2017. Net product revenues for EXONDYS 51 for 2017 increased by $149.2 million compared with 2016. The increases primarily reflect the continuing increase in demand for EXONDYS 51 in the U.S.

Cost of Sales

Our cost of sales relates to sales of EXONDYS 51 following its commercial launch in the U.S. Prior to receiving regulatory approval for EXONDYS 51 by the FDA in September 2016, we expensed such manufacturing and material costs as research and development expenses. For EXONDYS 51 sold in 2017 and 2016, the majority of related manufacturing costs incurred had previously been expensed as research and development expenses, as such costs were incurred prior to the FDA approval of EXONDYS 51. For EXONDYS 51 sold in 2018, only part of the related manufacturing costs incurred had previously been expensed as research and development expenses. The following table summarizes the components of our cost of sales for the periods indicated:

	For the Year Ended December 31			
	2018	2017	Change $	Change %
	(in thousands)			
Royalty payments to BioMarin	$15,065	$4,719	$10,346	219 %
Inventory costs related to EXONDYS 51 sold	8,616	414	8,202	NM*
Overhead costs	4,754	1,387	3,367	243 %
Other inventory costs	5,758	833	4,925	NM*
Total cost of sales	$34,193	$7,353	$26,840	365 %

	For the Year Ended December 31			
	2017	2016	Change $	Change %
	(in thousands)			
Royalty payments to BioMarin	$4,719	$—	$4,719	NM*
Overhead costs	1,387	29	1,358	NM*
Inventory costs related to EXONDYS 51 sold	414	26	388	NM*
Other inventory costs	833	46	787	NM*

Total cost of sales	$7,353	$101	$7,252	NM*

*NM: not meaningful

The cost of sales for 2018 increased $26.8 million compared with 2017. The increase was primarily driven by the following:

- $10.3 million increase in royalty payments to BioMarin primarily as a result of the increasing demand for EXONDYS 51 during 2018;
- $8.2 million and $3.4 million increases in inventory costs related to EXONDYS 51 sold and overhead costs, respectively, reflect increasing demand for EXONDYS 51; and
- $4.9 million increase in other inventory costs as a result of the write-off of certain batches of EXONDYS 51 not meeting our quality specifications.

The cost of sales for 2017 increased $7.3 million compared with 2016. The increase was primarily driven by the following:

- $4.7 million increase in royalty payments to BioMarin as a result of the execution of the settlement and license agreements with BioMarin in July 2017 as well as increasing demand for EXONDYS 51 during 2017; and
- $1.4 million, $0.4 million and $0.8 million increases in overhead costs, inventory costs related to EXONDYS 51 sold, and other inventory costs, respectively, reflect increasing demand for EXONDYS 51.

If product related costs had not previously been expensed as research and development expenses prior to receiving FDA approval, the incremental inventory costs related to EXONDYS 51 sold in 2018, 2017 and 2016 would have been approximately $12.6 million, $8.6 million and $0.5 million, respectively.

Research and Development Expenses

Research and development expenses consist of costs associated with research activities as well as costs associated with our product development efforts, conducting pre-clinical trials, clinical trials and manufacturing activities. Direct research and development expenses associated with our programs include clinical trial site costs, clinical manufacturing costs, costs incurred for consultants, up-front fees and milestones paid to third parties in connection with technologies that have not reached technological feasibility and do not have an alternative future use, and other external services, such as data management and statistical analysis support, and materials and supplies used in support of clinical programs. Indirect costs of our clinical programs include salaries, stock-based compensation and allocation of our facility costs.

Research and development expenses represent a substantial percentage of our total operating expenses. We do not maintain or evaluate and, therefore, do not allocate internal research and development costs on a project-by-project basis. As a result, a significant portion of our research and development expenses are not tracked on a project-by-project basis, as the costs may benefit multiple projects.

The following table summarizes our research and development expenses by project for each of the periods indicated:

	For the Year Ended December 31			
	2018	2017	Change $	Change %
	(in thousands)			
Up-front and milestone payments	$142,413	$22,000	$120,413	NM*
Eteplirsen (exon 51)	32,056	40,161	(8,105)	(20)%
Casimersen (exon 45)	26,758	19,867	6,891	35 %
Golodirsen (exon 53)	25,875	19,626	6,249	32 %
PPMO platform	23,911	8,145	15,766	194 %
Gene therapies	8,880	—	8,880	NM*
Summit Utrophin cost-sharing	8,599	—	8,599	NM*
Other projects	2,135	1,200	935	78 %
Internal research and development expenses	131,216	55,708	75,508	136 %
Total research and development expenses	$401,843	$166,707	$235,136	141 %

	For the Year Ended December 31			
	2017	2016	Change $	Change %
	(in thousands)			
Eteplirsen (exon 51)	$40,161	$65,454	$(25,293)	(39)%

Up-front and milestone payments	22,000	48,035	(26,035)	(54	)%
Golodirsen (exon 53)	19,626	11,847	7,779	66	%
Casimersen (exon 45)	19,867	9,562	10,305	108	%
PPMO platform	8,145	570	7,575	NM*	
Other projects	1,200	678	522	77	%
Internal research and development expenses	55,708	52,126	3,582	7	%
Total research and development expenses	$166,707	$188,272	$(21,565)	(11	)%

*NM: not meaningful

The following table summarizes our research and development expenses by category for each of the periods indicated:

	For the Year Ended December 31			
	2018	2017	Change $	Change %
	(in thousands)			
Up-front and milestone payments	$142,413	$22,000	$120,413	NM*
Clinical and manufacturing expenses	111,101	75,728	35,373	47 %
Compensation and other personnel expenses	49,701	25,607	24,094	94 %
Pre-clinical expenses	22,992	9,407	13,585	144 %
Professional services	17,926	10,132	7,794	77 %
Facility-related expenses	16,555	8,940	7,615	85 %
Stock-based compensation	14,214	8,542	5,672	66 %
Collaboration expense	8,599	—	8,599	NM*
Restructuring expenses	—	188	(188)	(100)%
Other	18,342	6,163	12,179	198 %
Total research and development expenses	$401,843	$166,707	$235,136	141 %

	For the Year Ended December 31			
	2017	2016	Change $	Change %
	(in thousands)			
Clinical and manufacturing expenses	$75,728	$82,077	$(6,349)	(8)%
Compensation and other personnel expenses	25,607	21,322	4,285	20 %
Up-front and milestone payments	22,000	48,035	(26,035)	(54)%
Professional services	10,132	7,537	2,595	34 %
Pre-clinical expenses	9,407	3,415	5,992	175 %
Facility-related expenses	8,940	8,095	845	10 %
Stock-based compensation	8,542	9,499	(957)	(10)%
Restructuring expenses	188	2,013	(1,825)	(91)%
Research and other	6,163	6,279	(116)	(2)%
Total research and development expenses	$166,707	$188,272	$(21,565)	(11)%

*NM: not meaningful

Research and development expenses for 2018 increased by $235.1 million, or 141%, compared with 2017. The increase was primarily driven by the following:

- $120.4 million increase in up-front and milestone payments, primarily consisting of (1) $85.0 million up-front and milestone payments to Myonexus as a result of the execution of a warrant agreement in May 2018 as well as certain development milestones being achieved or becoming probable of being achieved, (2) $44.8 million up-front and milestone payments to Lysogene as a result of the execution of a collaboration and license agreement in October 2018 as well as certain development milestones becoming probable of being achieved, and (3) $8.0 million related to the purchase of a license to develop, manufacture and commercialize a pre-clinical Pompe product candidate under a license agreement with Lacerta in August 2018, partially offset by a $22.0 million payment in the prior year to Summit as a result of achieving the milestone of the last patient being dosed in the safety arm cohort to the PhaseOut DMD study;
- $35.4 million increase in clinical and manufacturing expenses primarily due to increased patient enrollment in our ongoing ESSENCE trial as well as a ramp-up of manufacturing activities for golodirsen, our gene therapy programs,

and our PPMO platform. These increases were partially offset by a ramp-down of clinical trials in eteplirsen primarily because the PROMOVI trial has been fully enrolled;

- $24.1 million and $7.6 million increases in compensation and other personnel expenses and facility-related expenses, respectively, primarily due to a net increase in headcount;
- $13.6 million increase in pre-clinical expenses primarily due to the continuing ramp-up of toxicology studies in our PPMO platform;
- $7.8 million increase in professional services primarily due to continuing accelerated company growth as a result of expansion of our research and development pipeline;
- $5.7 million increase in stock-based compensation expense primarily driven by increases in headcount and stock price;

- $8.6 million increase in collaboration expense driven by collaboration cost sharing with Summit on its Utrophin platform; and
- $12.2 million increase in research and other, primarily consisting of (1) $4.0 million increase in sponsored research with institutions such as Duke University and Nationwide, (2) $3.8 million increase in loss due to impairment of certain patents, and (3) $2.9 million increase in lab supplies as a result increase in headcount.

Research and development expenses for 2017 decreased by $21.6 million, or 11%, compared with 2016. The increase was primarily driven by the following:

- $6.3 million decrease in clinical and manufacturing expenses primarily because of the capitalization of inventory following the approval of EXONDYS 51 by the FDA partially offset by increased patient enrollment in our on-going late stage clinical trials;
- $26.0 million decrease in up-front and milestone payments. In 2017, we made a $22.0 million payment to Summit as a result of achieving the milestone of the last patient being dosed in the safety arm cohort to the PhaseOut DMD study. In 2016, we made $40.0 million and $7.0 million up-front payments to Summit and UWA, respectively, as a result of the execution of their respective license agreements;
- $4.3 million increase in compensation and other personnel expenses as a result of an increase in headcount;
- $2.6 million increase in professional fee due to accelerated company growth as a result of expansion of our research and development pipeline;
- $6.0 million increase in pre-clinical expenses as a result of a ramp-up of toxicology studies in our PPMO platform and other follow-on exons; and
- $1.8 million decrease in restructuring expenses as a majority of activities of the restructuring plans implemented in 2016 were completed prior to 2017.

Selling, General and Administrative Expenses

Selling, general and administrative expenses consist of salaries, benefits, stock-based compensation and related costs for personnel in our executive, finance, legal, information technology, business development, human resources, commercial and other general and administrative functions. Other general and administrative expenses include an allocation of our facility costs and professional fees for legal, consulting and accounting services.

The following table summarizes our selling, general and administrative expenses by category for each of the periods indicated:

	For the Year Ended December 31			
	2018	2017	Change $	Change %
	(in thousands)			
Professional services	$78,856	$44,652	$34,204	77 %
Compensation and other personnel expenses	72,042	36,956	35,086	95 %
Stock-based compensation	35,913	19,848	16,065	81 %
Facility-related expenses	10,729	5,828	4,901	84 %
Former CEO severance expense	—	3,537	(3,537)	(100)%
Restructuring expenses	(2,222)	2,832	(5,054)	(178)%
Other	12,443	9,029	3,414	38 %
Total selling, general and administrative expenses	$207,761	$122,682	$85,079	69 %

	For the Year Ended December 31			
	2017	2016	Change $	Change %
	(in thousands)			
Professional services	$44,652	$19,372	$25,280	130 %
Compensation and other personnel expenses	36,956	29,807	7,149	24 %
Stock-based compensation	19,848	20,463	(615)	(3)%
Facility-related expenses	5,828	4,669	1,159	25 %
Former CEO severance expense	3,537	—	3,537	NM*
Restructuring expenses	2,832	2,548	284	11 %
Other	9,029	6,890	2,139	31 %
Total selling, general and administrative expenses	$122,682	$83,749	$38,933	46 %

*NM: not meaningful

Selling, general and administrative expenses for 2018 increased by $85.1 million, or 69%, compared with 2017. This was primarily driven by the following:

- $34.2 million increase in professional services primarily due to continuing global expansion;
- $35.1 million and $4.9 million increases in compensation and other personnel expenses and facility-related expenses, respectively, primarily due to an increase in headcount;
- $16.1 million increase in stock-based compensation primarily due to increases in headcount and stock price, the achievement of a milestone related to the September 2016 restricted stock awards with performance conditions as well as the impact of revised forfeiture rate assumption for officers and members of our Board of Directors (beginning on January 1, 2018, based on recent trending of employee turnover data, we began to apply different forfeiture rates to non-officer employees and directors and officers);
- $3.5 million decrease in severance expense as a result of the termination of our former CEO in June 2017; and
- $5.1 million decrease in restructuring expenses primarily due to the relief of cease-use liabilities as a result of the termination of the rental agreement for our Corvallis facility.

Selling, general and administrative expenses for 2017 increased by $38.9 million, or 46%, compared with 2016. This was primarily driven by the following:

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- $25.3 million increase in professional services driven by increased legal fees because of on-going litigations and global expansion;
- $7.1 million and $1.2 million increases in compensation and other personnel expenses and facility-related expenses, respectively, primarily reflect an increase in headcount; and
- $3.5 million increase in severance expense due to the resignation of our former CEO.

EXONDYS 51 Settlement and License Charges

As a result of the execution of the settlement and license agreements with BioMarin in July 2017, we recognized EXONDYS 51 litigation and license charges of $28.4 million during 2017.

Amortization of In-licensed Rights

Amortization of in-license rights relate to the agreements we entered into with BioMarin and UWA in July 2017 and April 2011, respectively. We recorded an in-licensed right asset of approximately $6.6 million as a result of the settlement and license agreements with BioMarin. Additionally, following the first sale of EXONDYS 51 in September 2016, we recorded an in-licensed right asset of $1.0 million related to the license agreement with UWA. Both in-licensed rights are being amortized on a straight-line basis over the life of the patent from the first commercial sale of EXONDYS 51. For the years ended December 31, 2018, 2017 and 2016, we recorded amortization of in-licensed rights of approximately $0.9 million, $1.1 million and less than $0.1 million, respectively.

Interest expense and other, net

Interest expense and other, net, primarily consists of interest income on our cash, cash equivalents and investments, interest expense and rental income and loss. Our cash equivalents and investments consist of money market funds, commercial paper, government and government agency debt securities and certificates of deposit. Interest expense includes interest accrued on our convertible notes, term loan, revolving line of credit and a mortgage loan related to our Corvallis, Oregon property. Rental income and loss is from leasing excess space in some of our facilities.

Interest expense and other, net for 2018 increased by $17.0 million compared with 2017. Interest expense and other, net for 2017 increased by $1.5 million compared with 2016. For both 2018 and 2017, the increase was primarily driven by an increase in interest expense incurred in connection with the $570.0 million convertible debt offering partially offset by interest income from higher balances of cash, cash equivalents and investments.

Gain from Sale of Priority Review Voucher

In February 2017, we entered into an agreement with Gilead Sciences, Inc. (“Gilead”) to sell our Rare Pediatric Disease Priority Review Voucher (“PRV”). We received the PRV when EXONDYS 51 was approved by the FDA for the treatment of patients with DMD amenable to exon 51 skipping. Following the early termination of the applicable waiting period under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended, in March 2017, we completed our sale of the PRV to a subsidiary of Gilead. Pursuant to the agreement, the subsidiary of Gilead paid us $125.0 million, which was recorded as a gain from sale of the PRV as it did not have a carrying value at the time of the sale.

Income tax (benefit) expense

Income tax benefit for 2018 was approximately $0.7 million, which primarily reflected adjustments to estimated state income taxes in 2017. Income tax expense for 2017 was approximately $2.1 million, which related to the alternative minimum tax related to the gain from the sale of the PRV and estimated state income taxes. There was no income tax expense in 2016.

