FORM 10-K

BIOGEN INC. - BIIB

Filed: February 01, 2018 (period: December 31, 2017)

Annual report with a comprehensive overview of the company

UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Form 10-K

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

For the fiscal year ended December 31, 2017

or

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

Commission file number: 0-19311

BIOGEN INC.

(Exact name of registrant as specified in its charter)

Delaware	33-0112644
(State or other jurisdiction of incorporation or organization)	*(I.R.S. Employer Identification No.)*

225 Binney Street, Cambridge, Massachusetts 02142

(617) 679-2000

(Address, including zip code, and telephone number, including area code, of Registrant's principal executive offices)

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

Title of Each Class	Name of Each Exchange on Which Registered
Common Stock, $0.0005 par value	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 and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files): Yes ☒ No ☐

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K 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, or a smaller reporting 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 ☐
(Do not check if a 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 registrant's common stock held by non-affiliates of the registrant (without admitting that any person whose shares are not included in such calculation is an affiliate) computed by reference to the price at which the common stock was last sold as of the last business day of the registrant's most recently completed second fiscal quarter was $57,220,188,450.

As of January 26, 2018, the registrant had 211,562,686 shares of common stock, $0.0005 par value, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the definitive proxy statement for our 2018 Annual Meeting of Stockholders are incorporated by reference into Part III of this report.

BIOGEN INC.
ANNUAL REPORT ON FORM 10-K
For the Year Ended December 31, 2017
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NOTE REGARDING FORWARD-LOOKING STATEMENTS

This report contains forward-looking statements that are being made pursuant to the provisions of the Private Securities Litigation Reform Act of 1995 (the Act) with the intention of obtaining the benefits of the "Safe Harbor" provisions of the Act. These forward-looking statements may be accompanied by such words as "aim," "anticipate," "believe," "could," "estimate," "expect," "forecast," "intend," "may," "plan," "potential," "possible," "will" and other words and terms of similar meaning. Reference is made in particular to forward-looking statements regarding:

- the anticipated amount, timing and accounting of revenues, contingent payments, milestone, royalty and other payments under licensing, collaboration or acquisition agreements, tax positions and contingencies, collectability of receivables, pre-approval inventory, cost of sales, research and development costs, compensation and other selling, general and administrative expenses, amortization of intangible assets, foreign currency exchange risk, estimated fair value of assets and liabilities and impairment assessments;
- expectations, plans and prospects relating to sales, pricing, growth and launch of our marketed and pipeline products;
- our plans to invest in emerging growth areas such as pain, ophthalmology, neuropsychiatry and acute neurology;
- the potential impact of increased product competition in the markets in which we compete;
- patent terms, patent term extensions, patent office actions and expected availability and period of regulatory exclusivity;
- the costs and timing of potential clinical trials, filings and approvals, and the potential therapeutic scope of the development and commercialization of our and our collaborators' pipeline products;
- the drivers for growing our business, including our plans and intent to commit resources relating to business development opportunities and research and development programs;
- the anticipated benefits and the potential costs and expenses related to our current or future initiatives to streamline our operations and reallocate resources;
- our manufacturing capacity, use of third-party contract manufacturing organizations and plans and timing relating to the expansion of our manufacturing capabilities, including anticipated investments and activities in new manufacturing facilities;
- the potential impact on our results of operations and liquidity of the United Kingdom's (U.K.) intent to voluntarily depart from the European Union (E.U.);
- the impact of the continued uncertainty of the credit and economic conditions in certain countries in Europe and our collection of accounts receivable in such countries;
- the potential impact of healthcare reform in the United States (U.S.) and measures being taken worldwide designed to reduce healthcare costs to constrain the overall level of government expenditures, including the impact of pricing actions and reduced reimbursement for our products;
- the timing, outcome and impact of administrative, regulatory, legal and other proceedings related to our patents and other proprietary and intellectual property rights, tax audits, assessments and settlements, pricing matters, sales and promotional practices, product liability and other matters;
- lease commitments, purchase obligations and the timing and satisfaction of other contractual obligations;
- our ability to finance our operations and business initiatives and obtain funding for such activities;
- the anticipated benefits, costs and tax treatment of the spin-off of our hemophilia business; and
- the impact of new laws, including the Tax Cuts and Jobs Act of 2017, and accounting standards.

These forward-looking statements involve risks and uncertainties, including those that are described in Item 1A. *Risk Factors* included in this report and elsewhere in this report that could cause actual results to differ materially from those reflected in such statements. You should not place undue reliance on these statements. Forward-looking statements speak only as of the date of this report. Except as required by law, we do not undertake any obligation to publicly update any forward-looking statements, whether as a result of new information, future developments or otherwise.

NOTE REGARDING COMPANY AND PRODUCT REFERENCES

References in this report to:

- “Biogen,” the “company,” “we,” “us” and “our” refer to Biogen Inc. and its consolidated subsidiaries;
- “RITUXAN” refers to both RITUXAN (the trade name for rituximab in the U.S., Canada and Japan) and MabThera (the trade name for rituximab outside the U.S., Canada and Japan); and
- "ELOCTATE" refers to both ELOCTATE (the trade name for Antihemophilic Factor (recombinant), Fc Fusion Protein in the U.S., Canada and Japan) and ELOCTA (the trade name for Antihemophilic Factor (recombinant), Fc Fusion Protein in the E.U.).

NOTE REGARDING TRADEMARKS

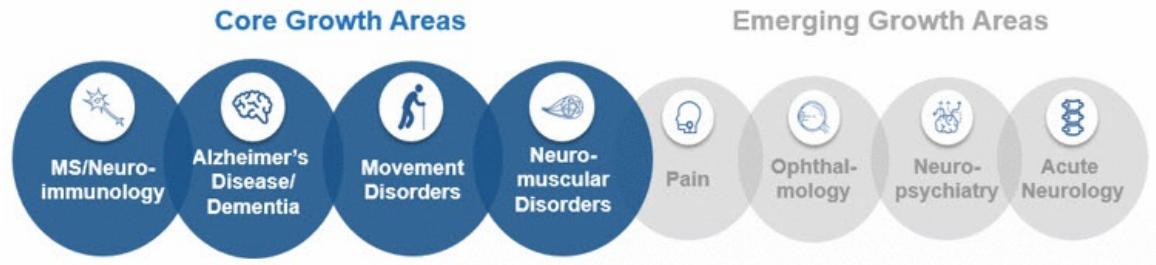
AVONEX®, PLEGRIDY®, RITUXAN®, RITUXAN HYCELA®, SPINRAZA®, TECFIDERA®, TYSABRI® and ZINBRYTA® are registered trademarks of Biogen. BENEPALI™, FLIXABI™, FUMADERM™ and IMRALDI™ are trademarks of Biogen. ALPROLIX®, ELOCTATE®, ENBREL®, FAMPYRA™, GAZYVA®, HUMIRA®, OCREVUS®, REMICADE® and other trademarks referenced in this report are the property of their respective owners.

PART I

Item 1. Business

Overview

Biogen is a global biopharmaceutical company focused on discovering, developing and delivering worldwide innovative therapies for people living with serious neurological and neurodegenerative diseases, including in our core growth areas of multiple sclerosis (MS) and neuroimmunology, Alzheimer's disease (AD) and dementia, movement disorders and neuromuscular disorders, including spinal muscular atrophy (SMA) and amyotrophic lateral sclerosis (ALS). We also plan to invest in emerging growth areas such as pain, ophthalmology, neuropsychiatry and acute neurology. In addition, we are employing innovative technologies to discover potential treatments for rare and genetic disorders, including new ways of treating diseases through gene therapy in the previously mentioned areas. We also manufacture and commercialize biosimilars of advanced biologics.



Our marketed products include TECFIDERA, AVONEX, PLEGRIDY, TYSABRI, ZINBRYTA and FAMPYRA for the treatment of MS, SPINRAZA for the treatment of SMA and FUMADERM for the treatment of severe plaque psoriasis. We also have certain business and financial rights with respect to RITUXAN for the treatment of non-Hodgkin's lymphoma, chronic lymphocytic leukemia (CLL) and other conditions, GAZYVA for the treatment of CLL and follicular lymphoma, OCREVUS for the treatment of primary progressive MS and relapsing MS and other potential anti-CD20 therapies under a collaboration agreement with Genentech, Inc. (Genentech), a wholly-owned member of the Roche Group.

We support our drug discovery and development efforts through the commitment of significant resources to discovery, research and development programs and business development opportunities, particularly within our core and emerging growth areas. For nearly two decades we have led in the research and development of new therapies to treat MS, resulting in our leading portfolio of MS treatments. Now our research is focused on additional improvements in the treatment of MS, such as the development of next generation therapies for MS, with a goal to reverse or possibly repair damage caused by the disease. We are also applying our scientific expertise to solve some of the most challenging and complex diseases, including AD, progressive supranuclear palsy (PSP), a rare condition that affects movement, speech, vision and cognitive function, Parkinson's disease and ALS.

Our innovative drug development and commercialization activities are complemented by our biosimilar therapies that expand access to medicines and reduce the cost burden for healthcare systems. We are leveraging our manufacturing capabilities and know-how to develop, manufacture and market biosimilars through Samsung Bioepis, our joint venture with Samsung BioLogics Co. Ltd. (Samsung Biologics). Under our commercial agreement, we market and sell BENEPALI, an etanercept biosimilar referencing ENBREL, and FLIXABI, an infliximab biosimilar referencing REMICADE, in the E.U.

Key Developments

During 2017 we had a number of key developments affecting our business.

Corporate Matters

2017 Corporate Strategy

In July 2017 we announced an updated strategic framework to optimize the value of our MS business while investing for the future across our core growth areas of MS and neuroimmunology, AD and dementia, movement disorders and neuromuscular diseases, including SMA and ALS. We also plan to invest in emerging growth areas such as pain, ophthalmology, neuropsychiatry and acute neurology.

In order to deliver positive results in the near term while investing in the next stages of our growth, we will focus on the following strategic priorities:

- maximizing the resilience of our MS core business;
- accelerating efforts in SMA as a significant new growth opportunity;
- developing and expanding our neuroscience portfolio;
- focusing our capital allocation efforts to drive investment for future growth; and
- creating a leaner and simpler operating model to streamline our operations and reallocate resources towards prioritized research and development and commercial value creation opportunities.

In October 2017, in connection with creating a leaner and simpler operating model, we approved a corporate restructuring program intended to streamline our operations and reallocate resources. We expect to make total non-recurring operating and capital expenditures of up to $170.0 million, primarily in 2018, and our goal is to redirect resources of up to $400.0 million annually by 2020 to prioritized research and development and other value creation opportunities.

TECFIDERA Settlement and License Agreement

In January 2017 we entered into a settlement and license agreement with Forward Pharma A/S (Forward Pharma). Pursuant to this agreement, we obtained U.S. and rest of world licenses to Forward Pharma's intellectual property, including Forward Pharma's intellectual property related to TECFIDERA. In exchange, we paid Forward Pharma $1.25 billion in cash. During the fourth quarter of 2016 we recognized a pre-tax charge of $454.8 million and in the first quarter of 2017 we recognized intangible assets of $795.2 million related to this agreement.

We have two intellectual property disputes with Forward Pharma, one in the U.S. and one in the E.U., concerning intellectual property related to TECFIDERA. In March 2017 the U.S. intellectual property dispute was decided in our favor. Forward Pharma appealed to the U.S. Court of Appeals for the Federal Circuit and the appeal is pending. We evaluated the recoverability of the U.S. asset acquired from Forward Pharma and recorded an impairment charge in the first quarter of 2017 to adjust the carrying value of the acquired U.S. asset to fair value reflecting the impact of the developments in the U.S. legal dispute. In January 2018 the European Patent Office (EPO) announced its decision revoking Forward Pharma's European Patent No. 2 801 355. Forward Pharma has stated that it expects to file an appeal to the Technical Board of Appeal of the EPO. Based upon our assessment of these rulings, we continue to amortize the remaining net book value of the U.S. and rest of world intangible assets in our consolidated statements of income utilizing an economic consumption model.

For additional information on our settlement and license agreement with Forward Pharma and related intangible assets, please read Note 7, *Intangible Assets and Goodwill*, to our consolidated financial statements included in this report. For additional information on these disputes, please read Note 21, *Litigation*, to our consolidated financial statements included in this report.

Tax Reform

The Tax Cuts and Jobs Act of 2017 (the 2017 Tax Act), which was signed into law on December 22, 2017, has resulted in significant changes to the U.S. corporate income tax system. These changes include a federal statutory rate reduction from 35% to 21%, the elimination or reduction of certain domestic deductions and credits and limitations on the deductibility of interest expense and executive compensation. The 2017 Tax Act also transitions international taxation from a worldwide system to a modified territorial system and includes base erosion prevention measures on non-U.S. earnings, which has the effect of subjecting certain earnings of our foreign subsidiaries to U.S. taxation as global intangible low-taxed income (GILTI). These changes are effective beginning in 2018.

The 2017 Tax Act also includes a one-time mandatory deemed repatriation tax on accumulated foreign subsidiaries' previously untaxed foreign earnings (the Transition Toll Tax).

Changes in tax rates and tax laws are accounted for in the period of enactment. Therefore, during the year ended December 31, 2017, we recorded a charge totaling $1,173.6 million related to our current estimate of the provisions of the 2017 Tax Act, including a $989.6 million expense under the Transition Toll Tax. The Transition Toll Tax will be paid over an eight-year period, starting in 2018, and will not accrue interest.

The 2017 Tax Act will provide us with flexibility in deploying our cash resources to advance our business interests. We expect that it will have a modest positive effect on our income tax rate in 2018 and a potential incremental benefit thereafter.

Hemophilia Spin-Off

On February 1, 2017, we completed the spin-off of our hemophilia business, Bioverativ Inc. (Bioverativ), as an independent, publicly traded company trading under the symbol "BIVV" on the Nasdaq Global Select Market. The spin-off was accomplished through the distribution of all the then outstanding shares of common stock of Bioverativ to Biogen shareholders, who received one share of Bioverativ common stock for every two shares of Biogen common stock they owned. The separation and distribution was structured to be tax-free for shareholders for federal income tax purposes. Bioverativ assumed all of our rights and obligations under our collaboration agreement with Swedish Orphan Biovitrum AB (Sobi) and our collaboration and license agreement with Sangamo Biosciences Inc. (Sangamo).

Our consolidated results of operations and financial position included in this report reflect the financial results of our hemophilia business for all periods through January 31, 2017.

For additional information on the spin-off of our hemophilia business, please read Note 3, *Hemophilia Spin-Off,* to our consolidated financial statements included in this report.

BIIB093 Acquisition

In May 2017 we completed an asset purchase of the Phase 3-ready candidate BIIB093 (intravenous glibencamide) (formerly known as CIRARA) from Remedy Pharmaceuticals Inc. (Remedy). The target indication for BIIB093 is large hemispheric infarction (LHI), a severe form of ischemic stroke where brain swelling (cerebral edema) often leads to a disproportionately large share of stroke-related morbidity and mortality. The U.S. Food and Drug Administration (FDA) recently granted BIIB093 Orphan Drug Designation for severe cerebral edema in patients with acute ischemic (AI) stroke. The FDA has also granted BIIB093 Fast Track designation.

Under this agreement, we are responsible for the future development and commercialization of BIIB093. Remedy will share in the cost of development for the target indication for BIIB093 in LHI stroke.

For additional information on our transaction with Remedy, please read Note 2, *Acquisitions,* to our consolidated financial statements included in this report.

BIIB092 License Agreement

In June 2017 we completed an exclusive license agreement with Bristol-Myers Squibb Company (BMS) for BIIB092 (formerly known as BMS-986168), a Phase 2-ready experimental medicine with potential in AD and PSP. BIIB092 is an antibody targeting tau, the protein that forms the deposits, or tangles, in the brain associated with AD and other neurodegenerative tauopathies such as PSP.

Under this agreement, we received worldwide rights to BIIB092 and are responsible for the full development and global commercialization of BIIB092 in AD and PSP.

For additional information on our collaboration arrangement with BMS, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Eisai Collaboration Agreement

In October 2017 we entered into a new collaboration agreement with Eisai Co. Ltd. (Eisai) for the joint development and commercialization of aducanumab, our anti-amyloid beta antibody candidate for AD (Aducanumab Collaboration Agreement). Under the Aducanumab Collaboration Agreement, we will continue to lead the ongoing Phase 3 development of aducanumab and will remain responsible for 100% of development costs for aducanumab until April 2018. Eisai will then reimburse us for 15% of aducanumab development expenses for the period April 2018 through December 2018, and 45% thereafter. Upon commercialization, both companies will co-promote aducanumab with a region-based profit split.

In addition, we and Eisai will continue to jointly develop two product candidates for AD, BAN2401, a monoclonal antibody that targets amyloid beta aggregates, and E2609, a BACE inhibitor.

We and Eisai will co-promote AVONEX, TYSABRI and TECFIDERA in Japan in certain settings and Eisai will distribute AVONEX, TYSABRI, TECFIDERA and PLEGRIDY in India and other Asia-Pacific markets, excluding China.

For additional information on our collaboration arrangement with Eisai, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Neurimmune Collaboration Agreement

In October 2017 we amended the terms of our collaboration and license agreement with Neurimmune Subone AG (Neurimmune). Under the amended agreement, we made a $150.0 million payment to Neurimmune, which is reflected as a charge to noncontrolling interests, in exchange for a 15% reduction in royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab. Our royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab, will now range from the high single digits to low-teens.

Under the amended agreement, we also have an option that will expire in April 2018 to further reduce our royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab, by an additional 5% in exchange for a $50.0 million payment to Neurimmune.

For additional information on our collaboration arrangement with Neurimmune, please read Note 19, *Investments in Variable Interest Entities,* to our consolidated financial statements included in this report.

BIIB098 License Agreement

In November 2017 we entered into an exclusive license and collaboration agreement with Alkermes Pharma Ireland Limited, a subsidiary of Alkermes plc (Alkermes), for BIIB098 (formerly known as ALKS 8700), an oral monomethyl fumarate (MMF) prodrug in Phase 3 development for the treatment of relapsing forms of MS.

Under this agreement, we received an exclusive, worldwide license to develop and commercialize BIIB098 and will pay Alkermes a royalty on potential worldwide net sales of BIIB098. Beginning in 2018 we are responsible for all development expenses related to BIIB098. Alkermes will maintain responsibility for regulatory interactions with the FDA through the potential approval of the New Drug Application (NDA) for BIIB098 for the treatment of MS.

For additional information on our collaboration arrangement with Alkermes, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Ionis Collaboration Agreement

In December 2017 we entered into a new collaboration agreement with Ionis Pharmaceuticals Inc. (Ionis) to identify new antisense oligonucleotide (ASO) drug candidates for the treatment of SMA. Under this agreement, we have the option to license therapies arising out of this collaboration and will be responsible for the development and commercialization of these therapies.

For additional information on our new collaboration arrangement with Ionis, please read Note 20, *Collaborative and Other Relationships*, to our consolidated financial statements included in this report.

Management Changes

During 2017 we appointed several new executives, each of whom has significant experience in the biopharmaceutical industry and is a leader in his or her functional area. These appointments included:

- Michel Vounatsos, Chief Executive Officer;
- Jeffrey Capello, Executive Vice President and Chief Financial Officer;
- Ginger Gregory, Executive Vice President and Chief Human Resources Officer; and
- Chirfi Guindo, Executive Vice President and Head of Global Marketing, Market Access and Customer Innovation.

For additional information on these and our other executive officers, please read the subsection entitled *"Our Executive Officers"* included in this report.

Product/Pipeline Developments

Core Growth Areas

Multiple Sclerosis and Neuroimmunology

TECFIDERA (dimethyl fumarate)

- In April 2017 we presented new real-world data evidence supporting TECFIDERA at the 69th annual meeting of the American Academy of Neurology (AAN) in Boston, MA.

  We presented a comparison of real-world data that supported TECFIDERA's strong efficacy relative to other oral MS therapies, both in newly-treated MS patients and those previously treated with a prior disease modifying therapy (DMT). Subgroup analyses of the open-label studies PROTEC and RESPOND assessed TECFIDERA in early MS and early switch patients, respectively. Results showed that TECFIDERA significantly reduced the annualized relapse rate over one year in the early MS subgroups, including those who switched to TECFIDERA from a prior DMT. Additional data presented at the AAN meeting affirmed the well-characterized, long-term safety profile of TECFIDERA in patients treated for up to nine years.