Liquidity and Capital Resources

The following table summarizes our financial condition for each of the periods indicated:

	As of December 31, 2018	As of December 31, 2017	Change $	Change %
	(in thousands)			
Financial assets:				
Cash and cash equivalents	$370,829	$599,691	$(228,862)	(38)%
Short-term investments	803,083	479,369	323,714	68 %
Long-term investments	—	9,980	(9,980)	(100)%
Restricted cash and investments	1,001	784	217	28 %
Total cash, cash equivalents and investments	$1,174,913	$1,089,824	$85,089	8 %
Borrowings:				
Long-term debt	$—	$30,410	$(30,410)	(100)%
Convertible debt	420,554	400,641	19,913	5 %
Total borrowings	$420,554	$431,051	$(10,497)	(2)%
Working capital				
Current assets	$1,426,183	$1,228,644	$197,539	16 %
Current liabilities	173,690	88,332	85,358	97 %
Total working capital	$1,252,493	$1,140,312	$112,181	10 %

For the year ended December 31, 2018, our principal source of liquidity was from debt and equity financings and product sales from EXONDYS 51. For the year ended December 31, 2017, our principal source of liquidity was from debt and equity financings, sale of the PRV and product sales from EXONDYS 51. Our principal uses of cash are research and development expenses, selling, general and administrative expenses, investments, capital expenditures, business development transactions and other working capital requirements.

Our future expenditures and capital requirements may be substantial and will depend on many factors, including but not limited to the following:

- our ability to continue to generate revenues from sales of EXONDYS 51 and potential future products;
- the timing and costs associated with our global expansion;
- the timing and costs of building out our manufacturing capabilities;
- the timing of advanced payments related to our future inventory commitments and manufacturing obligations;
- the timing and costs associated with our clinical trials and pre-clinical trials;
- the attainment of milestones and our obligations to make milestone payments to Myonexus, BioMarin, Lysogene, Lacerta, Nationwide, UWA and other institutions;
- repayment of outstanding debt; and
- the costs of filing, prosecuting, defending and enforcing patent claims and our other intellectual property rights.

Our cash requirements are expected to continue to increase as we advance our research, development and commercialization programs and we expect to seek additional financings primarily from, but not limited to, the sale and issuance of equity and debt securities, the licensing or sale of our technologies or additional government contracts. We cannot provide assurances that financing will be available when and as needed or that, if available, the financings will be on favorable or acceptable terms. If we are unable to obtain additional financing when and if we require, this would have a material adverse effect on our business and results of operations. To the extent we issue additional equity securities, our existing stockholders could experience substantial dilution.

Cash Flows

The following table summarizes our cash flow activity for each of the periods indicated:

	For the Year Ended December 31			
	2018	2017	Change $	Change %
	(in thousands)			
Cash provided by (used in)				
Operating activities	$(388,660)	$(231,996)	$(156,664)	68 %
Investing activities	(370,488)	(178,815)	(191,673)	107 %
Financing activities	530,150	888,082	(357,932)	(40)%
(Decrease) increase in cash and cash equivalents	$(228,998)	$477,271	$(706,269)	(148)%

	For the Year Ended December 31			
	2017	2016	Change $	Change %
	(in thousands)			
Cash provided by (used in)				
Operating activities	$(231,996)	$(245,820)	$13,824	(6)%
Investing activities	(178,815)	(90,193)	(88,622)	98 %
Financing activities	888,082	378,129	509,953	135 %
Increase in cash and cash equivalents	$477,271	$42,116	$435,155	NM*

*NM: not meaningful

Operating Activities.

Cash used in operating activities increased by $156.7 million for 2018 compared with 2017, primarily due to the following:

- $186.2 million increase in net loss (excluding the gain from sale of PRV in 2017) primarily driven by increases in research and development expense and selling, general and administrative expense partially offset by an increase in net product revenues for EXONDYS 51; and
- $10.4 million increase in unfavorable change in operating assets and liabilities.

The increases were partially offset by:

- $37.7 million increase in non-cash adjustments.

Cash used in operating activities decreased by $13.8 million for 2017 compared with 2016 primarily due to the following:

- $91.6 million decrease in net loss (excluding the gain from sale of PRV) which was driven by net product revenues for EXONDYS 51 and decreased research and development expenses primarily due to capitalization of inventory following the approval of EXONDYS 51 partially offset by increased selling, general and administrative expenses; and
- $3.9 million increase in non-cash adjustments.

The increases were partially offset by:

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unfavorable changes of $81.7 million in operating assets and liabilities primarily related to increases in accounts receivables and inventory as we launched EXONDYS 51.

Investing Activities.

Cash used in investing activities increased by $191.7 million for 2018 compared with 2017, primarily due to the following:

- $582.1 million increase in purchase of available-for-sale securities;
- $49.2 million increase in purchase of property and equipment;
- $125.0 million decrease in proceeds from sales of the PRV; and
- $10.7 million decrease in proceeds from maturity of a restricted investment.

The increases were partially offset by:

- $569.6 million increase in proceeds from maturity of available-for-sale securities; and
- $6.0 million decrease in purchase of intangible assets.

Cash used in investing activities increased by $88.6 million for 2017 compared with 2016, primarily due to the following:

- $394.1 million increase in purchase of available-for-sale securities;
- $6.7 million increase in purchase of property and equipment; and
- $7.7 million increase in purchase of intangible assets.

The increases were partially offset by:

- $184.1 million increase in proceeds from maturity of available-for-sale securities;
  - $125.0 million from sales of the PRV;
- $10.7 million increase in proceeds from maturity of a restricted investment.

Financing Activities.

Cash provided by financing activities decreased by $357.9 million for 2018 compared with 2017, primarily driven by the following:

- $388.7 million decrease in proceeds from debt financings; and
- $214.6 million increase in repayment of outstanding debts.

The decreases were partially offset by:

- $159.5 million increase in proceeds from sales of common stock;
- $50.9 million decrease in purchase of capped call options; and
- $35.0 million increase in proceeds from the exercise of options and our employee stock purchase program.

Cash provided by financing activities increased by $510.0 million for 2017 compared with 2016, primarily driven by the following:

- $624.6 million increase in proceeds from debt financings.

The increase was partially offset by:

- $50.9 million increase in purchase of capped call options;
- $47.2 million increase in repayment of outstanding debts;
- $10.8 million decrease in proceeds from sales of common stock; and
- $5.7 million decrease in proceeds from the exercise of options and our employee stock purchase program.

Off-Balance Sheet Arrangements

During the periods presented, we did not have any relationships with unconsolidated entities or financial partnerships, such as entities often referred to as structured finance or special purpose entities, which would have been established for the purpose of facilitating off-balance sheet arrangements or for another contractually narrow or limited purpose.

Contractual Payment Obligations

In our continuing operations, we have entered into long-term contractual arrangements from time to time for our facilities, the provision of goods and services, and issuance of debt securities, among others. The following table presents contractual obligations arising from these arrangements as of December 31, 2018:

	Payment Due by Period				
	Total	Less Than 1 Year	1 - 3 Years	3 - 5 Years	More than 5 Years
	(in thousands)				
Convertible debt (1)	$620,231	$8,550	$17,100	$17,100	$577,481
Lease obligations	77,720	11,588	23,953	21,655	20,524
Manufacturing obligations (2)	458,352	182,352	68,000	84,000	124,000
Total contractual obligations and contingencies	$1,156,303	$202,490	$109,053	$122,755	$722,005

(1) Interest is included.

(2) Purchase obligations include agreements to purchase goods or services that are enforceable and legally binding or subject to cancellation fees and that specify all significant terms. Purchase obligations relate primarily to our commercialization of EXONDYS 51 and clinical programs for DMD and gene therapy programs.

Milestone Obligations

For product candidates that are currently in various research and development stages, we may be obligated to make up to $378.8 million of future development, up-front royalty and sales milestone payments associated with our collaboration and license agreements. Payments under these agreements generally become due and payable upon achievement of certain development, regulatory or sales milestones. Because the achievement of these milestones is not probable and payment is not required as of December 31, 2018, such contingencies have not been recorded in our consolidated financial statements. Amounts related to contingent milestone payments are not yet considered contractual obligations as they are contingent on the successful achievement of certain development, regulatory approval and sales milestones.

Other Funding Commitments

We have several on-going clinical trials in various stages. Our most significant clinical trial expenditures are to CROs. The CRO contracts are generally cancellable at our option. As of December 31, 2018, we have approximately $71.6 million in cancellable future commitments based on existing CRO contracts.

Recent Accounting Pronouncements

Please read Note 2, Summary of Significant Accounting Policies and Recent Accounting Pronouncements to the consolidated financial statements included elsewhere in this Annual Report on Form 10-K.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk.

Our current investment policy is to maintain a diversified investment portfolio consisting of money market investments, commercial paper, government and government agency bonds and high-grade corporate bonds with maturities of 36 months or less. Our cash is deposited in and invested through highly rated financial institutions in North America. As of December 31, 2018, we had $1,174.9 million of cash, cash equivalents and investments, comprised of $370.8 million of cash and cash equivalents, $803.1 million short-term investments and $1.0 million of restricted investment. The Company only holds debt securities classified as available-for-sale. The fair value of cash equivalents and short-term investments is subject to change as a result of potential changes in market interest rates. The potential change in fair value for interest rate sensitive instruments has been assessed on a hypothetical 10 basis point adverse movement across all maturities. For each of the years ended December 31, 2018 and 2017, we estimate that such hypothetical adverse 10 basis point movement would result in a hypothetical loss in fair value of approximately $0.1 million and $0.3 million, respectively, to our interest rate sensitive instruments.

Item 8. Financial Statements and Supplementary Data.

The information required by this Item 8 begins on page F-1 in Item 15 of Part IV of this Annual Report on Form 10-K and is incorporated into this item by reference.

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

None.

Item 9A. Controls and Procedures.

Disclosure Controls and Procedures

We carried out an evaluation as of the end of the period covered by this Annual Report on Form 10-K, under the supervision and with the participation of our management, including our principal executive officer and principal financial officer, of the effectiveness of our disclosure controls and procedures pursuant to paragraph (b) of Rule 13a-15 and 15d-15 under the Exchange Act. Based on that review, the principal executive officer and principal financial officer have concluded that our disclosure controls and procedures are effective to ensure that information required to be disclosed by us in the reports we file or submit under the Exchange Act (1) is recorded, processed, summarized, and reported within the time periods specified in the SEC rules and forms, and (2) is accumulated and communicated to our management, including our principal executive officer and principal financial officer, as appropriate to allow timely decisions regarding required disclosure.

We do not expect that our disclosure controls and procedures will prevent all errors and all fraud. A control procedure, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control procedure are met. Because of the inherent limitations in all control procedures, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, within our Company have been detected. These inherent limitations include the realities that judgments in decision making can be faulty, and that breakdowns can occur because of simple error or mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people, or by management override of the control. We considered these limitations during the development of our disclosure controls and procedures, and will continually reevaluate them to ensure they provide reasonable assurance that such controls and procedures are effective.

Internal Control over Financial Reporting

Management’s Annual Report on Internal Control over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting for our Company, as such term is defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act.

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 generally accepted accounting principles, and includes those policies and procedures that:

- pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of our assets;
- provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that our receipts and expenditures are being made only in accordance with authorizations of our management and 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. Management assessed the effectiveness of our internal control over financial reporting as of December 31, 2018. In making this assessment, management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO") in its 2013 Internal Control Integrated Framework.

Based on this assessment, management has concluded that, as of December 31, 2018, our internal control over financial reporting was effective based on those criteria.

The effectiveness of our internal control over financial reporting as of December 31, 2018 has been audited by KPMG LLP, an independent registered public accounting firm, as stated in their report which appears in this Annual Report on Form 10-K.

Changes in Internal Control over Financial Reporting

There have not been material changes in our internal control over financial reporting as defined in Rules 13a–15(f) and 15d–15(f) under the Exchange Act for the quarter ended December 31, 2018 that our certifying officers concluded materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Report of Independent Registered Public Accounting Firm

The Board of Directors and Stockholders

Sarepta Therapeutics, Inc.:

Opinion on Internal Control Over Financial Reporting

We have audited Sarepta Therapeutics, Inc. and subsidiaries' (the Company) internal control over financial reporting as of December 31, 2018, 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, 2018, 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, 2018 and 2017, the related consolidated statements of operations and comprehensive loss, stockholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2018, and the related notes (collectively, the consolidated financial statements), and our report dated February 28, 2019 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 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.

(signed) KPMG LLP

Cambridge, Massachusetts

February 28, 2019

Item 9B. Other Information.

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

The information regarding our directors and executive officers required by this item will be included in either an amendment to this Annual Report on Form 10-K or in our definitive proxy statement for our 2018 annual meeting of stockholders to be filed with the Commission not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K and is incorporated herein by reference.

Item 11. Executive Compensation.

The information required by this item will be included in either an amendment to this Annual Report on Form 10-K or in our definitive proxy statement for our 2019 annual meeting of stockholders to be filed with the Commission not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K and is incorporated herein by reference.

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

The information required by this item will be included in either an amendment to this Annual Report on Form 10-K or in our definitive proxy statement for our 2019 annual meeting of stockholders to be filed with the Commission not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K and is incorporated herein by reference.

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

The information required by this item will be included in either an amendment to this Annual Report on Form 10-K or in our definitive proxy statement for our 2019 annual meeting of stockholders to be filed with the Commission not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K and is incorporated herein by reference.

Item 14. Principal Accounting Fees and Services.

The information required by this item will be included in either an amendment to this Annual Report on Form 10-K or in our definitive proxy statement for our 2019 annual meeting of stockholders to be filed with the Commission not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K and is incorporated herein by reference.

PART IV

Item 15. Exhibits, Financial Statement Schedules.

(a) The following documents are filed as part of this Annual Report on Form 10-K:

(1) Financial Statements

The following consolidated financial statements of the Company and the Report of KPMG LLP, Independent Registered Public Accounting Firm, are included in Part IV of this Annual Report on Form 10-K on the pages indicated:

(2) Financial Statement Schedules

All schedules are omitted because they are not applicable or the required information is shown in the consolidated financial statements or the notes thereto.

(3) Exhibits

The exhibits required by Item 601 of Regulation S-K are listed in paragraph (b) below.

(b) Exhibits.