TYSABRI (natalizumab)

- In February 2017 the Committee for Medicinal Products for Human Use (CHMP) of the European Medicines Agency (EMA) adopted a positive opinion to update the TYSABRI E.U. label with pediatric information to remove the contraindication in pediatrics and to describe the results of the post-marketing meta-analysis of pediatric data. The label update entitles us to apply for a six-month extension to the E.U. patent Supplementary Protection Certificate.
- In April 2017 we presented new real-world data from the TYSABRI Observational Program that confirmed the efficacy of TYSABRI and demonstrated that early and continued treatment leads to better clinical outcomes. These data were presented at the 69th annual meeting of AAN in Boston, MA.

FAMPYRA (prolonged-release fampridine tablets)

- In May 2017 the European Commission (EC) granted a standard marketing authorization for FAMPYRA for walking improvement in people with MS.

ZINBRYTA (daclizumab)

- In July 2017 the EMA announced that it had provisionally restricted the use of ZINBRYTA to adult patients with highly active relapsing disease despite a full and adequate course of treatment with at least one DMT or with rapidly evolving severe relapsing MS who are unsuitable for treatment with other DMTs. These restrictions followed the initiation of an EMA review (referred to as an Article 20 Procedure) of ZINBRYTA following the report of a case of fatal fulminant liver failure, as well as four cases of serious liver injury.
- In October 2017, as part of the Article 20 Procedure of ZINBRYTA, the EMA Pharmacovigilance Risk Assessment Committee (PRAC) completed its assessment and recommended a further set of restrictions on the use of ZINBRYTA by MS patients.
- In November 2017 the CHMP adopted an opinion, confirming the PRAC's recommendations, for further restrictions to minimize the risk of serious liver injury with ZINBRYTA, including restriction of its use to adult patients with relapsing forms of MS who have had an inadequate response to at least two DMTs and for whom treatment with any other DMT is contraindicated or otherwise unsuitable. In January 2018 the EC adopted a final and legally-binding decision, which concluded the Article 20 Procedure, confirming the CHMP opinion. As a result of the CHMP's recommendation of these restrictions, we recorded net impairment charges related to intangible assets, inventory, property, plant and equipment and prepaid tax assets, totaling approximately $190.8 million. Offsetting these amounts was an unrecorded tax benefit related to certain ZINBRYTA related assets totaling approximately $93.8 million.

Opicinumab (anti-LINGO-1)

- In October 2017 we initiated the Phase 2b clinical trial AFFINITY, designed to evaluate opicinumab as an investigational add-on therapy in people with relapsing MS. The trial follows the comprehensive review of SYNERGY, a Phase 2 trial, which identified a specific population that may be more likely to respond to treatment.

- In October 2017 we presented data supporting opicinumab as a potential therapy to repair damage to the central nervous system caused by MS. These data were presented at the seventh Joint Meeting of the European Committee for Treatment and Research in MS and Americas Committee for Treatment and Research in MS (ECTRIMS-ACTRIMS).

Neuromuscular Disorders

SPINRAZA (nusinersen)

- In January 2017 we presented new data from the Phase 3 ENDEAR study of SPINRAZA, which demonstrated a statistically significant reduction in the risk of death or permanent ventilation in SPINRAZA-treated infants with SMA compared to untreated infants. The data were presented at the British Pediatric Neurology Association annual conference in Cambridge, U.K.

- In April 2017 the CHMP of the EMA adopted a positive opinion recommending the granting of a marketing authorization in the E.U. for SPINRAZA to treat patients with SMA.

- In April 2017 we presented Phase 3 end of study SPINRAZA data from CHERISH, which demonstrated a highly statistically significant and clinically meaningful improvement in motor function in children with later-onset (most likely to develop Type 2 or Type 3) SMA compared to untreated children. The overall findings continued to support the efficacy and favorable safety profile of SPINRAZA across a broad range of individuals with SMA.

  We also presented interim data from the Phase 2 NURTURE study evaluating SPINRAZA for the treatment of infants under six weeks old with genetically diagnosed SMA who were presymptomatic at treatment initiation. At the time of the interim analysis, infants (n=20) were enrolled for a median of 317.5 days, and all infants were alive and none required respiratory intervention (chronic non-invasive ventilation, invasive ventilation or tracheostomy). Further, most infants achieved motor milestone and growth parameter gains generally consistent with normal development, such as head control, independent sitting, standing and walking independently, as measured by validated scales.

  These data were presented at the 69th annual meeting of AAN in Boston, MA.

- In June 2017 the EC granted a marketing authorization for SPINRAZA for the treatment of 5q SMA in pediatric and adult patients in the E.U. SPINRAZA is the first approved treatment in the E.U. for SMA. SPINRAZA was reviewed under the EMA's accelerated assessment program.

- In June 2017 we presented robust efficacy and safety data from Phase 2 and Phase 3 SPINRAZA studies at the Cure SMA 2017 Annual SMA Conference in Orlando, FL. Data demonstrated motor function improvements in infants on permanent ventilation and no increase in the risk of adverse events in children with scoliosis.

- In July 2017 the Japanese Ministry of Health, Labor and Welfare approved the use of SPINRAZA for the treatment of infantile SMA.

- In September 2017 the Japanese Ministry of Health, Labor and Welfare approved the use of SPINRAZA for the treatment of pediatric and adult patients with SMA.

- In October 2017 we presented new data at the 22nd International Congress of the World Muscle Society demonstrating that earlier initiation of treatment with SPINRAZA may improve motor function outcomes in infants and children with SMA. Results demonstrated the favorable efficacy and safety profile of SPINRAZA.

- In October 2017 we and Ionis were awarded the 2017 Prix Galien USA Award for Best Biotechnology Product for SPINRAZA.

- In November 2017 the end of study results from ENDEAR, the Phase 3 study of SPINRAZA, were published in *The New England Journal of Medicine*.

Alzheimer's Disease and Dementia

Aducanumab (BIIB037)

- In March 2017 we presented data from research of aducanumab at the 13th International Conference on Alzheimer's and Parkinson's Diseases (AD/PD™) in Vienna, Austria.

- In April 2017 we presented data from a Phase 1b study of aducanumab at the 69th annual meeting of the AAN in Boston, MA. This data was previously presented at the Clinical Trials on Alzheimer's Disease (CTAD) meeting

in December 2016 and included interim results from the titration cohort of the placebo-controlled period of the Phase 1b study as well as data from the first year of the long-term extension (LTE).

- In May 2017 we announced that we had amended the protocol of the Phase 3 trials of aducanumab. ApoE4 carriers that previously would be on a high dose of 6 mg/kg may now be titrated up to 10 mg/kg. This amendment is being reviewed by regulatory bodies and clinical study ethic independent review boards globally and may be implemented on a country by country basis. The change has already been incorporated in the U.S.
- In July 2017 we presented a new post-hoc analysis of the Phase 1b PRIME study of aducanumab at the Alzheimer's Association International Conference in London, U.K. Data presented included changes in the cognitive and functional subscores of the clinical dementia rating score. Aducanumab slowed decline on both the cognitive and functional assessments compared to placebo, and the results of all subgroups studied were consistent with the overall study population.
- In August 2017 we announced results from a recently conducted analysis of the LTE of our ongoing Phase 1b study of aducanumab. The updated analyses include data from the placebo-controlled period and the LTE for patients treated with aducanumab up to 24 months in the titration cohort and up to 36 months in the fixed-dose cohorts. The results are consistent with previously reported analyses from this ongoing Phase 1b study and support the design of the ongoing Phase 3 studies of aducanumab for early AD.
- In November 2017 we presented new data from the LTE of our ongoing Phase 1b study of aducanumab at the CTAD meeting in Boston, MA. The data included results from patients in the Phase 1b study who were treated with a gradually increased dose of aducanumab for up to 24 months and those who were treated with a fixed dose of 3, 6 or 10 mg/kg aducanumab for up to 36 months. The results are consistent with previously reported analyses from the Phase 1b study and support the design of the ongoing Phase 3 studies of aducanumab for early AD.

BAN2401 (Aβ mAb)

- In December 2017 we announced that an Independent Data Monitoring Committee determined that BAN2401 did not meet the criteria for success based on a Bayesian analysis at 12 months as the primary endpoint in an 856-patient Phase 2 clinical study. Following the predefined study protocol, the blinded study will continue and a comprehensive final analysis will be conducted at 18 months seeking to demonstrate clinically significant results. The results of the final analysis are expected to be obtained during the second half of 2018.

BIIB076

- In January 2017 we initiated a Phase 1 trial of BIIB076, an anti-tau monoclonal antibody, in healthy volunteers and participants with AD.

BIIB092

- In June 2017 we dosed our first patient in our Phase 2 study of BIIB092 for PSP.

BIIB080 (also known as Ionis-MAPT$_{Rx}$)

- In October 2017 our collaboration partner Ionis announced the initiation of a Phase 1/2a clinical study of IONIS-MAPT$_{Rx}$ in patients with mild AD. IONIS-MAPT$_{Rx}$ is an antisense drug designed to selectively reduce the production of microtubule-associated protein tau (MAPT), or tau protein, in the brain. We have an option to develop and commercialize IONIS-MAPT$_{Rx}$.

Movement Disorders

BIIB054 (anti-alpha-synuclein antibody)

- In March 2017 we presented data from research of BIIB054, our investigational treatment for Parkinson's disease, at the 13th International Conference on Alzheimer's and Parkinson's Diseases (AD/PD™) in Vienna, Austria.
- In July 2017 we completed enrollment in the Phase 1 study of BIIB054 in both healthy volunteers and patients with early onset Parkinson's disease.
- In January 2018 we dosed our first patient in our Phase 2 SPARK study of BIIB054 in Parkinson's disease.

Emerging Growth Areas

Acute Neurology

Natalizumab (α4-integrin inhibitor) - Acute Ischemic Stroke

- In August 2017 we completed enrollment in the Phase 2b ACTION2 study evaluating the effects of natalizumab versus placebo on clinical measures of functional independence and activities of daily living in acute ischemic stroke patients.

Natalizumab - Epilepsy

- In October 2017 we initiated the Phase 2 OPUS study evaluating the efficacy, safety and tolerability of natalizumab in drug-resistant focal epilepsy.

Biosimilars

Samsung Bioepis - Biogen's Joint Venture with Samsung Biologics

BENEPALI (Etanercept)

- In June 2017 we presented real-world evidence from investigator-initiated studies supported by us demonstrating sustained efficacy and safety of, and high acceptance and adherence in patients initiating treatment with, BENEPALI. These data were presented at the Annual European Congress of Rheumatology (EULAR) in Madrid.

IMRALDI (Adalimumab)

- In June 2017 the CHMP of the EMA issued a positive opinion for IMRALDI, an adalimumab biosimilar candidate referencing HUMIRA.
- In August 2017 the EC granted a marketing authorization for IMRALDI.

Genentech Relationship

Anti-CD20 Therapies

OCREVUS (ocrelizumab)

- In March 2017 the FDA approved OCREVUS, a humanized anti-CD20 monoclonal antibody, for the treatment of relapsing MS (RMS) and primary progressive MS (PPMS).
- In July 2017 OCREVUS was approved in Australia for the treatment of RMS and PPMS.
- In September 2017 OCREVUS was approved in Switzerland for the treatment of RMS and PPMS.
- In January 2018 the EC granted a marketing authorization for OCREVUS for the treatment of RMS and PPMS.

RITUXAN (rituximab)

- In March 2017 Roche announced that the FDA's Oncologic Drugs Advisory Committee voted unanimously that the benefit-risk of rituximab/hyaluronidase for subcutaneous (under the skin) injection was favorable for the treatment of certain blood cancers. This new co-formulation includes the same monoclonal antibody as intravenous RITUXAN and hyaluronidase, a molecule that helps to deliver medicine under the skin.
- In June 2017 the FDA approved RITUXAN HYCELA (rituximab and hyaluronidase human) for subcutaneous injection for the treatment of adults with previously untreated and relapsed or refractory follicular lymphoma, previously untreated diffuse large B-cell lymphoma and CLL. This new treatment includes the same monoclonal antibody as intravenous RITUXAN in combination with hyaluronidase human, an enzyme that helps to deliver rituximab under the skin.

GAZYVA

- In November 2017 the FDA approved GAZYVA in combination with chemotherapy, followed by GAZYVA alone in those who responded, for people with previously untreated advanced follicular lymphoma. The approval is based on results from the Phase 3 GALLIUM study, which showed superior progression-free survival for patients who received this GAZYVA-based regimen compared with those who received a RITUXAN-based regimen as an initial therapy.

Other

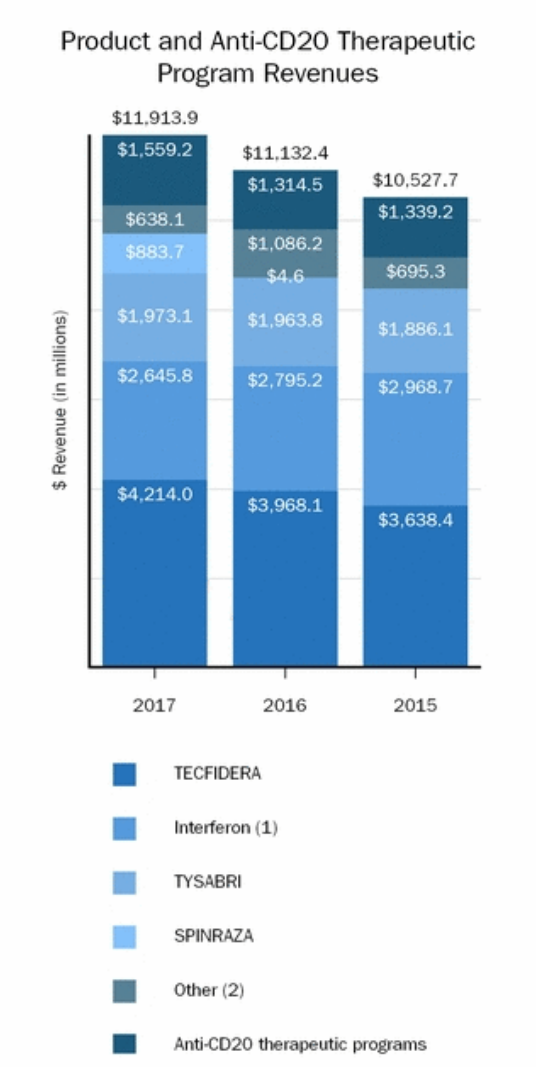
Idiopathic Pulmonary Fibrosis

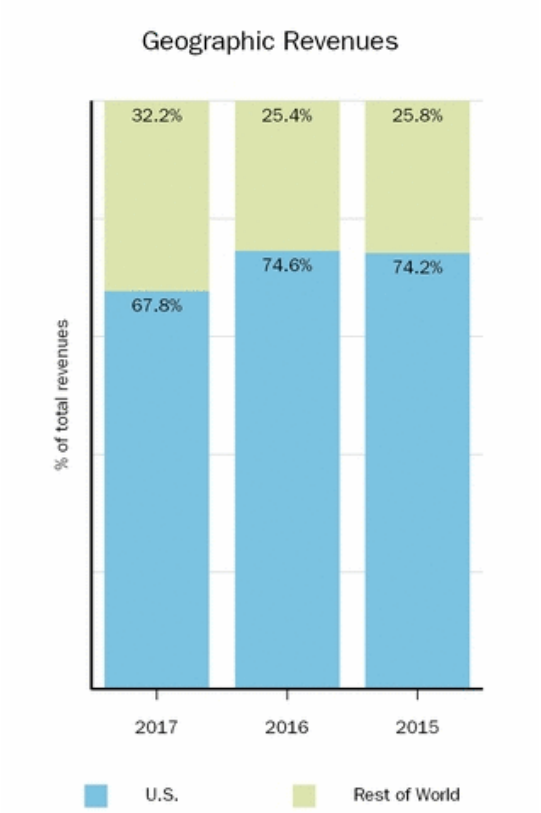
BG00011 (STX-100)

- In October 2017 we reported that BG00011 (STX-100) achieved proof of biology in a Phase 2a study in patients with idiopathic pulmonary fibrosis (IPF), a chronic irreversible and ultimately fatal disease characterized by a progressive decline in lung function. We plan to initiate a Phase 2b study for BG00011 in 2018.

Marketed Products

The following graphs show our revenues by product and revenues from anti-CD20 therapeutic programs and geography as a percentage of revenues for the years ended December 31, 2017, 2016 and 2015.





(1) Interferon includes AVONEX and PLEGRIDY
(2) Other includes ZINBRYTA, FAMPYRA, ELOCTATE, ALPROLIX, FUMADERM, BENEPALI and FLIXABI

Product sales for TECFIDERA, AVONEX and TYSABRI and anti-CD20 therapeutic programs for RITUXAN each accounted for more than 10% of our total revenues for the years ended December 31, 2017, 2016 and 2015. For additional financial information about our product and other revenues and geographic areas where we operate, please read Note 25, *Segment Information,* to our consolidated financial statements, Item 6. *Selected Financial Data* and Item 7. *Management's Discussion and Analysis of Financial Condition and Results of Operations* included in this report. A discussion of the risks attendant to our operations is set forth in Item 1A. *Risk Factors* included in this report.

Multiple Sclerosis and Neuroimmunology

We develop, manufacture and market a number of products designed to treat patients with MS. MS is a progressive neurological disease in which the body loses the ability to transmit messages along nerve cells, leading to a loss of muscle control, paralysis and, in some cases, death. Patients with active RMS experience an uneven pattern of disease progression characterized by periods of stability that are interrupted by flare-ups of the disease after which the patient returns to a new baseline of functioning.

Our MS products and major markets include:

Product	Indication	Collaborator	Major Markets
Tecfidera (dimethyl fumarate) delayed-release capsules	Relapsing forms of MS in the U.S. Relapsing-remitting MS (RRMS) in the E.U.	None	U.S. Canada France Germany Italy Spain U.K.
AVONEX (interferon beta-1a)	Relapsing forms of MS	None	U.S. France Germany Japan Italy Spain U.K.
plegridy (peginterferon beta-1a)	Relapsing forms of MS in the U.S. RRMS in the E.U.	None	U.S. France Germany Italy Spain U.K.
TYSABRI (natalizumab)	Relapsing forms of MS Crohn's disease in the U.S.	None	U.S. France Germany Italy Spain U.K.
Zinbryta™ (daclizumab)	Relapsing forms of MS	AbbVie Inc. (AbbVie)	U.S. Germany
fampyra 10 mg prolonged-release tablets fampridine	Walking ability for patients with MS	Acorda Therapeutics, Inc. (Acorda)	France Germany

Neuromuscular Diseases

SMA is characterized by loss of motor neurons in the spinal cord and lower brain stem, resulting in severe and progressive muscular atrophy and weakness. Ultimately, individuals with the most severe type of SMA can become paralyzed and have difficulty performing the basic functions of life, like breathing and swallowing. Due to a loss of, or defect in, the SMN1 gene, people with SMA do not produce enough survival motor neuron (SMN) protein, which is critical for the maintenance of motor neurons. The severity of SMA correlates with the amount of SMN protein. People with Type 1 SMA, the most severe life-threatening form, produce very little SMN protein and do not achieve the ability to sit without support or live beyond two years without respiratory support. People with Type 2 and Type 3 SMA produce greater amounts of SMN protein and have less severe, but still life-altering, forms of SMA.

In December 2016 the FDA approved SPINRAZA for the treatment of SMA in pediatric and adult patients. In June 2017 the EC approved SPINRAZA for the treatment of SMA in pediatric and adult patients in the E.U. The Japanese Ministry of Health, Labor and Welfare approved SPINRAZA for the treatment of infantile SMA in July 2017 and for the treatment of pediatric and adult patients with SMA in September 2017.