The following exhibits are filed herewith or are incorporated by reference to exhibits filed with the SEC:

		Incorporated by Reference to Filings Indicated				
					Filing	Provided
Exhibit Number	Description	Form	File No.	Exhibit	Date	Herewith
2.1	Agreement and Plan of Merger dated June 6, 2013 between Sarepta Therapeutics, Inc., a Delaware corporation, and Sarepta Therapeutics, Inc., an Oregon corporation.	8-K12B	001-14895	2.1	6/6/13	
2.2	Warrant to Purchase Common Stock of Myonexus Therapeutics, Inc., issued by Myonexus Therapeutics, Inc.	10-Q	001-14895	2.1	8/8/18	

	to Sarepta Therapeutics, Inc., dated as of May 3, 2018.				
3.1	Amended and Restated Certificate of Incorporation.	8-K12B	001-14895	3.1	6/6/13
3.2	Amendment to the Amended and Restated Certificate of Incorporation.	8-K	001-14895	3.1	6/30/15
3.3	Amended and Restated Bylaws.	8-K	001-14895	3.1	9/25/14
4.1	Form of Specimen Certificate for Common Stock.	10-Q	001-14895	4.1	8/8/13
4.2	Form of Common Stock Purchase Warrant, issued on January 30, 2009.	8-K	001-14895	4.4	1/30/09
4.3	Form of Common Stock Purchase Warrant, issued on August 25, 2009.	8-K	001-14895	4.1	8/24/09
4.4	Indenture, dated as of November 14, 2017, by and between Sarepta Therapeutics, Inc. and U. S. Bank National Association (including the form of the 1.50% Convertible Senior Note due 2024).	8-K	001-14895	4.1	11/14/17
4.5	Form of Note (included in Exhibit 4.1)	8-K	001-14895	4.1	11/14/17

Exhibit Number	Description	Incorporated by Reference to Filings Indicated			Filing Date	Provided Herewith
		Form	File No.	Exhibit		
10.1†	Amended and Restated Executive Employment Agreement dated April 19, 2013 by and between Sarepta Therapeutics, Inc. and Christopher Garabedian.	10-Q	001-14895	10.2	5/9/13	
10.2†	Executive Employment Agreement dated March 29, 2011 by and between AVI BioPharma, Inc. and Peter S. Linsley, Ph.D.	10-Q	001-14895	10.4	5/10/11	
10.3†	Executive Employment Agreement dated June 13, 2011 by and between AVI BioPharma, Inc. and Edward Kaye, M.D.	10-Q	001-14895	10.4	8/8/11	
10.4†	Stand Alone Stock Option Grant between the Registrant and Peter Linsley dated May 16, 2011.	S-8	333-175031	4.8	6/20/11	
10.5†	Stand Alone Stock Option Grant between the Registrant and Edward Kaye dated June 20, 2011.	S-8	333-175031	4.9	6/20/11	
10.6†	AVI BioPharma, Inc. 2002 Equity Incentive Plan.	Schedule 14A	001-14895	Appendix A	4/11/02	
10.7†	Sarepta Therapeutics, Inc. Amended and Restated 2011 Equity Incentive Plan.	8-K	001-14895	10.1	7/1/16	
10.8†	Form of Stock Option Award Agreement under the Amended and Restated 2011 Equity Incentive Plan.	10-K	001-14895	10.13	2/28/17	
10.9†	Form of Restricted Stock Agreement under the Amended and Restated 2011 Equity Incentive Plan.	10-K	001-14895	10.14	2/28/17	
10.10†	AVI BioPharma, Inc. Non-Employee Director Compensation Policy.	8-K	001-14895	10.85	10/1/10	
10.11†	Form of Indemnification Agreement.	8-K	001-14895	10.86	10/8/10	
10.12†	Form of Restricted Stock Unit Award Agreement under 2011 Equity Incentive Plan.	10-K	001-14895	10.17	2/28/17	
10.13†	Form of Stock Appreciate Right Award Agreement under the 2011 Equity Incentive Plan.	10-K	001-14895	10.18	2/28/17	

10.14†	Form of Senior Vice President Change in Control and Severance Agreement.	10-K	001-14895	10.19	3/15/13
10.15†	Form of Vice President Change in Control and Severance Agreement.	10-K	001-14895	10.20	3/15/13
10.16†	Sarepta Therapeutics, Inc. Amended and Restated 2013 Employee Stock Purchase Plan.	8-K	001-14895	10.2	7/1/16
10.17†	Executive Employment Agreement with Jayant Aphale, Ph.D.	10-Q	001-14895	10.1	8/8/13
10.18†	Offer Letter dated October 23, 2013 by and between Sarepta Therapeutics, Inc. and Sandesh Mahatme.	10-K	001-14895	10.24	3/3/14
10.19†	Offer Letter dated October 23, 2012 by and between Sarepta Therapeutics, Inc. and David Tyronne Howton.	10-K	001-14895	10.25	3/3/14
10.20†	Sarepta Therapeutics, Inc. 2014 Employment Commencement Incentive Plan, as amended.	S-8	001-14895	4.4	2/25/16

Exhibit Number	Description	Incorporated by Reference to Filings Indicated Form	File No.	Exhibit	Filing Date	Provided Herewith
10.21	Form of Stock Option Award Agreement under 2014 Employment Commencement Incentive Plan	10-K	001-14895	10.28	3/3/14	
10.22*	Amended and Restated Exclusive License Agreement by and among The University of Western Australia, Sarepta Therapeutics, Inc., and Sarepta International CV dated April 10, 2013.	10-Q	001-14895	10.1	5/9/13	
10.23*	First Amendment to License Agreement by and among The University of Western Australia, Sarepta Therapeutics, Inc., and Sarepta International CV dated June 19, 2016.	10-Q	001-14895	10.1	8/9/16	
10.24	Commercial Lease between Research Way Investments, Landlord, and Antivirals, Inc., Tenant, effective June 15, 1992.	SB-2	333-20513	10.9	1/28/97	
10.25	Lease Extension and Modification Agreement dated September 1, 1996, by and between Research Way Investments and Antivirals, Inc.	10-K	001-14895	10.53	3/15/11	
10.26	Second Lease Extension and Modification Agreement dated January 24, 2006 by and between Research Way Investments and AVI BioPharma, Inc.	10-Q	001-14895	10.55	8/9/06	
10.27	Real Property Purchase Agreement by and between WKL Investments Airport, LLC and AVI BioPharma, Inc., dated March 1, 2007, as amended.	10-Q	001-14895	10.61	8/9/07	
10.28	Lease Agreement dated June 25, 2013 by and between Sarepta Therapeutics, Inc. and ARE-MA Region No. 38, LLC.	8-K	001-14895	10.1	7/1/13	
10.29	Purchase and Sale Agreement dated May 22, 2014 between Sarepta Therapeutics, Inc. and Eisai Inc.	10-Q	001-14895	10.1	8/7/14	
10.30†	Employment Agreement dated September 20, 2016 between Sarepta Therapeutics, Inc. and Edward M. Kaye, M.D.	10-Q	001-14895	10.1	11/7/16	
10.31	Credit and Security Agreement between Sarepta Therapeutics, Inc. and MidCap Financial dated June 26, 2015	10-Q	001-14895	10.1	8/6/15	
10.32	Pledge Agreement between Sarepta Therapeutics, Inc. and MidCap Financial dated June 26, 2015	10-Q	001-14895	10.2	8/6/15	
10.33†	Separation and Consulting Agreement and General Release between Sarepta Therapeutics, Inc. and Christopher Garabedian entered into on June 30, 2015	10-Q	001-14895	10.3	8/6/15	

10.34†	Amendment No. 1 to the Sarepta Therapeutics, Inc. Amended and Restated 2011 Equity Incentive Plan	8-K	001-14895	10.1	6/30/15
10.35*	License and Collaboration Agreement between Summit (Oxford) Ltd and Sarepta Therapeutics, Inc. dated October 3, 2016	10-Q	001-14895	10.2	11/7/16
10.36	Asset Purchase Agreement dated February 20, 2017 by and between Sarepta Therapeutics Inc. and Gilead Sciences, Inc.	10-Q	001-14895	10.1	5/4/17

Exhibit Number	Description	Incorporated by Reference to Filings Indicated Form	File No.	Exhibit	Filing Date	Provided Herewith
10.37†	Offer Letter dated December 5, 2012 by and between Sarepta Therapeutics, Inc. and Shamim Ruff	10-Q	001-14895	10.2	5/4/17	
10.38†	Offer Letter dated December 3, 2012 by and between Sarepta Therapeutics, Inc. and Alexander “Bo” Cumbo	10-Q	001-14895	10.3	5/4/17	
10.39†	Offer Letter dated February 2, 2017 by and between Sarepta Therapeutics, Inc. and Dr. Catherine Stehman-Breen	10-Q	001-14895	10.4	5/4/17	
10.40†	Form of Severance Letter Agreement entered between Sarepta Therapeutics, Inc. and each of Sandesh Mahatme, Alexander “Bo” Cumbo, David Tyronne Howton, Jr. and Shamim Ruff	10-K	001-14895	10.58	3/1/18	
10.41†	Employment Agreement, dated as of June 26, 2017, between Sarepta Therapeutics, Inc. and Douglas S. Ingram	8-K	001-14895	10.1	6/28/17	
10.42†	Change in Control and Severance Agreement by and between Douglas S. Ingram and Sarepta Therapeutics, Inc., effective June 26, 2017	8-K	001-14895	10.2	6/28/17	
10.43†	Amendment No. 1 to the Sarepta Therapeutics, Inc. 2014 Employment Commencement Incentive Plan	8-K	001-14895	10.3	6/28/17	
10.44†	Restricted Stock Agreement under the 2014 Employment Commencement Incentive Plan	8-K	001-14895	10.4	6/28/17	
10.45†	Performance Stock Option Award Agreement under the 2014 Employment Commencement Incentive Plan	8-K	001-14895	10.5	6/28/17	
10.46	Amendment No. 1 to the License and Collaboration Agreement between Summit (Oxford) Ltd. and Sarepta Therapeutics Inc. dated June 13, 2017	10-Q	001-14895	10.1	8/3/17	
10.47*	Settlement Agreement between Sarepta Therapeutics, Inc., Sarepta International C.V. and The University of Western Australia on the one hand, and BioMarin Leiden Holding BV, BioMarin Nederlands BV and BioMarin Technologies BV on the other hand dated July 17, 2017	10-Q	001-14895	10.7	8/3/17	
10.48*	License Agreement between Sarepta Therapeutics, Inc. and Sarepta International C.V. on the one hand and BioMarin Leiden Holding BV, BioMarin Nederlands BV and BioMarin Technologies BV on the other hand dated July 17, 2017	10-Q	001-14895	10.8	8/3/17	
10.49		10-Q	001-14895	10.9	8/3/17	

	Amended and Restated Credit and Security Agreement between Sarepta Therapeutics, Inc. and MidCap Financial Trust dated July 18, 2017				
10.50	Revolving Credit and Security Agreement between Sarepta Therapeutics, Inc. and MidCap Financial Trust dated July 18, 2017	10-Q	001-14895	10.10	8/3/17
10.51	Amendment to the Pledge Agreement related to the Amended and Restated Credit and Security Agreement between Sarepta Therapeutics, Inc. and MidCap Financial Trust dated July 18, 2017	10-Q	001-14895	10.11	8/3/17

Exhibit Number	Description	Incorporated by Reference to Filings Indicated Form	File No.	Exhibit	Filing Date	Provided Herewith
10.52	Pledge Agreement related to the Revolving Credit Agreement between Sarepta Therapeutics, Inc. and MidCap Financial Trust dated July 18, 2017	10-Q	001-14895	10.12	8/3/17	
10.53	Consulting Agreement dated August 17, 2017 by and between Sarepta Therapeutics, Inc. and Dr. Edward M. Kaye	10-Q	001-14895	10.1	11/1/17	
10.54	Offer Letter dated August 28, 2017 by and between Sarepta Therapeutics, Inc. and Guriqbal S. Basi	10-Q	001-14895	10.2	11/1/17	
10.55	Letter Agreement by and between Sarepta Therapeutics, Inc. and Guriqbal S. Basi dated September 25, 2017	10-Q	001-14895	10.3	11/1/17	
10.56	Letter Agreement by and between Sarepta Therapeutics, Inc. and Catherine Stehman-Breen dated September 26, 2017	10-Q	001-14895	10.4	11/1/17	
10.57	First Amendment to the Amended and Restated Credit and Security Agreement, dated November 7, 2017, between the Company and MidCap Financial Trust, as administrative agent.	8-K	001-14895	4.3	11/14/17	
10.58	First Amendment to the Credit and Security Agreement, dated November 7, 2017, between the Company and MidCap Financial Trust, as administrative agent	8-K	001-14895	4.4	11/14/17	
10.59	Base Call Option Transaction Confirmation, dated as of November 8, 2017, between Sarepta Therapeutics, Inc. and JPMorgan Chase Bank, National Association, London Branch.	8-K	001-14895	10.1	11/14/17	
10.60	Base Call Option Transaction Confirmation, dated as of November 8, 2017, between Sarepta Therapeutics, Inc. and Goldman Sachs & Co. LLC.	8-K	001-14895	10.2	11/14/17	
10.61	Additional Call Option Transaction Confirmation, dated as of November 9, 2017, between Sarepta Therapeutics, Inc. and JPMorgan Chase Bank, National Association, London Branch	8-K	001-14895	10.3	11/14/17	
10.62	Additional Call Option Transaction Confirmation, dated as of November 9, 2017, between Sarepta Therapeutics, Inc. and Goldman Sachs & Co. LLC	8-K	001-14895	10.4	11/14/17	
10.63†	General Release and Amendment to Separation Agreement between Sarepta Therapeutics, Inc. and Dr. Catherine Stehman-Breen dated April 12, 2018	10-Q	001-14895	10.1	5/3/18	

10.64	Seventh Amendment to a Lease Agreement between the Company and ARE-MA Region No. 38, LLC dated April 27, 2018	10-Q	001-14895	10.4	5/3/18
10.65†	Sarepta Therapeutics, Inc. 2018 Equity Incentive Plan	10-Q	001-14895	10.1	8/8/18
10.66†	Employment Agreement between Sarepta Therapeutics, Inc. and Gilmore O'Neill, M.D., effective as of June 7, 2018	10-Q	001-14895	10.2	8/8/18

Exhibit Number	Description	Incorporated by Reference to Filings Indicated				Provided Herewith
		Form	File No.	Exhibit	Filing Date	
10.67†	Change in Control and Severance Agreement between Sarepta Therapeutics, Inc. and Gilmore O'Neill, M.D., effective as of June 7, 2018	10-Q	001-14895	10.3	8/8/18	
10.68†	Letter Agreement between Douglas S. Ingram and Sarepta Therapeutics, Inc. dated June 26, 2018	10-Q	001-14895	10.4	8/8/18	
10.69†	Form of Restricted Stock Unit Award Agreement under Sarepta Therapeutics, Inc. 2014 Employment Commencement Incentive Plan	10-Q	001-14895	10.5	8/8/18	
10.70†	Amendment No. 2 to the Sarepta Therapeutics, Inc. 2014 Employment Commencement Incentive Plan	10-Q	001-14895	10.6	8/8/18	
10.71†	Form of Stock Option Award Agreement under Sarepta Therapeutics, Inc. 2018 Equity Incentive Plan	10-Q	001-14895	10.1	10/31/18	
10.72†	Form of Restricted Stock Award Agreement under Sarepta Therapeutics, Inc. 2018 Equity Incentive Plan	10-Q	001-14895	10.2	10/31/18	
10.73†	Form of Restricted Stock Unit Award Agreement under Sarepta Therapeutics, Inc. 2018 Equity Incentive Plan	10-Q	001-14895	10.3	10/31/18	
10.74†	Form of Stock Appreciation Right Award Agreement under Sarepta Therapeutics, Inc. 2018 Equity Incentive Plan	10-Q	001-14895	10.4	10/31/18	
10.75**†	Amendment to Restricted Stock Award Agreement between Douglas S. Ingram and Sarepta Therapeutics, Inc. dated December 17, 2018					X
21.1**	Subsidiaries of the Registrant.					X
23.1**	Consent of Independent Registered Public Accounting Firm.					X
24.1**	Power of Attorney (contained on signature page).					X
31.1**	Certification of the Company's President and Chief Executive Officer, Douglas S. Ingram, pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X
31.2**	Certification of the Company's Executive Vice President, Chief Financial Officer and Chief Business Officer, Sandesh Mahatme, pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.					X

32.1***	Certification of the Company's President and Chief Executive Officer, Douglas S. Ingram, pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.	X
32.2***	Certification of the Company's Executive Vice President, Chief Financial Officer and Chief Business Officer, Sandesh Mahatme, pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.	X

Exhibit Number	Description	Incorporated by Reference to Filings Indicated				Provided Herewith
		Form	File No.	Exhibit	Filing Date	
101.INS	XBRL Instance Document.					X
101.SCH	XBRL Taxonomy Extension Schema Document.					X
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document.					X
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document.					X
101.LAB	XBRL Taxonomy Extension Label Linkbase Document.					X
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document.					X

†Indicates management contract or compensatory plan, contract or arrangement.
^Confidential treatment has been requested for portions of this exhibit.
*Confidential treatment has been granted for portions of this exhibit.
**Field herewith
***Furnished herewith.