Our products for SMA and major markets include:

Product	Indication	Collaborator	Major Markets
SPINRAZA (nusinersen) injection 12 mg/5 mL	SMA	Ionis	U.S. France Germany Japan Turkey

Biosimilars

Biosimilars are a group of biologic medicines that are similar to currently available biologic therapies known as originators. Under our agreement with Samsung Bioepis, we manufacture and commercialize two anti-TNF biosimilars in certain countries in the E.U.: BENEPALI, an etanercept biosimilar referencing ENBREL, and FLIXABI, an infliximab biosimilar referencing REMICADE. In August 2017 the EC granted a marketing authorization for IMRALDI, an adalimumab biosimilar referencing HUMIRA, in the E.U.

Product	Indication	Major Markets
Benepali® Etanercept	Moderate to severe rheumatoid arthritis Progressive psoriatic arthritis Axial spondyloarthritis Moderate to severe plaque psoriasis	Germany Norway Sweden U.K.
Flixabi® Infliximab	Rheumatoid arthritis Moderate to severe Crohn's disease Severe ulcerative colitis Severe ankylosing spondylitis Psoriatic arthritis Moderate to severe plaque psoriasis	Germany

Genentech Relationships

We have a collaboration agreement with Genentech that entitles us to certain business and financial rights with respect to RITUXAN, GAZYVA, OCREVUS and other anti-CD20 product candidates. Current products include:

Product	Indication	Major Markets
Rituxan® Rituximab	Non-Hodgkin's lymphoma CLL Rheumatoid arthritis Two forms of ANCA-associated vasculitis	U.S. Canada
GAZYVA® obinutuzumab injection	In combination with chlorambucil for previously untreated CLL Follicular lymphoma	U.S.
OCREVUS®	RMS PPMS	U.S. Australia Switzerland

For information about our anti-CD20 therapeutic programs and related agreements with Genentech, please read Note 1, *Summary of Significant Accounting Policies,* and Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Other

Product	Indication	Collaborator	Major Markets
Fumaderm®	Moderate to severe plaque psoriasis	None	Germany

Patient Support and Access

We interact with patients, advocacy organizations and healthcare societies in order to gain insights into unmet needs. The insights gained from these engagements help us support patients with services, programs and applications that are designed to help patients lead better lives. Among other things, we provide customer service and other related programs for our products, such as disease and product specific websites, insurance research services, financial assistance programs and the facilitation of the procurement of our marketed products.

We are dedicated to helping patients obtain access to our therapies. Our patient representatives have access to a comprehensive suite of financial assistance tools. With those tools, we help patients understand their insurance coverage and, if needed, help patients compare and select new insurance options and programs. In the U.S., we have established programs that provide co-pay assistance or free marketed product for qualified uninsured or underinsured patients, based on specific eligibility criteria. We also provide charitable contributions to independent charitable organizations that assist patients with out-of-pocket expenses associated with their therapy.

Marketing and Distribution

Sales Force and Marketing

We promote our products worldwide, including in the U.S., most of the major countries of the E.U. and Japan, primarily through our own sales forces and marketing groups. In some countries, particularly in areas where we continue to expand into new geographic areas, we partner with third parties.

We co-promote ZINBRYTA with AbbVie in the U.S., E.U. and Canadian territories and BENEPALI and FLIXABI with Samsung Bioepis in certain countries in the E.U.

We and Eisai co-promote AVONEX, TYSABRI and TECFIDERA in Japan in certain settings.

RITUXAN, GAZYVA and OCREVUS are marketed by the Roche Group and its sublicensees.

We focus our sales and marketing efforts on specialist physicians in private practice or at major medical centers. We use customary pharmaceutical company practices to market our products and to educate physicians, such as sales representatives calling on individual physicians, advertisements, professional symposia, direct mail, public relations and other methods.

Distribution Arrangements

We distribute our products in the U.S. principally through wholesale distributors of pharmaceutical products, mail order specialty distributors or shipping service providers. In other countries, the distribution of our products varies from country to country, including through wholesale distributors of pharmaceutical products and third-party distribution partners who are responsible for most marketing and distribution activities.

AbbVie distributes ZINBRYTA in the U.S., and we distribute ZINBRYTA in ex-U.S. markets.

We distribute BENEPALI and FLIXABI in certain countries in the E.U.

Eisai distributes AVONEX, TYSABRI, TECFIDERA and PLEGRIDY in India and other Asia-Pacific markets, excluding China.

RITUXAN, GAZYVA and OCREVUS are distributed by the Roche Group and its sublicensees.

Our product sales to two wholesale distributors, AmerisourceBergen and McKesson, each accounted for more than 10% of our total revenues for the years ended December 31, 2017, 2016 and 2015, and on a combined basis, accounted for approximately 56%, 57% and 60% of our gross product revenues for the years ended December 31, 2017, 2016 and 2015, respectively. For additional information, please read Note 25, *Segment Information*, to our consolidated financial statements included in this report.

Patents and Other Proprietary Rights

Patents are important to obtaining and protecting exclusive rights in our products and product candidates. We regularly seek patent protection in the U.S. and in selected countries outside the U.S. for inventions originating from our research and development efforts. In addition, we license rights to various patents and patent applications.

U.S. patents, as well as most foreign patents, are generally effective for 20 years from the date the earliest application was filed; however, U.S. patents that issue on applications filed before June 8, 1995 may be effective until 17 years from the issue date, if that is later than the 20-year date. In some cases, the patent term may be extended to recapture a portion of the term lost during regulatory review of the claimed therapeutic or, in the case of the U.S., because of U.S. Patent and Trademark Office (USPTO) delays in prosecuting the application. Specifically, 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. The duration and extension of the term of foreign patents varies, in accordance with local law. For example, supplementary protection certificates (SPCs) on some of our products have been granted in a number of European countries, compensating in part for delays in obtaining marketing approval.

Regulatory exclusivity, which may consist of regulatory data protection and market protection, also can provide meaningful protection for our products. Regulatory data protection provides to the holder of a drug or biologic marketing authorization, for a set period of time, the exclusive use of the proprietary pre-clinical and clinical data that it created at significant cost and submitted to the applicable regulatory authority to obtain approval of its product. After the applicable set period of time, third parties are then permitted to rely upon our data to file for approval of their abbreviated applications for, and to market (subject to any applicable market protection), their generic drugs and biosimilars referencing our data. Market protection provides to the holder of a drug or biologic marketing authorization the exclusive right to commercialize its product for a set period of time, thereby preventing the commercialization of another product containing the same active ingredient(s) during that period. Although the World Trade Organization's agreement on trade-related aspects of intellectual property rights (TRIPS) requires signatory countries to provide regulatory exclusivity to innovative pharmaceutical products, implementation and enforcement varies widely from country to country.

We also rely upon other forms of unpatented confidential information to remain competitive. We protect such information principally through confidentiality agreements with our employees, consultants, outside scientific collaborators, scientists whose research we sponsor and other advisers. In the case of our employees, these agreements also provide, in compliance with relevant law, that inventions and other intellectual property conceived by such employees during their employment shall be our exclusive property.

Our trademarks are important to us and are generally covered by trademark applications or registrations in the USPTO and the patent or trademark offices of other countries. We also use trademarks licensed from third parties, such as the trademark FAMPYRA which we license from Acorda. 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.

Our Patent Portfolio

The following table describes our patents in the U.S. and Europe that we currently consider of primary importance to our marketed products, including the territory, patent number, general subject matter and expected expiration dates. Except as otherwise noted, the expected expiration dates include any granted patent term extensions and issued SPCs. In some instances, there are later-expiring patents relating to our products directed to, among other things, particular forms or compositions, methods of manufacturing or use of the drug in the treatment of particular diseases or conditions. We also continue to pursue additional patents and patent term extensions in the U.S. and other territories covering various aspects of our products that may, if issued, extend exclusivity beyond the expiration of the patents listed in the table.

Product	Territory	Patent No.	General Subject Matter	Patent Expiration(1)
TECFIDERA	U.S.	7,619,001	Methods of treatment	2018
	U.S.	7,803,840	Methods of treatment	2018
	U.S.	8,399,514	Methods of treatment	2028
	U.S.	8,524,773	Methods of treatment	2018
	U.S.	6,509,376	Formulations of dialkyl fumarates for use in the treatment of autoimmune diseases	2019
	U.S.	8,759,393	Formulations	2019
	U.S.	7,320,999	Methods of treatment	2018
	Europe	1131065	Formulations of dialkyl fumarates and their use for treating autoimmune diseases	2019(2)
	Europe	2137537	Methods of use	2028(3)
AVONEX and PLEGRIDY	U.S.	7,588,755	Use of recombinant beta interferon for immunomodulation	2026
PLEGRIDY	U.S.	7,446,173	Polymer conjugates of interferon beta-1a	2022
	U.S.	8,524,660	Methods of treatment	2023
	U.S.	8,017,733	Polymer conjugates of interferon beta-1a	2027
	Europe	1656952	Polymer conjugates of interferon-beta-1a and uses thereof	2019
	Europe	1476181	Polymer conjugates of interferon-beta-1a and uses thereof	2023(4)
TYSABRI	U.S.	6,602,503	Humanized recombinant antibodies; nucleic acids and host cells; processes for production; therapeutic compositions; methods of use	2020
	U.S.	7,807,167	Methods of treatment	2023
	U.S.	9,493,567	Methods of treatment	2027
	Europe	0804237	Humanized immunoglobulins; nucleic acids; pharmaceutical compositions; medical uses	2020(5)
	Europe	1485127	Methods of use	2023
FAMPYRA	Europe	1732548	Sustained-release aminopyridine compositions for increasing walking speed in patients with MS	2025(6)
	Europe	23775536	Sustained-release aminopyridine compositions for treating MS	2025(7)
ZINBRYTA	U.S.	8,454,965	Methods of treatment	2024
	U.S.	7,258,859	Methods of treatment	2024
	U.S.	9,340,619	Daclizumab HYP compositions	2032
	Europe	1539200	Anti-IL-2-receptor antibody for use in a method of treating a subject with MS	2023
SPINRAZA	U.S.	6,166,197	Oligomeric Compounds Having Pyrimidine Nucleotide(s)	2017
	U.S.	6,210,892	Alteration of Cellular Behavior By Antisense Modulation of MRNA Processing	2018
	U.S.	7,101,993	Oligonucleotides Containing 2'-O-Modified Purines	2023
	U.S.	7,838,657	SMA Treatment Via Targeting of SMN2 Splice Site Inhibitory Sequences	2027
	U.S.	8,110,560	SMA Treatment Via Targeting of SMN2 Splice Site Inhibitory Sequences	2025
	U.S.	8,361,977	Compositions And Methods For Modulation of SMN2 Splicing	2030
	U.S.	8,980,853	Compositions And Methods For Modulation of SMN2 Splicing	2030
	U.S.	9,717,750	Compositions and Methods For Modulation of SMN2 Splicing	2030
	Europe	1910395	Compositions And Methods For Modulation of SMN2 Splicing	2026
	Europe	2548560	Compositions And Methods For Modulation of SMN2 Splicing	2026

Footnotes follow on next page.