Item 16. Form 10-K Summary.

Not applicable.

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 28, 2019 SAREPTA THERAPEUTICS, INC.

By: /s/ Douglas S. Ingram
Douglas S. Ingram
President and Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Douglas S. Ingram and Sandesh Mahatme, and each of them, with full power of substitution and resubstitution and full power to act without the other, as his or her true and lawful attorney-in-fact and agent to act in his or her name, place and stead and to execute in the name and on behalf of each person, individually and in each capacity stated below, and to file, any and all documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing, ratifying and confirming all that said attorneys-in-fact and agents or any of them or their and his or her substitute or substitutes, may lawfully do or cause to be done by virtue thereof.

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 indicated on February 28, 2019:

Signature	Title
/s/ Douglas S. Ingram Douglas S. Ingram	President, Chief Executive Officer and Director (Principal Executive Officer)
/s/ Sandesh Mahatme Sandesh Mahatme	Executive Vice President, Chief Financial Officer and Chief Business Officer (Principal Financial and Accounting Officer)
/s/ M. Kathleen Behrens M. Kathleen Behrens, Ph.D.	Chairwoman of the Board
/s/ Richard Barry Richard Barry	Director
/s/ Michael W. Bonney Michael W. Bonney	Director
/s/ Mary Ann Gray Mary Ann Gray, Ph.D.	Director

/s/ Claude Nicaise, MD Claude Nicaise, MD	Director
/s/ Hans Wigzell Hans Wigzell, M.D., Ph.D.	Director

SAREPTA THERAPEUTICS, INC.

CONSOLIDATED FINANCIAL STATEMENTS

Report of Independent Registered Public Accounting Firm

The Board of Directors and Stockholders

Sarepta Therapeutics, Inc.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of Sarepta Therapeutics, Inc. and subsidiaries (the Company) as of December 31, 2018 and 2017, the related consolidated statements of operations and comprehensive loss, stockholders' equity, and cash flows for each of the years in the three year period ended December 31, 2018, 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, 2018 and 2017, and the results of its operations and its cash flows for each of the years in the three year period ended December 31, 2018, 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, 2018, 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 28, 2019 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.

(signed) KPMG LLP

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

Cambridge, Massachusetts

February 28, 2019

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Sarepta Therapeutics, Inc.

Consolidated Balance Sheets

(in thousands, except share and per share amounts)

	As of December 31, 2018	As of December 31, 2017
Assets		
Current Assets:		
Cash and cash equivalents	$370,829	$599,691
Short-term investments	803,083	479,369
Accounts receivable, net	49,044	29,468
Inventory	125,445	83,605
Other current assets	77,782	36,511
Total Current Assets	1,426,183	1,228,644
Property and equipment, net of accumulated depreciation of $28,149 and $18,022 as of December 31, 2018 and 2017, respectively	97,024	43,156
Intangible assets, net of accumulated amortization of $3,852 and $4,145 as of December 31, 2018 and 2017, respectively	11,574	14,355
Investments and other assets	107,294	21,809
Total Assets	$1,642,075	$1,307,964
Liabilities and Stockholders' Equity		
Current Liabilities:		
Accounts payable	$33,829	$8,467
Accrued expenses	134,095	68,982
Current portion of long-term debt	—	6,175
Deferred revenue	3,303	3,316
Other current liabilities	2,463	1,392
Total Current Liabilities	173,690	88,332
Long-term debt	420,554	424,876
Deferred rent and other	15,555	5,539
Total Liabilities	609,799	518,747
Commitments and contingencies (Note 21)		
Stockholders' Equity:		
Preferred stock, $.0001 par value, 3,333,333 shares authorized; none issued and outstanding	—	—
Common stock, $.0001 par value, 99,000,000 shares authorized; 71,071,887 and 64,791,670 issued and outstanding at December 31, 2018 and 2017, respectively	7	6
Additional paid-in capital	2,611,294	2,006,598

Accumulated other comprehensive loss	(99)	(379)
Accumulated deficit	(1,578,926)	(1,217,008)
Total Stockholders' Equity	1,032,276	789,217
Total Liabilities and Stockholders' Equity	$1,642,075	$1,307,964

See accompanying notes to consolidated financial statements.

Sarepta Therapeutics, Inc.

Consolidated Statements of Operations and Comprehensive Loss

(in thousands, except per share data)

	For the Year Ended December 31,		
	2018	2017	2016
Revenues:			
Product, net	$301,034	$154,584	$5,421
Total revenues	301,034	154,584	5,421
Cost and expenses:			
Cost of sales (excluding amortization of in-licensed rights)	34,193	7,353	101
Research and development	401,843	166,707	188,272
Selling, general and administrative	207,761	122,682	83,749
EXONDYS 51 litigation and license charges	—	28,427	—
Amortization of in-licensed rights	865	1,053	29
Total cost and expenses	644,662	326,222	272,151
Operating loss	(343,628)	(171,638)	(266,730)
Other (loss) income:			
Interest expense and other, net	(18,982)	(1,990)	(535)
Gain from sale of Priority Review Voucher	—	125,000	—
Total other (loss) income	(18,982)	123,010	(535)
Loss before income tax (benefit) expense	(362,610)	(48,628)	(267,265)
Income tax (benefit) expense	(692)	2,060	—
Net loss	(361,918)	(50,688)	(267,265)
Other comprehensive loss:			
Unrealized gain (loss) on available-for-sale securities	280	(259)	(9)
Total other comprehensive gain (loss)	280	(259)	(9)
Comprehensive loss	$(361,638)	$(50,947)	$(267,274)
Net loss per share — basic and diluted	$(5.46)	$(0.86)	$(5.49)
Weighted average number of shares of common stock outstanding for computing basic and diluted net loss per share	66,250	58,818	48,697

See accompanying notes to consolidated financial statements.

Sarepta Therapeutics, Inc.

Consolidated Statements of Stockholders' Equity

(in thousands)

	Common Shares	Stock Amount	Additional Paid-In Capital	Accumulated Other Comprehensive Loss	Accumulated Deficit	Total Stockholders' Equity
BALANCE AT DECEMBER 31, 2015	45,630	5	1,089,508	(111)	(899,055)	190,347
Exercise of options for common stock	1,113	—	19,353	—	—	19,353
Grant of restricted stock awards, net of cancellations	50	—	—	—	—	—
Shares withheld for taxes	(47)	—	(2,168)	—	—	(2,168)
Issuance of common stock for cash, net of offering costs	7,876	—	364,749	—	—	364,749
Issuance of common stock under employee stock purchase plan	137	—	1,577	—	—	1,577
Stock-based compensation	—	—	30,107	—	—	30,107
Unrealized loss from available-for-sale securities	—	—	—	(9)	—	(9)
Net loss	—	—	—	—	(267,265)	(267,265)
BALANCE AT DECEMBER 31, 2016	54,759	5	1,503,126	(120)	(1,166,320)	336,691
Exercise of options for common stock	793	—	13,799	—	—	13,799
Grant of restricted stock awards and vest of restricted stock units, net of cancellations	400	—	—	—	—	—
Shares withheld for taxes	(60)	—	(2,227)	—	—	(2,227)
Issuance of common stock for cash, net of offering costs	8,798	1	353,958	—	—	353,959
Issuance of common stock under employee stock purchase plan	102	—	1,425	—	—	1,425
Equity component of convertible notes	—	—	156,953	—	—	156,953
Purchase of capped call share options	—	—	(50,901)	—	—	(50,901)
Stock-based compensation	—	—	30,465	—	—	30,465
Unrealized loss from available-for-sale securities	—	—	—	(259)	—	(259)
Net loss	—	—	—	—	(50,688)	(50,688)
BALANCE AT DECEMBER 31, 2017	64,792	6	2,006,598	(379)	(1,217,008)	789,217
Exercise of options for common stock	2,119	—	47,916	—	—	47,916

Grant of restricted stock awards and vest of restricted stock units, net of cancellations	58	—	—	—	—	—
Shares withheld for taxes	(79)	—	(9,061)	—	—	(9,061)
Issuance of common stock for cash, net of offering costs	4,107	1	513,408	—	—	513,409
Issuance of common stock under employee stock purchase plan	75	—	2,306	—	—	2,306
Stock-based compensation	—	—	50,127	—	—	50,127
Unrealized gain from available-for-sale securities	—	—	—	280	—	280
Net loss	—	—	—	—	(361,918)	(361,918)
BALANCE AT DECEMBER 31, 2018	71,072	$ 7	$2,611,294	$ (99)	$(1,578,926)	$ 1,032,276

See accompanying notes to consolidated financial statements.

Sarepta Therapeutics, Inc.

Consolidated Statements of Cash Flows

(in thousands)

	For the Year Ended December 31,		
	2018	2017	2016
Cash flows from operating activities:			
Net loss	$(361,918)	$(50,688)	$(267,265)
Adjustments to reconcile net loss to cash flows in operating activities:			
Gain from sale of Priority Review Voucher	—	(125,000)	—
Depreciation and amortization	12,245	8,092	5,611
Amortization of investment (discount) premium	(7,672)	(888)	80
Loss from extinguishment of debt	2,322	—	—
Non-cash interest expense	20,190	2,679	355
Loss on disposal of assets	3,938	805	293
Stock-based compensation	50,127	30,465	29,962
Non-cash restructuring expense	—	—	911
Changes in operating assets and liabilities, net:			
Net increase in accounts receivable	(19,576)	(24,240)	(1,251)
Net increase in inventory	(41,840)	(70,792)	(12,813)
Net increase in other assets	(136,638)	(15,354)	(9,012)
Net increase in accounts payable, accrued expenses, deferred revenue and other liabilities	90,162	12,925	7,309
Net cash used in operations	(388,660)	(231,996)	(245,820)
Cash flows from investing activities:			
Purchase of property and equipment	(61,157)	(12,000)	(5,341)
Purchase of intangible assets	(3,188)	(9,215)	(1,525)
Purchase of available-for-sale securities	(1,171,603)	(589,520)	(195,427)
Maturity and sales of available-for-sale securities	865,813	296,225	112,100
Proceeds from sale of Priority Review Voucher	—	125,000	—
Purchase of restricted investment	(353)	—	—
Maturity of restricted investment	—	10,695	—
Net cash used in investing activities	(370,488)	(178,815)	(90,193)
Cash flows from financing activities:			
Proceeds from July 2017 Term Loan	—	30,000	—
Repayment of June 2015 and July 2017 Term Loan	(30,000)	(15,000)	(5,000)
Repayment of mortgage loans and notes payable	(1,265)	(109)	(2,603)
Proceeds from revolving line of credit	235,872	39,708	—
Repayment of revolving line of credit	(235,954)	(39,645)	—
Payment for debt extinguishment	(2,134)	—	—
Proceeds from sales of common stock, net of offering costs	513,409	353,959	364,802
Proceeds from convertible debt offering	—	570,000	—
Debt issuance costs	—	(15,154)	—
Purchase of capped call options	—	(50,901)	—

Proceeds from exercise of options and employee stock purchase program	50,222	15,224	20,930
Net cash provided by financing activities	530,150	888,082	378,129
(Decrease) increase in cash and cash equivalents	(228,998)	477,271	42,116
Cash, cash equivalents and restricted cash:			
Beginning of period	599,827	122,556	80,440
End of period	$370,829	$599,827	$122,556
Reconciliation of cash, cash equivalents and restricted cash:			
Cash and cash equivalents	$370,829	$599,691	$122,420
Restricted cash in other assets	—	$136	$136
Total cash, cash equivalents and restricted cash	$370,829	$599,827	$122,556
Supplemental disclosure of cash flow information:			
Cash paid during the period for interest	$11,308	$1,912	$1,562
Cash paid during the period for income taxes	$1,548	$5,336	$—
Supplemental schedule of non-cash investing activities and financing activities:			
Accrued exit and legal fees for debts	$—	$625	$400
Reclassification of software licenses	$—	$204	$—
Property and equipment reclassified to asset held for sale	$—	$1,529	$—
Property and equipment included in accrued expenses	$5,421	$2,525	$1,186
Intangible assets included in accrued expenses	$374	$343	$1,163
Shares withheld for taxes	$9,061	$2,227	$2,168
Reclassification of long term investments to short term investments	$9,980	$—	$—

See accompanying notes to consolidated financial statements.

Sarepta Therapeutics, Inc.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. ORGANIZATION AND NATURE OF BUSINESS

Sarepta Therapeutics, Inc. (together with its wholly-owned subsidiaries, "Sarepta" or the "Company") is a commercial-stage biopharmaceutical company focused on the discovery and development of unique RNA-targeted therapeutics, gene therapy and other genetic medicine approaches for the treatment of rare diseases. Applying its proprietary, highly-differentiated and innovative platform technologies, the Company is able to target a broad range of diseases and disorders.

Its first commercial product in the U.S., EXONDYS 51® (eteplirsen) Injection ("EXONDYS 51"), was granted accelerated approval by the U.S. Food and Drug Administration (the "FDA") on September 19, 2016. EXONDYS 51 is indicated for the treatment of Duchenne muscular dystrophy ("DMD") in patients who have a confirmed mutation of the DMD gene that is amenable to exon 51 skipping. In December 2018, the Company completed the submission of its rolling new drug application ("NDA") to the FDA seeking accelerated approval for golodirsen, the Company's PMO chemistry and exon-skipping technology to skip exon 53 of the DMD gene.

As of December 31, 2018, the Company had approximately $1,174.9 million of cash, cash equivalents and investments, consisting of $370.8 million of cash and cash equivalents, $803.1 million of short-term investments, and $1.0 million of a long-term restricted investment. The Company believes that its balance of cash, cash equivalents and investments as of December 31, 2018 is sufficient to fund its current operational plan for at least the next twelve months, though it may pursue additional cash resources through public or private debt and equity financings, seek additional government contracts and establish collaborations with or license its technology to other companies.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND RECENT ACCOUNTING PRONOUNCEMENTS

Basis of Presentation

The accompanying consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States ("U.S. GAAP"), reflect the accounts of Sarepta Therapeutics, Inc. and its wholly-owned subsidiaries. All intercompany transactions between and among its consolidated subsidiaries have been eliminated. Management has determined that the Company operates in one segment: helping patients through the discovery and development of unique RNA-targeted therapeutics, gene therapy and other genetic therapeutic modalities for the treatment of rare diseases. The Company's CEO, as the chief operating decision-maker, manages and allocates resources to the operations of the Company on a total company basis. The Company's research and development organization is responsible for the research and discovery of new product candidates and supports development and registration efforts for potential future products. The Company's supply chain organization manages the development of the manufacturing processes, clinical trial supply and commercial product supply. The Company's commercial organization is responsible for commercialization of EXONDYS 51 in the U.S. and internationally. The Company is supported by other back-office general and administration functions. Consistent with this

decision-making process, the Company's CEO uses consolidated, single-segment financial information for purposes of evaluating performance, forecasting future period financial results, allocating resources and setting incentive targets.

Estimates and Uncertainties

The preparation of the consolidated financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, equity, revenue, expenses and the disclosure of contingent assets and liabilities. Actual results could differ from those estimates.

Fair Value Measurements

The Company has certain financial assets that are recorded at fair value which have been classified as Level 1, 2 or 3 within the fair value hierarchy as described in the accounting standards for fair value measurements:

- Level 1—quoted prices for identical instruments in active markets;
- Level 2—quoted prices for similar instruments in active markets, quoted prices for identical or similar instruments in markets that are not active, and model-derived valuations in which all significant inputs and significant value drivers are observable in active markets; and
- Level 3—valuations derived from valuation techniques in which one or more significant value drivers are unobservable.

The fair value of the majority of the Company's financial assets is categorized as Level 1 within the fair value hierarchy. These assets include money market funds, publicly traded debt, and equity securities. For additional information related to fair value measurements, please read Note 5, Fair Value Measurements to the consolidated financial statements.

Cash and Cash Equivalents

Only investments that are highly liquid and readily convertible to cash and have original maturities of three months or less are considered cash equivalents.

Investments

Available-For-Sale Debt Securities

Available-for-sale debt securities are recorded at fair market value and unrealized gains and losses are included in accumulated other comprehensive loss in stockholder's equity. Realized gains and losses are reported in interest expense and other, net, on a specific identification basis.

Equity Investments

The Company's equity investments include its investments in a publicly traded biotechnology company and a privately held biotechnology company and are included in investments and other assets in the Company's consolidated balance sheets. The equity investment in the publicly traded biotechnology company has a readily determinable fair value and is carried at fair value with changes in value recorded in the Company's consolidated statements of operations and comprehensive loss. The equity investment in the privately held biotechnology company does not have readily determinable fair value and is measured at cost less any impairment, plus or minus changes resulting from observable price changes for the identical or a similar investment of the same issuer, which is recorded as a gain or loss on the Company's consolidated statements of operations and comprehensive loss.

Accounts Receivable

The Company's accounts receivable arise from product sales, government research contracts and other grants. They are generally stated at the invoiced amount and do not bear interest. 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 Medicaid rebates, governmental chargebacks including Public Health Services ("PHS") chargebacks, prompt pay discounts, co-pay assistance and distribution fees. 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 no payments are required of the Company) for PHS chargebacks, prompt pay discounts and certain distribution fees, or a current liability (if a payment is required of us), for Medicaid rebates, co-pay assistance and certain distribution fees.

The accounts receivable from product sales represents receivables due from the Company's specialty distributor and specialty pharmacies in the U.S. as well as certain distributors in the EU, Brazil, Israel and the Middle East (collectively, "Customers"). The Company monitors the financial performance and creditworthiness of its Customers so that it can properly assess and respond to changes in the Customers' credit profiles. The Company provides reserves against trade receivables for estimated losses that may result from a customer's inability to pay. Amounts determined to be uncollectible are written-off against the established reserve. As of December 31, 2018, the credit profiles for the Company's Customers are deemed to be in good standing and an allowance for doubtful accounts receivable is not considered necessary. Further, no accounts receivable amounts related to government research contracts and other grants have historically been written off and, thus, an allowance for doubtful accounts receivable related to government research contracts and other grants is also not considered necessary.

Concentration of Credit Risk

Financial instruments which potentially subject the Company to concentrations of credit risk consist of accounts receivable from Customers and cash, cash equivalent and investments held at financial institutions.

For the year ended December 31, 2018, the majority of the Company’s accounts receivable arose from product sales in the U.S. and all customers have standard payment terms which generally require payment within 30 to 60 days. Outside of the U.S., the payment terms range between 60 and 120 days. Three individual customers accounted for 42%, 38% and 18% of net product revenues and 51%, 28% and 10% of accounts receivable from product sales, respectively. As of December 31, 2018, the Company believes that such Customers are of high credit quality.

As of December 31, 2018, the Company's cash equivalents and investments were concentrated at three financial institutions. The Company does not believe that there is significant risk of non-performance by the financial institutions.

Inventories

Inventories are stated at the lower of cost and net realizable value with cost determined on a first-in, first-out basis. The Company capitalizes inventory costs associated with products following regulatory approval when future commercialization is considered probable and the future economic benefit is expected to be realized. EXONDYS 51 inventory that may be used in clinical development programs is charged to research and development expense when the product enters the research and development process and no longer can be used for commercial purposes.

The Company periodically reviews its inventories for excess amounts or obsolescence and writes down obsolete or otherwise unmarketable inventory to its estimated net realizable value. Additionally, though the Company's product is subject to strict quality control and monitoring which it performs throughout the manufacturing processes, certain batches or units of product may not meet quality specifications resulting in a charge to cost of sales.

Property and Equipment

Property and equipment are initially recorded at cost, including the acquisition cost and all costs necessarily incurred to bring the asset to the location and working condition necessary for its intended use. The cost of normal, recurring or periodic repairs and maintenance activities related to property and equipment are expensed as incurred. The cost for planned major maintenance activities, including the related acquisition or construction of assets, is capitalized if the repair will result in future economic benefits. Interest costs incurred during the construction period of major capital projects are capitalized until the asset is ready for its intended use, at which point the interest costs are amortized as depreciation expense over the life of the underlying asset.

The Company generally depreciates the cost of its property and equipment using the straight-line method over the estimated useful lives of the respective assets, which are summarized as follows:

Asset Category	Useful lives
Lab equipment	5 years
Office equipment	5 years
Software and computer equipment	3 - 5 years
Leasehold improvements	Lesser of the useful life or the term of the respective lease
Land	Not depreciated
Building	30 years
Construction in Progress	Not depreciated until put into service

Intangible assets

The Company's intangible assets consist of in-licensed rights, patent costs, and software licenses, which are stated in the Company's consolidated balance sheets net of accumulated amortization and impairments, if applicable.

The in-licensed rights relates to agreements with BioMarin (defined in Note 3) and the University of Western Australia ("UWA"). The in-licensed rights are being amortized on a straight-line basis over the remaining life of the related patent because the life of the related patent reflects the expected time period that the Company will benefit from the in-licensed rights.

Patent costs consist primarily of external legal costs, filing fees incurred to file patent applications and renewal fees on proprietary technology developed or licensed by the Company. Patent costs associated with applying for a patent, being issued a patent and annual renewal fees are capitalized. Costs to defend a patent and costs to invalidate a competitor's patent or patent application are expensed as incurred. Patent costs are amortized on a straight-line basis over the shorter of the estimated economic lives or the initial term of the patents, which is generally 20 years.

Impairment of Long-Lived Assets

Long-lived assets held and used by the Company, intangible assets with definite lives and equity investments without a readily determinable fair value are reviewed for impairment whenever events or circumstances indicate that the carrying amount of assets may not be recoverable. The Company evaluates recoverability of assets to be held and used by comparing the carrying amount of an asset to future net undiscounted cash flows to be generated by the asset. If the asset is considered to be impaired, the impairment

to be recognized is measured as the amount by which the carrying amount of the assets exceeds the fair value of the assets. Such reviews assess the fair value of the assets based upon estimates of future cash flows that the assets are expected to generate.

Convertible Debt

The Company separately accounts for the liability and equity components of convertible debt instruments that can be settled in cash by allocating the proceeds from issuance between the liability component and the embedded conversion option. The value of the equity component is calculated by first measuring the fair value of the liability component, using the interest rate of a similar liability that does not have a conversion feature, as of the issuance date. The difference between the proceeds from the convertible debt issuance and the amount measured as the liability component is recorded as the equity component with a corresponding discount recorded on the debt. The Company recognizes the amortization of the resulting discount as interest expense using the effective interest method. Simultaneously, the Company bought capped call options from certain counterparties to minimize the impact of potential dilution upon conversion. The premium for the capped call options was recorded as additional paid-in capital. For additional information related to the convertible debt transactions, please read Note 14, Indebtedness to the consolidated financial statements.

Revenue Recognition

The Company recognizes revenue when a customer obtains control of promised goods or services, in an amount that reflects the consideration which the Company expects to receive in exchange for the goods or services provided. To determine revenue recognition for arrangements within the scope of ASC Topic 606, “Revenue from Contracts with Customers”, the Company performs the following five steps: (1) identify the contracts with a customer; (2) identify the performance obligations in the contract; (3) determine the transaction price; (4) allocate the transaction price to the performance obligations in the contract; and (5) recognize revenue when or as the Company satisfies a performance obligation. The Company only applies the five-step model to contracts when it is probable that the entity will collect the consideration it is entitled to in exchange for the goods or services it transfers or provides to the customer. At contract inception, the Company assesses the goods or services promised within each contract and determines those that are performance obligations, and assesses whether each promised good or service is distinct. The Company then recognizes as revenue the amount of the transaction price that is allocated to the respective performance obligation when or as the performance obligation is satisfied. For all contracts that fall into the scope of ASC Topic 606, only one performance obligation has been identified by the Company: to timely deliver drug products to the customer’s designated warehouses.

Product revenues

The Company distributes its product principally through its Customers. The Customers subsequently resell the product to patients and health care providers. The Company provides no right of return to the Customers except in cases of shipping error or product defect. Product revenues are recognized when the Customers take control of the product, which typically occurs upon delivery to the Customers. For the years ended 2018, 2017 and 2016, the majority of the revenues recognized were generated by the specialty distributor and specialty pharmacies in the U.S.

Variable Consideration

Product revenues are recorded at the net sales price (transaction price) which includes estimated reserves for variable consideration, such as Medicaid rebates, governmental chargebacks, including PHS chargebacks, prompt payment discounts, co-pay assistance and distribution fees. These reserves reflect the Company’s best estimates of the amount of consideration to which it is entitled based on the terms of the contracts. Additional details relating to variable consideration follows:

- Medicaid rebates relate to the Company's estimated obligations to states under established reimbursement arrangements. Medicaid rebate reserves are recorded in the same period the related revenue is recognized, resulting in a reduction of product revenue and the establishment of a liability which is included in accrued expenses.
- Governmental chargebacks, including PHS chargebacks, relate to the Company's estimated obligations resulting from contractual commitments to sell products to qualified healthcare providers at prices lower than the list prices that the Company charges to wholesalers. The wholesaler charges the Company for the difference between what the wholesaler pays for the products and the ultimate selling price to the qualified healthcare providers. Chargeback reserves are recorded in the same period the related revenue is recognized, resulting in a reduction of product revenue and accounts receivable. Chargeback amounts are generally determined at the time of resale to the qualified healthcare provider from the wholesaler, and the Company generally issues credits for such amounts within a few weeks of receiving notification of resale from the wholesaler.
- Prompt payment discounts relate to the Company's estimated obligations for credits to be granted to a specialty pharmacy for remitting payment on its purchases within established incentive periods. Reserves for prompt payment discounts are

recorded in the same period the related revenue is recognized, resulting in a reduction of product revenue and accounts receivable.

- Co-pay assistance relates to financial assistance provided to qualified patients, whereby the Company may assist them with prescription drug co-payments required by the patient's insurance provider. Reserves for co-pay assistance are recorded in the same period the related revenue is recognized, resulting in a reduction of product revenue and the establishment of a liability which is included in accrued expenses.
- Distribution fees relate to fees paid to Customers in the distribution channel that provide the Company with inventory management, data and distribution services and are generally accounted for as a reduction of revenue. To the extent that the services received are distinct from the Company's sale of products to the Customers, these payments are accounted for as selling, general and administrative expenses. Reserves for distribution fees result in an increase in a liability if payments are required of the Company or a reduction of accounts receivable if no payments are required of the Company.

Deferred revenue

As of December 31, 2018, the Company had deferred revenue of $3.3 million, which primarily represents up-front fees which it may recognize as revenue upon settlement of certain contingencies related to an agreement with Charley's Fund, Inc.

Research and Development

Research and development expenses consist of costs associated with research activities as well as those with the Company's product development efforts, conducting pre-clinical trials, clinical trials and manufacturing activities. Research and development expenses are expensed as incurred. Up-front fees and milestones paid to third parties in connection with technologies which have not reached technological feasibility and do not have an alternative future use are expensed when incurred. Nonrefundable advance payments for goods or services that will be used or rendered for future research and development activities pursuant to an executory contractual arrangement will be capitalized, and recognized as an expense as the related goods are delivered or the related services are performed. If the Company does not expect the goods to be delivered or services to be rendered, the advance payment capitalized will be charged to expense.

Direct research and development expenses associated with the Company's programs include clinical trial site costs, clinical manufacturing costs, costs incurred for consultants and other external services, such as data management and statistical analysis support and materials and supplies used in support of clinical programs. Indirect costs of the Company's clinical programs include salaries, stock-based compensation and an allocation of its facility costs.

When third-party service providers' billing terms do not coincide with the Company's period-end, the Company is required to make estimates of its obligations to those third parties, including clinical trial and pharmaceutical development costs, contractual services costs and costs for supply of its drug candidates, incurred in a given accounting period and record accruals at the end of the period. The Company bases its estimates on its knowledge of the research and development programs, services performed for the period, past history for related activities and the expected duration of the third-party service contract, where applicable.

Stock-Based Compensation

The Company's stock-based compensation programs include stock options, restricted stock awards ("RSAs"), restricted stock units ("RSUs"), stock appreciation rights ("SARs") and an employee stock purchase program ("ESPP"). The Company accounts for stock-based compensation using the fair value method.

The fair values of stock options and SARs are estimated on the date of grant using the Black-Scholes-Merton option-pricing model. The fair values of RSAs and RSUs are based on the fair market value of the Company's common stock on the date of the grant. The fair value of stock awards, with consideration given to estimated

forfeitures, is recognized as stock-based compensation expense on a straight-line basis over the vesting period of the grants. For stock awards with performance-vesting conditions, the Company does not recognize compensation expense until it is probable that the performance-vesting condition will be achieved.

Under the Company's ESPP, participating employees purchase common stock through payroll deductions. The purchase price is equal to 85% of the lower of the closing price of the Company's common stock on the first business day and the last business day of the relevant purchase period. The fair values of stock purchase rights are estimated using the Black-Scholes-Merton option-pricing model. The fair value of the look-back provision with the 15% discount is recognized on a graded-vesting basis as stock-based compensation expense over the purchase period.

In addition to stock options with service and performance conditions, the Company also granted its CEO options with service and market conditions. A market condition relates to the achievement of a specified price of the Company's common stock, a specified amount of intrinsic value indexed to the Company's common stock or a specified price of the Company's common stock in terms of other similar equity shares. The grant date fair value for the options with service and market conditions is determined by a lattice model with Monte Carlo simulations and is recognized as stock-based compensation expense on a straight-line basis over the service period.

Income Taxes

The Company follows the asset and liability method of accounting for income taxes. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the consolidated financial statement carrying amounts of existing assets and liabilities and their respective tax bases and operating loss and tax credit carryforwards. It is the intention of the Company to reinvest the earnings of its non-U.S. subsidiaries in those operations and not to repatriate the earnings to the U.S. Accordingly, the Company does not provide for deferred taxes on the excess of the financial reporting over the tax basis in its investments in foreign subsidiaries as they are considered permanent in duration.

Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered and settled. A valuation allowance is recorded to reduce the net deferred tax asset to zero when it is more likely than not that the net deferred tax asset will not be realized. The Company recognizes the effect of income tax positions only if those positions are more likely than not of being sustained upon an examination.