(1) In addition to patent protection, certain of our products are entitled to regulatory exclusivity in the U.S. and the E.U. expected until the dates set forth below:

Product	Territory	Expected Expiration
TECFIDERA	U.S.	2018
	E.U.	2024
PLEGRIDY	U.S.	2026
	E.U.	2024
FAMPYRA	E.U.	2021
ZINBRYTA	U.S.	2028
	E.U.	*
SPINRAZA	U.S.	2023
	E.U.	2027**

*ZINBRYTA was not designated a new active substance at the time of its approval in the E.U. and is not automatically entitled to regulatory exclusivity. Regulatory exclusivity may, however, be available for independent development of known active substances. We intend to assert the protection of its data on this basis.
**SPINRAZA may be eligible for an additional two years exclusivity in Europe based on the orphan pediatric indication.

(2) This patent is subject to granted SPCs in certain European countries, which extended the patent term in those countries to 2024.

(3) This patent was revoked in a European opposition. This decision is being appealed. The patent is subject to granted SPCs in certain European countries, which extended the patent term in those countries to 2029.

(4) This patent is subject to granted SPCs in certain European countries, which extended the patent term in those countries to 2028.

(5) Reflects SPCs granted in most European countries and pediatric extension in some countries.

(6) This patent is subject to granted SPCs in certain European countries, which extended the patent term in those countries to 2026.

(7) This patent is subject to granted SPCs in certain European countries, which extended the patent term in those countries to 2026.

The existence of patents does not guarantee our right to practice the patented technology or commercialize the patented product. Patents relating to pharmaceutical, biopharmaceutical and biotechnology products, compounds and processes, such as those that cover our existing compounds, products and processes and those that we will likely file in the future, do not always provide complete or adequate protection. Litigation, interferences, oppositions, *inter partes* reviews or other proceedings are, have been and may in the future be necessary in some instances to determine the validity and scope of certain of our patents, regulatory exclusivities or other 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 patents, regulatory exclusivities and other proprietary rights covering our products by manufacturers of generics and biosimilars. 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 certain patents described above is set forth in Note 21, *Litigation,* to our consolidated financial statements included in this report.

Competition

Competition in the biopharmaceutical industry is intense and comes from many sources, including specialized biotechnology firms and large pharmaceutical companies. Many of our competitors are working to develop or have commercialized products similar to those we market or are developing and have considerable experience in undertaking clinical trials and in obtaining regulatory approval to market pharmaceutical products. Certain of these companies have substantially greater financial, marketing and research and development resources than we do.

We believe that competition and leadership in the industry is based on managerial and technological excellence and innovation as well as establishing patent and other proprietary positions through research and development. The achievement of a leadership position also depends largely upon our ability to maximize the approval, acceptance and use of products resulting from research and the availability of adequate financial resources to fund facilities, equipment, personnel, clinical testing, manufacturing and marketing. Another key aspect of remaining competitive within the industry is recruiting and retaining leading scientists and technicians. We believe that we have been successful in attracting and retaining skilled and experienced scientific personnel.

Competition among products approved for sale may be based, among other things, on patent position, product efficacy, safety, convenience/delivery devices, reliability, availability and price. In addition, early entry of a new pharmaceutical product into the market may have important advantages in gaining product acceptance and market share. Accordingly, the relative speed with which we can develop products, complete the testing and approval process and supply commercial quantities of products will have a significant impact on our competitive position.

The introduction of new products or technologies, including the development of new processes or technologies by competitors or new information about existing products or technologies, may result in increased competition for our marketed products or pricing pressure on our marketed products. It is also possible that the development of new or improved treatment options or standards of care or cures for the diseases our products treat could reduce or eliminate the use of our products or may limit the utility and application of ongoing clinical trials for our product candidates. We may also face increased competitive pressures as a result of generics and the emergence of biosimilars in the U.S. and E.U. If a generic or biosimilar version of one of our products were approved, it could reduce our sales of that product.

Additional information about the competition that our marketed products face is set forth below.

Multiple Sclerosis

TECFIDERA, AVONEX, PLEGRIDY, TYSABRI and ZINBRYTA each compete with one or more of the following products:

Competing Product	Competitor
AUBAGIO (teriflunomide)	Sanofi
BETASERON/BETAFERON (interferon-beta-1b)	Bayer Group
COPAXONE (glatiramer acetate)	Teva Pharmaceuticals Industries Ltd.
EXTAVIA (interferon-beta-1b)	Novartis AG
GILENYA (fingolimod)	Novartis AG
GLATOPA (glatiramer acetate)	Sandoz, a division of Novartis AG
LEMTRADA (alemtuzumab)	Sanofi
OCREVUS (ocrelizumab)	Genentech
REBIF (interferon-beta-1)	Merck KGaA (and co-promoted with Pfizer Inc. in the U.S.)

FAMPYRA is indicated as a treatment to improve walking in adult patients with MS who have walking disability and is the first treatment that addresses this unmet medical need with demonstrated efficacy in people with all types of MS. FAMPYRA is currently the only therapy approved to improve walking in patients with MS.

Competition in the MS market is intense. Along with us, a number of companies are working to develop additional treatments for MS that may in the future compete with our MS products. One such product that was approved in the U.S. in 2017 and in the E.U. in 2018 is OCREVUS, a treatment for RMS and PPMS that was developed by Genentech. While we have a financial interest in OCREVUS, future sales of our MS products may be adversely affected if OCREVUS continues to gain market share, or if other MS products that we or our competitors are developing are commercialized. Future sales may also be negatively impacted by the introduction of generics, prodrugs of existing therapeutics or biosimilars of existing products and other technologies.

Spinal Muscular Atrophy

SPINRAZA is the only approved treatment for SMA. We are aware of other products in development that, if successfully developed and approved, may compete with SPINRAZA in the SMA market.

Psoriasis

FUMADERM competes with several different types of therapies in the psoriasis market within Germany, including oral systemics such as methotrexate and cyclosporine.

Biosimilars

BENEPALI and FLIXABI, the two biosimilars we currently manufacture and commercialize in the E.U. for Samsung Bioepis, compete with their applicable reference products, ENBREL and REMICADE, respectively, as well as other biosimilars of those reference products.

Genentech Relationships in Other Indications

RITUXAN and GAZYVA in Oncology

RITUXAN and GAZYVA compete with a number of therapies in the oncology market, including TREANDA (bendamustine HCL), ARZERRA (ofatumumab), IMBRUVICA (ibrutinib) and ZYDELIG (idelalisib).

We also expect that over time GAZYVA will increasingly compete with RITUXAN in the oncology market. In addition, we are aware of other anti-CD20 molecules, including biosimilars, in development that, if successfully developed and approved, may compete with RITUXAN and GAZYVA in the oncology market.

RITUXAN in Rheumatoid Arthritis

RITUXAN competes with several different types of therapies in the rheumatoid arthritis market, including, among others, traditional disease-modifying anti-rheumatic drugs such as steroids, methotrexate and cyclosporine, TNF inhibitors, ORENCIA (abatacept), ACTEMRA (tocilizumab) and XELJANZ (tofacitinib).

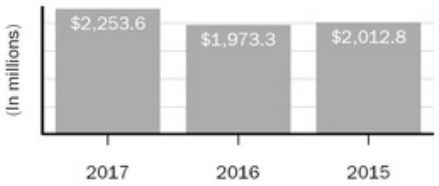
We are also aware of other products, including biosimilars, in development that, if successfully developed and approved, may compete with RITUXAN in the rheumatoid arthritis market.