The Tax Cuts and Jobs Act (the "TCJA") was enacted on December 22, 2017. The TCJA reduces the U.S. federal corporate tax rate from 35% to 21%, requires companies to pay a one-time transition tax on earnings of certain foreign subsidiaries that were previously tax deferred and creates new taxes on certain foreign sourced earnings. The Company continues to evaluate the overall impact of the TCJA on its business. There is continuing uncertainty in the TCJA, and although changes or challenges cannot be predicted, the Company believes it has used reasonable assumptions and interpretations in applying the TCJA. The Company continues to monitor for legislative developments, issuance of regulations and technical memorandum to provide further clarification and/or interpretations of the TCJA and will adjust its financial statements as needed.

Rent Expense

The Company's operating leases for its Cambridge, Andover and Burlington, Massachusetts and Dublin and Columbus, Ohio facilities provide for scheduled annual rent increases throughout each lease's term. The Company recognizes the effects of the scheduled rent increases on a straight-line basis over the full term of the leases. Tenant improvement allowances provided by a landlord are recorded as deferred rent and amortized as reduction to rent expense over the lease term.

For the years ended December 31, 2018, 2017 and 2016, the Company recognized rent expense and occupancy costs of $7.9 million, $4.4 million and $5.6 million, respectively.

Commitments and Contingencies

The Company records liabilities for legal and other contingencies when information available to the Company indicates that it is probable that a liability has been incurred and the amount of loss can be reasonably estimated. Legal costs in connection with legal and other contingencies are expensed as costs are incurred.

Recent Accounting Pronouncements

In February 2016, the Financial Accounting Standards Board ("FASB") issued ASU No. 2016-02, "Leases (Topic 842)", which supersedes ASC Topic 840, "Leases", and issued additional clarifications throughout 2018. Under the new guidance, a lessee should recognize assets and liabilities that arise from its leases and disclose qualitative and quantitative information about its leasing arrangements. The Company expects to elect the optional transition method to apply the standard as of the January 1, 2019 the effective date and therefore, it will not apply the standard to comparative periods. The Company also expects to elect the available package of practical expedients in transition which would allow it to not re-assess whether existing or expired arrangements contain a lease, the lease classification of existing or expired leases, or whether previous initial direct costs would qualify for capitalization under the new lease standard. The Company continues to finalize the impact of the ASU on its processes, disclosures and internal controls over financial reporting. Based on the procedures performed to date, the Company has estimated that the adoption of this ASU will result in an increase between $40.0 million and $45.0 million in right of use assets and between $60.0 million and $65.0 million in lease liabilities.

In March 2017, the FASB issued ASU No. 2017-08, “Receivables - Nonrefundable Fees and Other Costs (Subtopic 310-20): Premium Amortization on Purchased Callable Debt Securities”. This new standard amends the amortization period for certain purchased callable debt securities held at a premium by shortening the amortization period for the premium to the earliest call date. ASU No. 2017-02 will be effective for fiscal years beginning after December 15, 2018, with early adoption permitted. As of December 31, 2018, the Company has elected to early adopt this new standard and the adoption did not have a material impact on its financial position and results of operations.

In June 2018, the FASB issued ASU No. 2018-07, “Compensation - Stock Compensation (Topic 718), Improvements to Nonemployee Share-Based Payment Accounting.” This ASU expands the scope of Topic 718 to include share based payment transactions for acquiring goods and services from nonemployees. An entity should apply the requirements of Topic 718 to nonemployee awards except for specific guidance on inputs to an option pricing model and the attribution of cost. ASU No. 2018-07 will be effective for fiscal years beginning after December 15, 2018, with early adoption permitted, although no earlier than the adoption date of Topic 606. The Company elected to early adopt this ASU in the quarter ended June 30, 2018 and determined that the adoption of this new standard did not have a material impact on its consolidated financial statements.

In August 2018, the FASB issued ASU No. 2018-13, “Fair Value Measurement (Topic 820), Disclosure Framework – Changes to the Disclosure Requirements for Fair Value Measurement”. This ASU removed the following disclosure requirements: (1) the amount of and reasons for transfers between Level 1 and Level 2 of the fair value hierarchy; (2) the policy for timing of transfers between levels; and (3) the valuation processes for Level 3 fair value measurements. Additionally, this update added the following disclosure requirements: (1) the changes in unrealized gains and losses for the period included in other comprehensive income and loss for recurring Level 3 fair value measurements held at the end of the reporting period; (2) the range and weighted average of significant unobservable inputs used to develop Level 3 fair value measurements. For certain unobservable inputs, an entity may disclose other quantitative information (such as the median or arithmetic average) in lieu of the weighted average if the entity determines that other quantitative information would be a more reasonable and rational method to reflect the distribution of unobservable inputs used to develop Level 3 fair value measurements. ASU No. 2018-13 will be effective for fiscal years beginning after December 15, 2019 with early adoption permitted. As of December 31, 2018, the Company has not elected to early adopt this guidance but does not expect that the adoption of this guidance will have a material effect on its consolidated financial statements.

In August 2018, the FASB issued ASU No. 2018-15, “Intangibles – Goodwill and Other – Internal-Use Software (Subtopic 350-40): Customer’s Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That is a Service Contract”. This ASU requires a customer in a cloud computing arrangement (i.e., hosting arrangement) that is a service contract to follow the internal-use software guidance contained in ASC Subtopic 350-40 to determine which implementation costs to capitalize as assets or expense as incurred. Capitalized implementation costs related to a hosting arrangement that is a service contract will be amortized over the term of the hosting arrangement, beginning when the module or component of the hosting arrange is ready for its intended use. ASU No. 2018-15 will be effective for fiscal years beginning after December 15, 2019, with early adoption permitted. As of December 31, 2018, the Company has not elected to early adopt this guidance but believes that the adoption of this guidance will not have a material effect on its consolidated financial statements.

3. LICENSE AND COLLABORATION AGREEMENTS

Lysogene S.A.

On October 15, 2018, the Company entered into a license and collaboration agreement (the "Lysogene License and Collaboration Agreement") for developing and commercializing LYS-SAF302, a gene therapy to treat Mucopolysaccharidosis type IIIA ("MPS IIIA") with Lysogene S.A. ("Lysogene"). Under the terms of the Lysogene License and Collaboration Agreement, Lysogene will be responsible for completion of the pivotal trial, which commenced in the fourth quarter of 2018. The Company will have exclusive rights to commercialize LYS-SAF302 in the U.S. and all territories outside of Europe. Lysogene will retain exclusive commercial rights to LYS-SAF302 in Europe. The Company will be responsible for global manufacturing of LYS-SAF302 and will supply drug products to Lysogene for Europe. Lysogene also granted the Company certain option rights to an additional central nervous system targeted gene therapy candidate.

Concurrently with the execution of the Lysogene License and Collaboration Agreement, the Company entered into an equity investment agreement with Lysogene. Under the equity investment agreement, the Company purchased 950,606 shares of common stock issued by Lysogene, representing 8% of the outstanding equity of Lysogene at the time of the transaction.

The Company considered whether it would have to consolidate the operations of Lysogene and concluded that, while Lysogene is a variable interest entity, the Company is not the primary beneficiary as it does not have the power to direct the activities that would most significantly impact the economic performance of Lysogene.

As a result of execution of the agreements, the Company made a payment of $28.0 million to Lysogene related to the up-front license fee, the option fee, the equity investment and reimbursement of certain development activities. Additionally, the Company may be liable for up to approximately $102.8 million in development, regulatory and sales milestones associated with the Lysogene License and Collaboration Agreement. Furthermore, the Company may be required to make tiered royalty payments based on net sales of the LYS-SAF302 product subsequent to its commercialization.

Of the $28.0 million payment to Lysogene, $1.9 million was allocated to the equity investment in Lysogene, based on the closing price of Lysogene's common stock traded on the Euronext Paris Exchange on October 12, 2018, and was recorded as an other non-current asset. The remaining $26.1 million was allocated to the up-front license fee, the option fee, and reimbursement of certain development activities, and represents rights to potential future benefits associated with ongoing research and development activities that have no alternative future use. Accordingly, this amount was recorded as research and development expense as incurred. As of December 31, 2018, one development milestone was deemed as probable of being achieved. As a result, the Company recorded an accrued expense of $18.7 million which was classified as research and development expense.

Changes in the fair value of the equity investment in Lysogene are recorded to other income and expense in the Company's consolidated statements of operations and other comprehensive loss. As of December 31, 2018, the Company recognized a loss of $0.2 million related to the change in fair market value of the equity investment.

Lacerta Therapeutics

On August 8, 2018 (the "Effective Date"), the Company entered into a License, Development and Option Agreement (the "Lacerta License Agreement") with Lacerta Therapeutics, Inc. ("Lacerta"). Pursuant to the Lacerta License Agreement, the Company licensed exclusive worldwide rights to develop, manufacture and commercialize a pre-clinical Pompe product candidate (the "Pompe License"). Lacerta also granted the Company exclusive options to enter into exclusive license agreements to develop, manufacture and commercialize other gene therapy product candidates for Sanfilipo syndrome and L-Amino Acid Decarboxylase Deficiency for additional consideration of $42.0 million (collectively, the "Options") when (and if) the Options are exercised. Additionally, the Company may be liable for up to approximately $44.0 million in development, regulatory and sales milestones associated with the Pompe License and may be required to make a high-single-digit royalty payments based on net sales of the Pompe product subsequent to its commercialization.

Concurrently with the execution of the Lacerta License Agreement, the Company entered into a Series A Preferred Stock Purchase Agreement (the "Purchase Agreement") with Lacerta. Under the Purchase Agreement, the Company purchased approximately 4.5 million shares of Series A preferred stock issued by Lacerta.

The Company considered whether it would have to consolidate the operations of Lacerta and concluded that, while Lacerta is a variable interest entity, the Company is not the primary beneficiary as it does not have the power to direct the activities that would most significantly impact the economic performance of Lacerta.

The Company made an up-front payment of $38.0 million to Lacerta in consideration of both the Lacerta License Agreement and the Purchase Agreement. This payment was allocated to the fair value of the Series A preferred stock investment, the Pompe License and the Options based on their respective relative fair values on the Effective Date. The fair value of the Options were determined using an option pricing model, whereas the Series A preferred stock investment was determined using a cost approach corroborated by the Black-Scholes option pricing model. The fair value of the Pompe License was determined by the income approach, using a discounted cash flow model based on projections of future cash flows that will arise from the Pompe product candidate. Accordingly: (i) $30.0 million was allocated to the Series A preferred stock investment, (ii) $8.0 million was allocated to the Pompe License, and (iii) no amount was allocated to the Options as they are far out of money and were determined to have a fair value of zero. The Series A preferred stock investment was initially measured at cost and classified as an other non-current

asset in the accompanying consolidated balance sheets. Subsequently, changes in the carrying value of the investment will be reported as a component of earnings whenever there are observable price changes in orderly transactions for identical or similar investments of Lacerta in the future. The amount allocated to the Pompe License represents rights to potential future benefits associated with ongoing research and development activities that have no alternative future use. Accordingly, this amount has been recorded as research and development expense in the accompanying consolidated statements of operations and comprehensive loss for the year ended December 31, 2018. As of December 31, 2018, no development milestones were deemed as probable of being achieved and, accordingly, no research and development expense was recognized related to these development milestones.

Myonexus Therapeutics

On May 3, 2018, the Company entered into a Warrant to Purchase Common Stock Agreement ("Warrant Agreement") with Myonexus Therapeutics, Inc. ("Myonexus"). Pursuant to the terms of the Warrant Agreement, the Company made an up-front payment of $60.0 million to purchase an exclusive option to acquire Myonexus for $200.0 million plus sales-related and regulatory-

related contingent payments. Prior to the exercise of the option to acquire Myonexus, the Company may be required to make additional development milestone payments to Myonexus of up to $45.0 million over an approximately two-year evaluation period.

The Company considered whether it would have to consolidate the operations of Myonexus and concluded that, while Myonexus is a variable interest entity, the Company is not the primary beneficiary as it does not have the power to direct the activities that would most significantly impact the economic performance of Myonexus.

As of December 31, 2018, the Company made an up-front payment of $60.0 million and milestone payments totaling $20.0 million to Myonexus corresponding to execution of the Warrant Agreement and achievement of two development milestones, respectively. Additionally, the third development milestone for $5.0 million was deemed probable of being achieved as of December 31, 2018, and has been recorded as an accrued expense. Prior to regulatory approval, all consideration paid to Myonexus represents rights to potential future benefits associated with Myonexus's ongoing research and development activities, which have not reached technological feasibility and have no alternative future use. Accordingly, the Company recorded $85.0 million for the year ended December 31, 2018 as research and development expense in the accompanying consolidated statements of operations and comprehensive loss.

Nationwide Children's Hospital

On December 29, 2016, the Company entered into an exclusive option agreement with Nationwide Children's Hospital ("Nationwide") from which the Company obtained an exclusive right to acquire a worldwide license of the micro-dystrophin gene therapy technology for DMD and Becker muscular dystrophy. On October 8, 2018, the Company exercised the option and entered into a license agreement with Nationwide ("Nationwide License Agreement"). Pursuant to the Nationwide License Agreement, the Company licensed exclusive worldwide rights to develop, manufacture and commercialize micro-dystrophin gene therapy product candidates. Under the agreement, the Company made an up-front payment of $1.0 million to Nationwide, which was recorded as research and development expense in the accompanying consolidated statements of operations and comprehensive loss for the year ended December 31, 2018. Additionally, the Company may be required to make up to $29.0 million in development, regulatory and sale milestone payments per micro-dystrophin product and a low-single-digit royalty payments based on net sales of the micro-dystrophin products upon commercialization. As of December 31, 2018, no development milestones were deemed as probable of being achieved and, accordingly, no research and development expense was recognized related to these development milestones.

BioMarin Pharmaceutical, Inc.

In July 2017, the Company and UWA entered into a settlement agreement with BioMarin Leiden Holding BV, its subsidiaries BioMarin Nederlands BV and BioMarin Technologies BV (collectively, "BioMarin"). On the same day, the Company entered into a license agreement with BioMarin and Academisch Ziekenhuis Leiden ("AZL") (collectively with the Company, UWA and BioMarin, the "Settlement Parties"). Under these agreements, BioMarin agreed to provide the Company with an exclusive license to certain intellectual property with an option to convert the exclusive license into a co-exclusive license and the Settlement Parties agreed to stop most existing efforts to continue with ongoing litigation and opposition and other administrative proceedings concerning BioMarin's intellectual property. Under terms of the agreements, the Company agreed to make total up-front payments of $35.0 million upon execution of the agreements, consisting of $20.0 million under the settlement agreement and $15.0 million under the license agreement. Additionally, the Company may be liable for up to approximately $65.0 million in regulatory and sales milestones for eteplirsen as well as exon 45 and exon 53 skipping product candidates. BioMarin will also be eligible to receive royalty payments, ranging from 4% - 8%, for exon 51 skipping products, exon 45 skipping products and exon 53 skipping products. The royalty terms under the license agreement will expire in December 2023 in the U.S. and September 2024 in the EU.

In connection with the above agreements, in July 2017, the Company made a cash payment of $35.0 million to BioMarin. Of this amount, $6.6 million was recorded as an intangible asset on the Company's consolidated balance sheets. The remaining amount of $28.4 million was expensed as incurred as EXONDYS 51 settlement and license charges in the Company's consolidated statements of operations and comprehensive loss.