Research and Development Programs

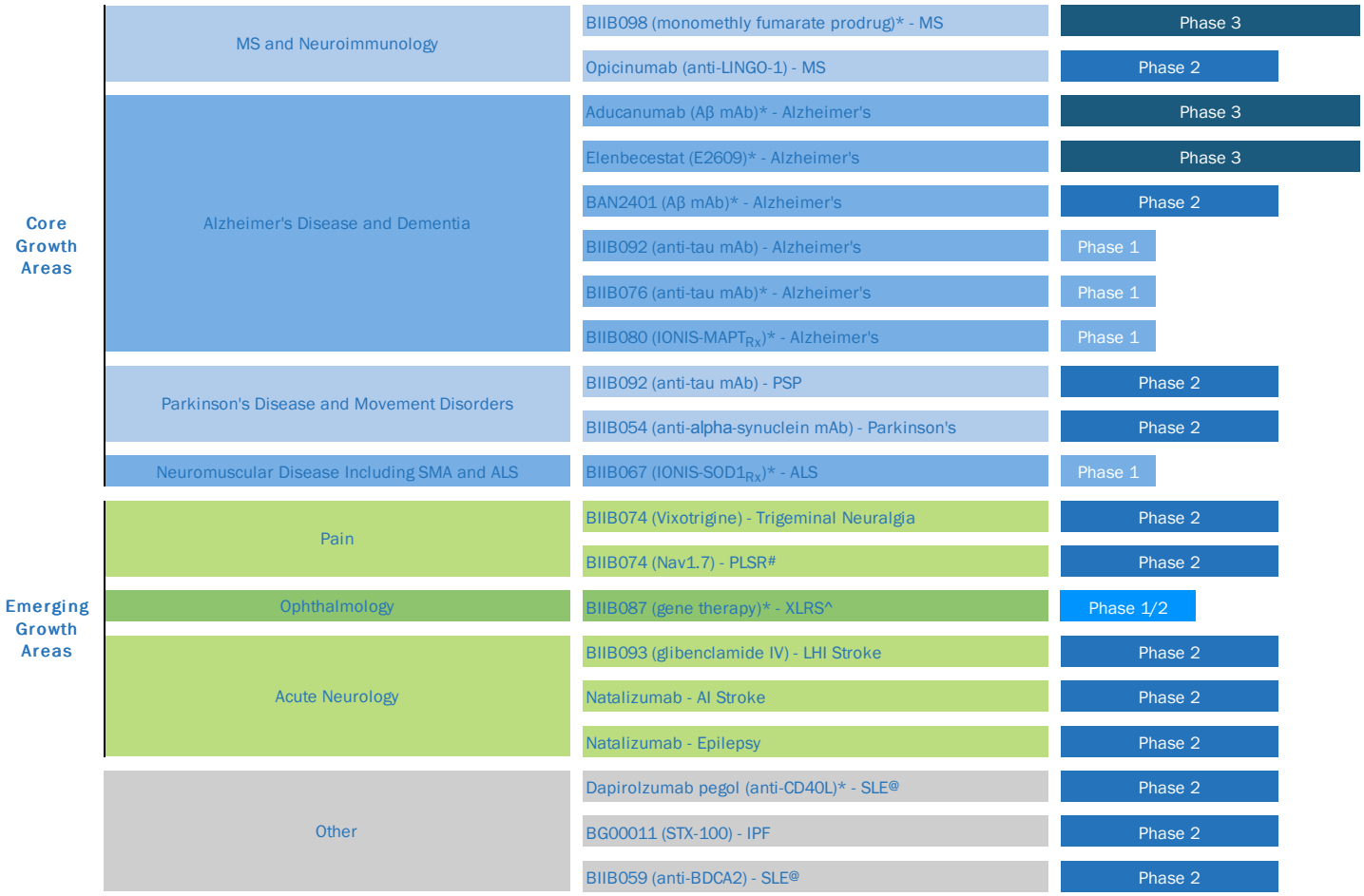
A commitment to research is fundamental to our mission. Our research efforts are focused on better understanding the underlying biology of diseases so we can discover and deliver treatments that have the potential to make a real difference in the lives of patients with high unmet medical needs. By applying our expertise in biologics and our growing capabilities in small molecule, antisense, gene therapy, gene editing and other technologies, we target specific medical needs where we believe new or better treatments are needed.

We intend to continue committing significant resources to research and development opportunities. As part of our ongoing research and development efforts, we have devoted significant resources to conducting clinical studies to advance the development of new pharmaceutical products and technologies and to explore the utility of our existing products in treating disorders beyond those currently approved in their labels.

Research and Development Expense
For the Years ended December 31, 2017, 2016 and 2015



The table below highlights our current research and development programs that are in clinical trials and the current phase of such programs. Drug development involves a high degree of risk and investment, and the status, timing and scope of our development programs are subject to change. Important factors that could adversely affect our drug development efforts are discussed in Item 1A. *Risk Factors* included in this report.



* Collaboration programs
# Painful Lumbosacral Radiculophath (PLSR)
^ X-linked Retinoschisis (XLRS)
@ Systemic Lupus Erythematosus (SLE)

For information about certain of our agreements with collaborators and other third parties, please read the subsection entitled *"Business Relationships"* below and Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Business Relationships

As part of our business strategy, we establish business relationships, including joint ventures and collaborative arrangements with other companies, universities and medical research institutions, to assist in the clinical development and/or commercialization of certain of our products and product candidates and to provide support for our research programs. We also evaluate opportunities for acquiring products or rights to products and technologies that are complementary to our business from other companies, universities and medical research institutions.

Below is a brief description of certain business relationships and collaborations that expand our pipeline and provide us with certain rights to existing and potential new products and technologies. For additional information on certain of these relationships, including their ongoing financial and accounting impact on our business, please read Note 19, *Investments in Variable Interest Entities,* and Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

AbbVie, Inc.

We have a collaboration agreement with AbbVie for the development and commercialization of ZINBRYTA in MS. Under this agreement, we and AbbVie conduct ZINBRYTA co-promotion activities in the U.S., E.U. and Canadian territories, and we are responsible for all manufacturing and research and development activities.

For information on the Article 20 Procedure of ZINBRYTA and resulting impairment of ZINBRYTA related assets, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Acorda Therapeutics, Inc.

We have a collaboration and license agreement with Acorda to develop and commercialize products containing fampridine, such as FAMPYRA, in markets outside the U.S. We are responsible for all regulatory activities and the future clinical development of related products in those markets.

Alkermes

We have an exclusive license and collaboration agreement with Alkermes to develop and commercialize BIIB098, an oral MMF prodrug in Phase 3 development for the treatment of relapsing forms of MS.

Applied Genetic Technologies Corporation

We have a collaboration agreement with Applied Genetic Technologies Corporation (AGTC) to develop gene-based therapies for multiple ophthalmic diseases. This collaboration is focused on the development of a clinical-stage candidate for X-linked Retinoschisis (XLRS) and a preclinical candidate for the treatment of X-linked Retinitis Pigmentosa (XLRP), for which we were granted worldwide commercialization rights. This agreement also provides us with options to early stage discovery programs in two ophthalmic diseases and one non-ophthalmic condition.

Bristol-Myers Squibb Company

We have an exclusive license agreement with BMS for the development and commercialization of BIIB092. Under this agreement, we received worldwide rights to BIIB092 and are responsible for the full development and global commercialization of BIIB092 in AD and PSP.

Eisai Co., Ltd.

We have a collaboration agreement with Eisai to jointly develop and commercialize E2609 and BAN2401, two Eisai product candidates for the treatment of AD. Eisai serves as the global operational and regulatory lead for both E2609 and BAN2401 and all costs, including research, development, sales and marketing expenses, are shared equally between us and Eisai. Following marketing approval in major markets, we will co-promote E2609 and BAN2401 with Eisai and share profits equally.

We also have the Aducanumab Collaboration Agreement with Eisai for the joint development and commercialization of aducanumab. Under the Aducanumab Collaboration Agreement, the two companies will co-promote aducanumab with a region-based profit split and we will continue to lead the ongoing Phase 3 development of aducanumab.

We and Eisai will co-promote AVONEX, TYSABRI and TECFIDERA in Japan in certain settings and Eisai will distribute AVONEX, TYSABRI, TECFIDERA and PLEGRIDY in India and other Asia-Pacific markets, excluding China.

Genentech (Roche Group)

We have a collaboration agreement with Genentech which entitles us to certain financial and other rights with respect to RITUXAN, GAZYVA, OCREVUS and other anti-CD20 product candidates.

Ionis Pharmaceuticals, Inc.

We have an exclusive, worldwide option and collaboration agreement with Ionis relating to the development and commercialization of up to three gene targets, and an exclusive, worldwide option and collaboration agreement with Ionis under which both companies are responsible for the development and commercialization of SPINRAZA for the treatment of SMA.

We also have research collaboration agreements with Ionis, under which both companies perform discovery level research and will develop and commercialize new ASO drug candidates for the treatment of SMA and additional antisense and other therapeutics for the treatment of neurological disorders.

Neurimmune

We have a collaboration and license agreement with Neurimmune for the development and commercialization of antibodies for the treatment of AD, including aducanumab. Under this agreement, we are responsible for the development, manufacturing and commercialization of all licensed products.

Samsung Bioepis

We and Samsung Biologics established a joint venture, Samsung Bioepis, to develop, manufacture and market biosimilar pharmaceuticals. We also have an agreement with Samsung Bioepis to commercialize, over a 10-year term, three anti-TNF biosimilar product candidates in specified E.U. countries and, in the case of BENEPALI, Japan. Under this agreement, we are manufacturing and commercializing BENEPALI, an etanercept biosimilar referencing ENBREL, and FLIXABI, an infliximab biosimilar referencing REMICADE.

In addition to our joint venture and commercialization agreement with Samsung Bioepis, we license certain of our proprietary technology to Samsung Bioepis in connection with Samsung Bioepis' development, manufacture and commercialization of its biosimilar products. We also provide technical development and technology transfer services to Samsung Bioepis, and manufacture clinical and commercial quantities of bulk drug substance of Samsung Bioepis' biosimilar products.

University of Pennsylvania

We have a collaboration and alliance with the University of Pennsylvania (UPenn) to advance gene therapy and gene editing technologies. The collaboration is primarily focused on the development of therapeutic approaches that target the eye, skeletal muscle and the central nervous system. The alliance is also focused on the research and validation of next-generation gene transfer technology using adeno-associated virus gene delivery vectors and exploring the expanded use of genome editing technology as a potential therapeutic platform.

Regulatory

Our current and contemplated activities and the products, technologies and processes that result from such activities are subject to substantial government regulation.

Regulation of Pharmaceuticals

Product Approval and Post-Approval Regulation in the U.S.

APPROVAL PROCESS

Before new pharmaceutical products may be sold in the U.S., preclinical studies and clinical trials of the products must be conducted and the results submitted to the FDA for approval. With limited exceptions, the FDA requires companies to register both pre-approval and post-approval clinical trials and disclose clinical trial results in public databases. Failure to register a trial or disclose study results within the required time periods could result in penalties, including civil monetary penalties. Clinical trial programs must establish efficacy, determine an appropriate dose and dosing regimen, and define the conditions for safe use. This is a high-risk process that requires stepwise clinical studies in which the candidate product must successfully meet predetermined endpoints. The results of the preclinical and clinical testing of a product are then submitted to the FDA in the form of a Biologics License Application (BLA) or a New Drug Application (NDA). In response to a BLA or NDA, the FDA may grant marketing approval, request additional information or deny the application if it determines the application does not provide an adequate basis for approval.

Product development and receipt of regulatory approval takes a number of years, involves the expenditure of substantial resources and depends on a number of factors, including the severity of the disease in question, the availability of alternative treatments, potential safety signals observed in preclinical or clinical tests and the risks and benefits of the product as demonstrated in clinical trials. The FDA has substantial discretion in the product approval process, and it is impossible to predict with any certainty whether and when the FDA will grant marketing approval. The agency may require the sponsor of a BLA or NDA to conduct additional clinical studies or to provide other scientific or technical information about the product, and these additional requirements may lead to unanticipated delay or expense. Furthermore, even if a product is approved, the approval may be subject to limitations based on the FDA's interpretation of the existing pre-clinical or clinical data.