The $6.6 million intangible asset represents the fair value of the U.S. license to BioMarin's intellectual property related to EXONDYS 51, which was determined by an income-based approach, and is being amortized on a straight-line basis over the remaining life of the patent. For the year ended December 31, 2018, the Company recognized intangible asset amortization expense and royalty expense of approximately $0.9 million and $15.1 million, respectively. For the year ended December 31, 2017, the Company recognized intangible asset amortization expense and royalty expense of approximately $1.0 million and $4.7 million, respectively. The royalties are included in cost of sales in the Company's consolidated statements of operations and comprehensive loss. As of December 31, 2018, no regulatory or sales milestones were deemed as probable of being achieved and, accordingly, no additional in-licensed rights were recognized related to these milestones.

Summit (Oxford) Ltd.

In October 2016, the Company entered into an exclusive Collaboration and License Agreement (the "Summit Collaboration Agreement") with Summit which grants the Company the exclusive right to commercialize products in Summit's utrophin modulator pipeline in the EU, Switzerland, Norway, Iceland, Turkey and the Commonwealth of Independent States (the "Licensed Territory").

Under the terms of the Summit Collaboration Agreement, the Company made an up-front payment of $40.0 million to Summit, with additional payments of up to $192.0 million based on achievement of certain development and regulatory milestones for ezutromid, a Summit product candidate in its utrophin modulator pipeline. For each of Summit's future generation small molecule utrophin modulators, the Company may be required to make up to $290.0 million in development and regulatory milestone payments. Additionally, on a product-by-product basis, the Company may be required to make up to $330.0 million in sales milestone payments. The Summit Collaboration Agreement also grants the Company an option to expand the Licensed Territory ("Option Territory"). If the Company exercises this option, it will be liable for a one-time $10.0 million option fee as well as up to $7.0 million in regulatory milestone payments. For each licensed product in the Option Territory, the Company may be liable for up to $82.5 million in sales milestone payments. Additionally, the Company may be required to make tiered royalty payments ranging from a low to high teens percentage of net sales on a product-by-product basis in the Licensed Territory.

Under the Summit Collaboration Agreement, a joint steering committee was established to plan, monitor and coordinate future development activities for ezutromid and future generation small molecule utrophin modulators. Summit was solely responsible for all research and development costs for the licensed products until December 31, 2017. Thereafter, Summit will be responsible for 55.0% of the budgeted research and development costs related to the licensed products in the Licensed Territory, and the Company will be responsible for 45.0% of such costs. Any costs in excess of 110.0% of the budgeted amount are borne by the party that incurred such costs. Summit is also obligated to spend a specified minimum amount on the research and development of certain licensed products prior to the end of 2019. For the year ended December 31, 2018, the Company incurred approximately $8.6 million in collaboration expense for ezutromid, with no similar activity in 2017 and 2016.

In June 2018, Summit announced that it is discontinuing the Phase 2 clinical trial on ezutromid. As a result, no development, regulatory or sales milestones were deemed as probable of being achieved as of December 31, 2018. For the years ended December 31, 2017, and 2016, the Company recorded a $22.0 million milestone payment and a $40.0 million up-front payment to Summit, respectively, as research and development expense in its consolidated statement of operations and comprehensive loss.

University of Western Australia

In April 2013, the Company and UWA entered into an agreement under which an existing exclusive license agreement between the Company and UWA was amended and restated (the "Amended and Restated UWA License Agreement"). The Amended and Restated UWA License Agreement grants the Company specific rights to the treatment of DMD by inducing the skipping of certain exons. EXONDYS 51 falls under the scope of the license agreement. Under the Amended and Restated UWA License Agreement, the Company may be required to make payments of up to $6.0 million in the aggregate to UWA based on the successful achievement of certain development and regulatory milestones relating to EXONDYS 51 and up to five additional product candidates. The Company may also be obligated to make payments to UWA of up to $20.0 million upon the achievement of certain sales milestones. Additionally, the Company may be required to pay a low-single-digit percentage royalty on net sales of products covered by issued patents licensed from UWA during the term of the Amended and Restated UWA License Agreement. However, the Company has the option to purchase future royalties up-front. Under this option, prior to the First Amendment (defined below), the Company could elect to make a one-time royalty payment of $30.0 million to UWA.

In June 2016, the Company and UWA entered into the first amendment to the Amended and Restated UWA License Agreement (the "First Amendment"). Under the First Amendment, the Company was obligated to make an up-front payment of $7.0 million to UWA upon execution of the amendment. Under the terms of the First Amendment, UWA has waived certain rights and amended the timing of certain payments under the Amended and Restated UWA License Agreement, including lowering the up-front payment that is due by the Company upon exercise of the option to purchase future royalties up-front. Upon exercise of the option to purchase future royalties up-front, the Company will be obligated to make a $23.0 million payment to UWA. Additionally, the Company would still be obligated to make up to $20.0 million in payments to UWA upon achievement of certain sales milestones.

For the year ended December 31, 2016, the Company recorded $7.6 million relating to the development milestone and up-front payments to UWA as research and development expense in the consolidated statement of operations and comprehensive loss as the Amended and Restated UWA License Agreement and its First Amendment were entered into before the FDA approval of EXONDYS 51. The Company did not incur any milestone expense for the years ended December 31, 2018 and 2017. Additionally, corresponding to the FDA approval and the subsequent commercial sale of EXONDYS 51, the Company recorded a $1.0 million milestone payment as an in-license right in its consolidated balance sheet in 2016. As of December 31, 2018, the in-license right is recorded net of $0.3 million accumulated amortization on the consolidated balance sheets. The amortization of the in-licensed right is

recorded as cost of sales in the Company's consolidated statements of operations and comprehensive loss. During the years ended December 31, 2018, 2017, and 2016, the Company did not incur royalty expense nor did it make any royalty payments to UWA but may be obligated to make these payments in the future.

4. GAIN FROM SALE OF PRIORITY REVIEW VOUCHER

In February 2017, the Company entered into an agreement with Gilead Sciences, Inc. ("Gilead") to sell the Company's Rare Pediatric Disease Priority Review Voucher ("PRV"). The Company received the PRV when EXONDYS 51 was approved by the FDA for the treatment of patients with DMD amenable to exon 51 skipping. Following the early termination of the applicable waiting period under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended, in March 2017, the Company completed its sale of the PRV to a subsidiary of Gilead. Pursuant to the agreement, the subsidiary of Gilead paid the Company $125.0 million, which was recorded as a gain from sale of the PRV as it did not have a carrying value at the time of the sale.

5. FAIR VALUE MEASUREMENTS

The tables below present information about the Company's financial assets that are measured and carried at fair value and indicate the level within the fair value hierarchy of the valuation techniques it utilizes to determine such fair value:

	Fair Value Measurement as of December 31, 2018			
	Total	Level 1	Level 2	Level 3
	(in thousands)			
Assets				
Money market funds	$42,920	$42,920	$—	$—
Commercial paper	125,907	—	125,907	—
Government and government agency bonds	760,235	760,235	—	—
Corporate bonds	43,468	43,468	—	—
Strategic equity investments	31,739	1,739	—	30,000
Certificates of deposit	1,001	1,001	—	—
Total	$1,005,270	$849,363	$125,907	$30,000

	Fair Value Measurement as of December 31, 2017			
	Total	Level 1	Level 2	Level 3
	(in thousands)			
Assets				
Money market funds	$352,370	$352,370	$—	$—
Commercial paper	133,368	—	133,368	—
Government and government agency bonds	294,717	284,745	9,972	—
Corporate bonds	127,956	127,956	—	—
Certificates of deposit	648	648	—	—
Total	$909,059	$765,719	$143,340	$—

The Company's assets with fair value categorized as Level 1 within the fair value hierarchy include money market funds, government and government agency bonds, corporate bonds, certificate of deposit, and the Company's strategic investment in Lysogene, a publicly traded company in France, as more fully described in Note 3, License and Collaboration Agreements. Certain of the government and government agency bonds and corporate bonds are publicly traded fixed income securities and are presented as cash equivalents on the consolidated balance sheets.

The Company's assets with fair value categorized as Level 2 within the fair value hierarchy consist of commercial paper and government and government agency bonds. These assets have been initially valued at the transaction price and subsequently valued, at the end of each reporting period, through income-based approaches utilizing market observable data.

The Company's assets with fair value categorized as Level 3 within the fair value hierarchy consists of a strategic investment in Series A preferred stock of Lacerta as more fully described in Note 3, License and Collaboration Agreements. The fair value of the asset is based on a cost approach corroborated by the Black-Scholes option pricing model. The most significant assumptions in the

option pricing model include historical volatility of similar public companies, estimated term through Lacerta's potential exit and a risk free rate based on certain U.S. Treasury rates.

The carrying amounts reported in the consolidated balance sheets for cash and cash equivalents, accounts receivable, accounts payable and revolving line of credit approximate fair value because of the immediate or short-term maturity of these financial instruments. The carrying amounts for the term loan approximate fair value based on market activity for other debt instruments with similar characteristics and comparable risk.

6. CASH, CASH EQUIVALENTS AND MARKETABLE SECURITIES

The following table summarizes the Company's financial assets with maturities of less than 90 days from the date of purchase included in cash equivalents in the consolidated balance sheets for each of the periods indicated:

	As of December 31	
	2018	2017
	(in thousands)	
Money market funds	$42,920	$352,370
Corporate bonds	—	16,720
Government and government agency bonds	111,587	49,972
Commercial paper	14,940	—
Total	$169,447	$419,062

It is the Company's policy to mitigate credit risk in its financial assets by maintaining a well-diversified portfolio that limits the amount of exposure as to maturity and investment type. The weighted average maturity of the Company's available-for-sale securities as of December 31, 2018 and 2017 was approximately two and seven months, respectively. The following tables summarize the Company's cash, cash equivalents and investments for each of the periods indicated:

	As of December 31, 2018			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Market Value
	(in thousands)			
Cash and money market funds	$244,302	$ —	$ —	$244,302
Commercial paper	125,907	—	—	125,907
Government and government agency bonds	760,258	12	(35)	760,235
Corporate bonds	43,544	—	(76)	43,468
Total cash, cash equivalents and investments	1,174,011	12	(111)	1,173,912
As reported:				
Cash and cash equivalents	$370,827	$ 3	$ (1)	$370,829
Short-term investments	803,184	9	(110)	803,083
Total cash, cash equivalents and investments	$1,174,011	$ 12	$ (111)	$1,173,912

	As of December 31, 2017			
	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Market Value
	(in thousands)			
Cash and money market funds	$532,999	$ —	$ —	$532,999
Commercial paper	133,368	—	—	133,368
Government and government agency bonds	294,915	2	(200)	294,717
Corporate bonds				
Current	118,121	—	(145)	117,976
Non-current	10,016	—	(36)	9,980
Total cash, cash equivalents and investments	1,089,419	2	(381)	1,089,040
As reported:				
Cash and cash equivalents	$599,698	$ 2	$ (9)	$599,691
Short-term investments	479,705	—	(336)	479,369
Long-term investments	$10,016	$ —	$ (36)	$9,980
Total cash, cash equivalents and investments	$1,089,419	$ 2	$ (381)	$1,089,040

7. ACCOUNTS RECEIVABLE AND RESERVES FOR PRODUCT SALES

The following table summarizes the components of the Company's accounts receivable for the periods indicated:

	As of December 31,	
	2018	2017
	(in thousands)	
Product sales, net of discounts and allowances	$48,252	$28,539
Government contract receivables	792	929
Total accounts receivable, net	$49,044	$29,468

The balance for government contract receivables for both periods presented is subject to government audit and will not be collected until the completion of the audit. The decrease in government contract receivables is related to contract finalization and subsequent collection of the EU SKIP-NMD Agreement related to the Company’s exon 53 product candidate.

The following table summarizes an analysis of the change in reserves for discounts and allowances for the periods indicated:

	Chargebacks	Rebates	Prompt Pay	Other Accruals	Total
	(in thousands)				
Balance, as of December 31, 2017	$995	$6,959	$169	$ 464	$8,587
Provision	12,284	28,420	2,624	5,286	48,614
Payments/credits	(11,901)	(11,103)	(2,255)	(3,432)	(28,691)
Balance, as of December 31, 2018	$1,378	$24,276	$538	$ 2,318	$28,510

The following table summarizes the total reserves above included in the Company's consolidated balance sheets for the periods indicated:

	As of December 31,	
	2018	2017
	(in thousands)	
Reduction to accounts receivable	$2,364	$1,285
Component of accrued expenses	26,146	7,302
Total reserves	$28,510	$8,587

8. INVENTORY

The following table summarizes the components of the Company's inventory for each of the periods indicated:

	As of December 31, 2018	As of December 31, 2017
	(in thousands)	
Raw materials	$71,313	$ 53,875
Work in progress	47,279	27,442
Finished goods	6,853	2,288
Total inventory	$125,445	$ 83,605

9. OTHER ASSETS

The following table summarizes the Company's other current assets for each of the periods indicated:

	As of December 31, 2018	As of December 31, 2017
	(in thousands)	
Manufacturing-related deposits and prepaids	$39,036	$ 18,650
Leasehold improvement receivable	13,474	—
Prepaid clinical and pre-clinical expenses	9,706	5,175
Prepaid maintenance services	2,994	1,711
Prepaid income tax	2,130	—
Prepaid research expenses	1,932	2,896
Interest receivable	1,918	709
Prepaid commercial expenses	1,573	1,589
Asset held for sale	—	1,501
Other prepaids	3,671	2,726
Other	1,348	1,554
Total other current assets	$77,782	$ 36,511

The following table summarizes the Company's investments and other assets for each of the periods indicated:

	As of December 31, 2018	As of December 31, 2017
	(in thousands)	
Manufacturing-related deposits	$62,821	$ —
Strategic investments	31,739	—
Prepaid clinical expenses	7,541	7,488
Alternative minimum tax credit	3,367	3,315
Restricted investments	1,001	784
Long-term available-for-sale securities	—	$ 9,980
Other	825	242
Total investments and other assets	$107,294	$ 21,809

10. PROPERTY AND EQUIPMENT, NET

Property and equipment are recorded at historical cost, net of accumulated depreciation. The following table summarizes components of property and equipment, net for each of the periods indicated:

	As of December 31,	
	2018	2017
	(in thousands)	
Land	$4,158	$4,158
Building and improvements	22,972	14,543
Software and computer equipment	15,774	8,965
Lab equipment	17,659	9,860
Office equipment	3,663	2,211
Leasehold improvements	20,937	13,633
Construction in progress	40,010	7,808
Property and equipment, gross	125,173	61,178
Less: accumulated depreciation	(28,149)	(18,022)
Property and equipment, net	$97,024	$43,156

For the years ended December 31, 2018, 2017 and 2016, depreciation expense totaled $10.2 million, $6.4 million and $5.0 million, respectively.

11. INTANGIBLE ASSETS

The following table summarizes the components of the Company’s intangible assets for each of the periods indicated:

	As of December 31, 2018	As of December 31, 2017
	(in thousands)	
Patents	$5,773	$ 7,660
In-licensed rights	5,626	6,491
Software licenses	175	204
Total	$11,574	$ 14,355

The in-licensed rights relate to agreements with BioMarin and UWA. Following the execution of the settlement and license agreements with BioMarin in July 2017, the Company recorded a $6.6 million intangible asset related to EXONDYS 51 in the U.S. Additionally, as a result of the FDA approval and the subsequent commercial sale of EXONDYS 51, the Company made a $1.0 million sales milestone to UWA and, accordingly, recorded an in-licensed right. The in-licensed rights are being amortized on a straight-line basis over the remaining life of the related patent because the life of the related patent reflects the expected time period that the Company will benefit from the in-licensed right. For the years ended December 31, 2018, 2017 and 2016, the Company recorded $0.9 million, $1.1 million and less than $0.1 million, respectively, of amortization related to the in-license rights.

Patent costs consist primarily of external legal costs, filing fees incurred to file patent applications and renewal fees on proprietary technology developed or licensed by the Company. Patent costs associated with applying for a patent, being issued a patent and annual renewal fees are capitalized. Costs to defend a patent and costs to invalidate a competitor's patent or patent application are expensed as incurred. Patent costs are amortized on a straight-line basis over the shorter of the estimated economic lives or the initial term of the patents, which is generally 20 years. Patent amortization expense was $0.7 million, $0.6 million and $0.6 million for the years ended December 31, 2018, 2017 and 2016, respectively. The Company also expensed the remaining net book value of previously capitalized patents that were later abandoned of $0.1 million, $0.6 million and $0.3 million for the years ended December 31, 2018, 2017 and 2016, respectively, which were included in research and development expenses on the consolidated statements of operations and comprehensive loss.

Additionally, the Company reviewed its patent portfolio and identified technology that the Company will no longer pursue. As a result, the Company impaired these patent assets and recorded $3.8 million in impairment loss, which was included in research and development expense on the consolidated statement of operations and comprehensive loss.

The following table summarizes the estimated future amortization for intangible assets for the next five years:

	As of December 31, 2018 (in thousands)
2019	1,490
2020	1,300
2021	1,299
2022	1,298
2023	1,297
Total	$ 6,684

12. ACCRUED EXPENSES

The following table summarizes the Company's accrued expenses for each of the periods indicated:

	As of December 31, 2018	As of December 31, 2017
	(in thousands)	
Product revenue related reserves	$26,146	$ 7,302

Accrued employee compensation costs	24,692	14,402
Accrued milestone expense	24,020	—
Accrued contract manufacturing costs	15,794	14,019
Accrued clinical and pre-clinical costs	11,396	15,975
Accrued professional fees	11,319	6,794
Accrued BioMarin royalties	8,254	2,846
Accrued property and equipment	5,421	2,525
Accrued collaboration cost sharing	2,167	—
Accrued research costs	1,070	401
Accrued interest expenses	1,045	1,291
Accrued income taxes	301	943
Other	2,470	2,484
Total accrued expenses	$134,095	$ 68,982

13. RESTRUCTURING

In March 2016, the Company announced a long-term plan to consolidate all of the Company's operations to Massachusetts as part of a strategic plan to increase operational efficiency. As part of the consolidation, research activities and some employees transitioned to the Company's facilities in Andover and Cambridge, Massachusetts. As of December 31, 2017, the relocations and terminations were completed.

The second floor and the first floor of the Company's facility in Corvallis, Oregon were vacated and closed and made available for sub-leasing in December 2016 and April 2017, respectively. Using a discounted cash flow methodology and based on

monthly rent payments as well as estimated sublease income, the Company recognized a total of approximately $1.5 million and $2.3 million, in restructuring expenses for the second and the first floor, respectively. In June 2018, the Corvallis facility was sold, and the Company entered into a rental termination agreement with the new landlord regarding the space made available for sub-lease. As a result, we relieved the remaining $2.2 million of cease-use liability related to this space in June 2018, which was recorded as a reduction to selling, general and administrative expenses.

For the years ended December 31, 2018, 2017 and 2016, the Company recognized $(2.2) million, $3.0 million and $4.6 million as restructuring expenses, respectively.

	For the Year Ended December 31		
	2018	2017	2016
	(in thousands)		
Research and development	$—	$188	$2,013
Selling, general and administrative	(2,222)	2,832	2,549
Total restructuring expenses	$(2,222)	$3,020	$4,562

The following table summarizes the restructuring reserve for each of the periods indicated:

	For the Year Ended December 31	
	2018	2017
	(in thousands)	
Restructuring reserve beginning balance	$2,933	$1,588
Restructuring expenses incurred during the period	—	3,020
Amounts paid during the period	(711)	(1,675)
Reversal of cease-use liability	(2,222)	—
Restructuring reserve ending balance	$—	$2,933

14. INDEBTEDNESS

2024 Convertible Notes

On November 14, 2017, the Company issued $570.0 million senior notes due on November 15, 2024 (the “2024 Notes”). The 2024 Notes were issued at face value and bear interest at the rate of 1.50% per annum, payable semi-annually in cash on each May 15 and November 15, commencing on May 15, 2018.

Upon conversion, the Company may pay cash, shares of its common stock or a combination of cash and stock, as determined by the Company in its discretion. The 2024 Notes may be convertible into 7,763,552 shares of the

Company's common stock under certain circumstances prior to maturity at a conversion rate of 13.621 shares per $1,000 principal amount of the 2024 Notes, which represents a conversion price of $73.42 per share, subject to adjustment under certain conditions.

The Company allocated the proceeds received from issuance of the 2024 Notes between the liability component and the embedded conversion option, or equity component. The liability component was determined by measuring the fair value of similar notes that do not include the embedded conversion option. The Company allocated $161.1 million to the equity component, which was determined by deducting the fair value of the liability component from the par value of the 2024 Notes. The equity component, net of allocated offering costs of $4.2 million, was recorded as an increase additional paid-in capital. The equity component, plus $10.6 million of offering costs allocated to the liability component, represent the total debt discount on the 2024 Notes at issuance. The debt discount will be amortized under an effective interest method and recorded as additional interest expense over the life of the 2024 Notes. The effective interest rate on the liability component of the 2024 Notes for the year ended December 31, 2018 and 2017 was 6.9%.

Upon the occurrence of a "fundamental change", which includes (1) change in beneficial ownership of the Company where any person/group possesses more than 50% of the voting power of the Company, (2) consolidation or merger of the Company, (3) shareholder approval of a liquidation plan or (4) the Company is delisted from NYSE or NASDAQ, the holders may require the Company to repurchase all or a portion of the 2024 Notes for cash at 100% of the principal amount of the 2024 Notes being purchased, plus any accrued and unpaid interest. Additionally, upon the occurrence of a "make-whole fundamental change" prior to the maturity date, the Company shall adjust the conversion rate on a sliding scale basis detailed in the agreement

To minimize the impact of potential dilution upon conversion of the 2024 Notes, the Company separately entered into capped call transactions with certain counterparties. The capped calls have a strike price of $73.42 and a cap price of $104.88 and are exercisable when and if the 2024 Notes are converted. If, upon conversion of the 2024 Notes, the price of the Company's common stock is between the strike price and the cap price of the capped calls, the counterparties will deliver shares of the Company's common stock and/or cash with an aggregate value equal to the difference between the price of the Company's common stock at the conversion date and the strike price, multiplied by the number of shares of the Company's common stock related to the capped calls being exercised. The Company paid $50.9 million for these capped calls transactions, which was recorded as additional paid-in capital.

Term Loan and Revolving Line of Credit

In July 2017, the Company entered into an amended and restated credit agreement (the "Amended and Restated Credit and Security Agreement") which provides a term loan ("July 2017 Term Loan") of $60.0 million with MidCap Financial Trust ("MidCap"). Borrowings under the Amended and Restated Credit and Security Agreement bore interest at a rate per annum equal to 6.25%, plus the one-month London Interbank Offered Rate ("LIBOR"). In addition to paying interest on the outstanding principal under the Amended and Restated Credit and Security Agreement, the Company paid an origination fee equal to 0.50% of the amount of the term loan when advanced under the Amended and Restated Credit and Security Agreement and would be liable for a final payment fee equal to 2.00% of the amount borrowed under the Amended and Restated Credit and Security Agreement when the July 2017 Term Loan was fully repaid. Commencing on July 1, 2018, and continuing for the remaining thirty six months of the facility, the Company was required to make monthly principal payments of approximately $0.8 million, set forth in the Amended and Restated Credit and Security Agreement, subject to certain adjustments as described therein. The facility would mature in July 2021.

In July 2017, the Company also entered into a revolving credit and security agreement (the "Revolving Credit Agreement") which provides an aggregate revolving loan commitment of $40.0 million (which may be increased by an additional tranche of $20.0 million) with MidCap. Borrowings under the Revolving Credit Agreement bore interest at a rate of 3.95%, plus the one-month LIBOR. In addition to paying interest on the outstanding principal under the Revolving Credit Agreement, the Company paid $0.2 million of origination fees, which was 0.50% of the amount of the revolving loan. The Company recognized this origination fee as other asset and it was amortized to interest expense over the term of the revolving loan.

In September 2018, the Company terminated both the Amended and Restated Credit and Security Agreement and the Revolving Credit Agreement with MidCap and paid off the remaining outstanding balance of principal and accrued and unpaid interest on the July 2017 Term Loan. As a result, the Company recorded a debt extinguishment loss of $2.3 million primarily related to the write-off of unamortized debt issuance costs and prepayment fees.

Mortgage Loans

The Company had two mortgage loans outstanding which bear interest at 4.75% with the original maturity date of February 2027 and were collateralized by a facility in Corvallis, Oregon. At December 31, 2017, these loans had unpaid principal balances of $0.8 million and $0.5 million, for a total indebtedness of $1.3 million, and were presented as current portion of long-term debt on the consolidated balance sheet. In connection with the sale of this property in January 2018, the two long-term mortgage loans were paid off.

As of December 31, 2018, the Company recorded approximately $420.6 million as long-term debt on the consolidated balance sheets. For the years ended December 31, 2018, 2017 and 2016, the Company recorded $33.7 million, $5.8 million and $1.9 million of interest expense, respectively.

The following table summarizes the Company's debt facilities for the periods indicated:

	As of December 31, 2018 (in thousand)	As of December 31, 2017 (in thousand)
Par value of the 2024 Notes	$570,000	$570,000
Unamortized discount - equity component	(140,206)	(158,890)
Unamortized discount - debt issuance costs	(9,240)	(10,449)
Net carrying value of convertible debt	420,554	400,661
Net carrying value of other debt facilities	—	30,390
Net carrying value of total debt facilities	420,554	431,051
Fair value of convertible debt	$952,681	$619,641

The fair value of the Company's 2024 Notes is based on open market trades and is classified as level 1 in the fair value hierarchy.

The following table summarizes the total gross payments due under the Company's debt arrangements:

	As of December 31, 2018 (in thousands)
2019	$ —
2020	—
2021	—
2022	—
2023	—
Thereafter	570,000
Total Payments	$ 570,000

15. EQUITY FINANCING

In November 2018, the Company sold approximately 4.1 million shares of common stock through an underwritten public offering, including 0.3 million shares sold to the underwriters. The offering price was $131.00 per share. The Company received net proceeds of approximately $513.4 million from the offering, net of commission and offering expenses of approximately $24.6 million.

In July 2017, the Company sold approximately 8.8 million shares of common stock through an underwritten public offering, including 1.2 million shares sold to the underwriters. The offering price was $42.50 per share. The Company received net proceeds of approximately $354.0 million from the offering, net of commission and offering expenses of approximately $20.0 million.

In September 2016, the Company sold approximately 5.8 million shares of common stock through an underwritten public offering at a price of $59.75 per share. The Company received net proceeds of approximately $327.4 million from the offering net of commission and offering expenses of approximately $17.6 million.

In June 2016, the Company sold approximately 2.1 million shares of common stock through an underwritten public offering at a price of $17.84 per share. The Company received net proceeds of approximately $37.3 million from the offering net of offering expense of approximately $0.2 million.

16. STOCK-BASED COMPENSATION

In June 2011, the Company's stockholders approved the 2011 Equity Incentive Plan ("2011 Plan"). The 2011 Plan, which authorized 13.0 million shares of common stock to be issued, allows for the grant of stock options, SARs, RSAs, RSUs, performance shares and performance units. In June 2016 and 2015, shareholders authorized the issuance of an additional 1.3 million and 1.7 million shares, respectively, of common stock under the 2011 Plan. As of December 31, 2018, the 2011 Plan was merged into the 2018 Plan (defined below). As a result, there were no shares of common stock remaining available for future grant under the 2011 Plan.

In June 2013, the Company's stockholders approved the 2013 ESPP with approximately 0.3 million shares of common stock available to be issued. In June 2016, the Company's stockholders approved an additional approximately 0.3 million shares of common stock available to be issued to be added to the 2013 ESPP. As of December 31, 2018, 0.2 million shares of common stock remain available for future grant under the 2013 ESPP.

In September 2014, the Company initiated the 2014 Employment Commencement Incentive Plan ("2014 Plan") with approximately 0.6 million shares of common stock available to be issued. In October 2015, June 2017 and July 2018, the 2014 Plan was increased by 1.0 million, 3.8 million and 1.2 million shares of common stock available to be issued, respectively. As of December 31, 2018, 0.9 million shares of common stock remain available for future grant under the 2014 Plan.

In June 2018, the Company's stockholders approved the 2018 Equity Incentive Plan ("2018 Plan"). The 2018 Plan, which authorized 2.9 million shares of common stock to be issued, allows for the grant of stock options, SARs, RSAs, RSUs, performance shares and performance units. The 2011 Plan was merged into the 2018 Plan and, as a result, all remaining shares in the 2011 Plan were transferred into the 2018 Plan. As of December 31, 2018, 4.4 million shares of common stock remain available for future grant under the 2018 Plan.

Stock Options

In general, stock options have a ten-year term and vest over a four-year period, with one-fourth of the underlying shares vesting on the first anniversary of the grant and 1/48th of the underlying shares vesting monthly thereafter, such that the underlying shares will be fully vested on the fourth anniversary of the grant, subject to the terms of the applicable plan under which they were granted.

The fair values of stock options granted during the periods presented were measured on the date of grant using the Black-Scholes-Merton option-pricing model, with the following assumptions:

	For the Year Ended December 31,		
	2018	2017	2016
Risk-free interest rate (1)	2.5 - 3.0%	1.6 - 2.1%	1.1 – 1.8%
Expected dividend yield (2)	—	—	—
Expected term (3)	5.06 years	4.2 - 4.8 years	4.2 – 4.8 years
Expected volatility (4)	52.4 - 60.8%	54.0 - 63.0%	78.2 – 137.1 %

(1) The risk-free interest rate is estimated using an average of Treasury bill interest rates over a historical period commensurate with the expected term of the option that correlates to the prevailing interest rates at the time of grant.
(2) The expected dividend yield is zero as the Company has not paid any dividends to date and does not expect to pay dividends in the future.
(3) The expected term is estimated using historical exercise behavior.
(4) Upon commercialization of EXONDYS 51 in the U.S., the Company's future risk profile changed. As a result, starting January 1, 2017, the Company estimates expected volatility by using only implied volatility in exchange-traded options of the Company's common stock. Prior to January 1, 2017, the expected volatility was estimated using a blend of calculated volatility of the Company's common stock over a historical period and implied volatility in exchange-traded options of the Company's common stock.

The amounts estimated according to the Black-Scholes-Merton option-pricing model may not be indicative of the actual values realized upon the exercise of these options by the holders.

The following tables summarize the Company's stock option activity for each of the periods indicated:

	For the Year Ended December 31,					
	2018		2017		2016	
	Shares	Weighted Average Exercise Price	Shares	Weighted Average Exercise Price	Shares	Weighted Average Exercise Price
Grants outstanding at beginning of	8,806,204	$ 29.74	5,436,951	$ 22.70	6,515,976	$ 23.91

the period						
Granted	2,152,439	90.15	4,805,722 (1)	35.09	1,285,051	14.89
Exercised	(2,119,306)	22.89	(792,845)	17.40	(1,056,821)	18.31
Cancelled	(448,166)	46.11	(643,624)	25.44	(1,307,255)	24.61
Grants outstanding at end of the period	8,391,171	$ 46.09	8,806,204	$ 29.74	5,436,951	$ 22