The FDA has developed four distinct approaches intended to make therapeutically important drugs available as rapidly as possible, especially when the drugs are the first available treatment or have advantages over existing treatments: accelerated approval, fast track, breakthrough therapy and priority review.

- *Accelerated Approval*: The FDA may grant “accelerated approval” status to products that treat serious or life-threatening illnesses and that provide meaningful therapeutic benefits to patients over existing treatments. Under this pathway, the FDA may approve a product based on surrogate endpoints, or clinical endpoints other than survival or irreversible morbidity. When approval is based on surrogate endpoints or clinical endpoints other than survival or morbidity, the sponsor will be required to conduct additional post-approval clinical studies to verify and describe clinical benefit. Under the FDA's accelerated approval regulations, if the FDA concludes that a drug that has been shown to be effective can be safely used only if distribution or use is restricted, it may require certain post-marketing restrictions as necessary to assure safe use. In addition, for products approved under accelerated approval, sponsors may be required to submit all copies of their promotional materials, including advertisements, to the FDA at least 30 days prior to initial dissemination. The FDA may withdraw approval under accelerated approval after a hearing if, for instance, post-marketing studies fail to verify any clinical benefit, it becomes clear that restrictions on the distribution of the product are inadequate to ensure its safe use, or if a sponsor fails to comply with the conditions of the accelerated approval.

- *Fast Track Status*: The FDA may grant "fast track" status to products that treat a serious condition and have data demonstrating the potential to address an unmet medical need or a drug that has been designated as a qualified infectious disease product.

- *Breakthrough Therapy*: The FDA may grant “breakthrough therapy” status to drugs designed to treat, alone or in combination with another drug or drugs, a serious or life-threatening disease or condition and for which preliminary clinical evidence suggests a substantial improvement over existing therapies. Such drugs need not address an unmet need, but are nevertheless eligible for expedited review if they offer the potential for an improvement. Breakthrough therapy status entitles the sponsor to earlier and more frequent meetings with the FDA regarding the development of nonclinical and clinical data and permits the FDA to offer product development or regulatory advice for the purpose of shortening the time to product approval. Breakthrough therapy status does not guarantee that a product will be developed or reviewed more quickly and does not ensure FDA approval.

- *Priority Review*: Priority Review only applies to applications (original or efficacy supplement) for a drug that treats a serious condition and, if approved, would provide a significant improvement in safety or effectiveness of the treatment, diagnosis or prevention of serious conditions when compared to standard applications. Priority Review may also be granted for any supplement that proposes a labeling change due to studies completed in response to a written request from the FDA for pediatric studies, for an application for a drug that has been designated as a qualified infectious disease product, or any application or supplement for a drug submitted with a priority review voucher.

  In December 2016, the FDA issued us a rare pediatric disease priority review voucher in connection with the approval of SPINRAZA.

POST-MARKETING STUDIES

Regardless of the approval pathway employed, the FDA may require a sponsor to conduct additional post-marketing studies as a condition of approval to provide data on safety and effectiveness. If a sponsor fails to conduct the required studies, the agency may withdraw its approval. In addition, if the FDA concludes that a drug that has been shown to be effective can be safely used only if distribution or use is restricted, it can mandate post-marketing restrictions as necessary to assure safe use. In such a case, the sponsor may be required to establish rigorous systems to assure use of the product under safe conditions. These systems are usually referred to as Risk Evaluation and Mitigation Strategies (REMS). The FDA can impose financial penalties for failing to comply with certain post-marketing commitments, including REMS. In addition, any changes to an approved REMS must be reviewed and approved by the FDA prior to implementation.

ADVERSE EVENT REPORTING

We monitor information on side effects and adverse events reported during clinical studies and after marketing approval and report such information and events to regulatory agencies. Non-compliance with the FDA's safety reporting requirements may result in civil or criminal penalties. Side effects or adverse events that are reported during clinical trials

can delay, impede or prevent marketing approval. Based on new safety information that emerges after approval, the FDA can mandate product labeling changes, impose a new REMS or the addition of elements to an existing REMS, require new post-marketing studies (including additional clinical trials), or suspend or withdraw approval of the product. These requirements may affect our ability to maintain marketing approval of our products or require us to make significant expenditures to obtain or maintain such approvals.

APPROVAL OF CHANGES TO AN APPROVED PRODUCT

If we seek to make certain types of changes to an approved product, such as adding a new indication, making certain manufacturing changes or changing manufacturers or suppliers of certain ingredients or components, the FDA will need to review and approve such changes in advance. In the case of a new indication, we are required to demonstrate with additional clinical data that the product is safe and effective for a use other than that initially approved. FDA regulatory review may result in denial or modification of the planned changes, or requirements to conduct additional tests or evaluations that can substantially delay or increase the cost of the planned changes.

REGULATION OF PRODUCT ADVERTISING AND PROMOTION

The FDA regulates all advertising and promotion activities and communications for products under its jurisdiction both before and after approval. Pursuant to FDA guidance, a company can make safety and efficacy claims from data either in or consistent with the label. However, physicians may prescribe legally available drugs for uses that are not described in the drug's labeling. Such off-label uses are common across medical specialties, and often reflect a physician's belief that the off-label use is the best treatment for patients. The FDA does not regulate the behavior of physicians in their choice of treatments, but FDA regulations do impose stringent restrictions on manufacturers' communications regarding off-label uses. Failure to comply with applicable FDA requirements may subject a company to adverse publicity, enforcement action by the FDA, corrective advertising and the full range of civil and criminal penalties available to the government.

Regulation of Combination Products

Combination products are defined by the FDA to include products comprising two or more regulated components (e.g., a biologic and a device). Biologics and devices each have their own regulatory requirements, and combination products may have additional requirements. Some of our marketed products meet this definition and are regulated under this framework and similar regulations outside the U.S., and we expect that some of our pipeline product candidates may be evaluated for regulatory approval under this framework as well.

Product Approval and Post-Approval Regulation Outside the U.S.

We market our products in numerous jurisdictions outside the U.S. Most of these jurisdictions have product approval and post-approval regulatory processes that are similar in principle to those in the U.S. In Europe, for example, where a substantial part of our ex-U.S. efforts are focused, there are several tracks for marketing approval, depending on the type of product for which approval is sought. Under the centralized procedure, a company submits a single application to the EMA. The marketing authorization application is similar to the NDA or BLA in the U.S. and is evaluated by the CHMP, the expert scientific committee of the EMA responsible for human medicines. If the CHMP determines that the marketing authorization application fulfills the requirements for quality, safety and efficacy and that the medicine has a positive benefit risk balance, it will adopt a positive opinion recommending grant of the marketing authorization by the EC. The CHMP opinion is not binding, but is typically adopted by the EC. A marketing application approved by the EC is valid in all member states of the E.U. The centralized procedure is required for all biological products, orphan medicinal products and new treatments for neurodegenerative disorders, and it is available for certain other products, including those which constitute a significant therapeutic, scientific or technical innovation.

In addition to the centralized procedure, Europe also has:

- a national procedure, which requires an application to the competent authority of an E.U. country (if an application is to be made in more than one E.U. country, following approval in the first country, the applicant must submit applications in the other countries using the mutual recognition procedure);
- a decentralized procedure, whereby applicants submit identical applications to several countries and receive simultaneous approval, if the medicine has not yet been authorized in any E.U. country; and
- a mutual recognition procedure, where applicants that have a medicine authorized in one E.U. country can apply for mutual recognition of this authorization in other E.U. countries.

In the E.U., there is detailed legislation on pharmacovigilance and extensive guidance on good pharmacovigilance practices.

Regardless of the approval process employed, various parties share responsibilities for the monitoring, detection and evaluation of adverse events post-approval, including national authorities, the EMA, the EC and the marketing authorization holder. The EMA's PRAC is responsible for assessing and monitoring the safety of human medicines and makes recommendations on product safety issues.

In some regions, it is possible to receive an "accelerated" review whereby the national regulatory authority will commit to truncated review timelines for products that meet specific medical needs.

Good Manufacturing Practices

Regulatory agencies regulate and inspect equipment, facilities and processes used in the manufacturing and testing of pharmaceutical and biologic products prior to approving a product. If, after receiving approval from regulatory agencies, a company makes a material change in manufacturing equipment, location or process, additional regulatory review and approval may be required. We also must adhere to current Good Manufacturing Practices (cGMP) and product-specific regulations enforced by regulatory agencies following product approval. The FDA, the EMA and other regulatory agencies also conduct periodic visits to re-inspect equipment, facilities and processes following the initial approval of a product. If, as a result of these inspections, it is determined that our equipment, facilities or processes do not comply with applicable regulations and conditions of product approval, regulatory agencies may seek civil, criminal or administrative sanctions or remedies against us, including significant financial penalties and the suspension of our manufacturing operations.

Good Clinical Practices

The FDA, the EMA and other regulatory agencies promulgate regulations and standards for designing, conducting, monitoring, auditing and reporting the results of clinical trials to ensure that the data and results are accurate and that the rights and welfare of trial participants are adequately protected (commonly referred to as current Good Clinical Practices (cGCP)). Regulatory agencies enforce cGCP through periodic inspections of trial sponsors, principal investigators and trial sites, contract research organizations (CROs) and institutional review boards. If our studies fail to comply with applicable cGCP guidelines, the clinical data generated in our clinical trials may be deemed unreliable and relevant regulatory agencies may require us to perform additional clinical trials before approving our marketing applications. Noncompliance can also result in civil or criminal sanctions. We rely on third parties, including CROs, to carry out many of our clinical trial-related activities. Failure of such third parties to comply with cGCP can likewise result in rejection of our clinical trial data or other sanctions.

In April 2014, the EC adopted a new Clinical Trial Regulation, which was effective in June 2014 but is not expected to apply until the second half of 2019. The regulation harmonizes the procedures for assessment and governance of clinical trials throughout the E.U. and will require that information on the authorization, conduct and results of each clinical trial conducted in the E.U. be publicly available.

Approval of Biosimilars

The Patient Protection and Affordable Care Act (PPACA) amended the Public Health Service Act (PHSA) to authorize the FDA to approve biological products, referred to as biosimilars or follow-on biologics that are shown to be highly similar to previously approved biological products based upon potentially abbreviated data packages. The biosimilar must show it has no clinically meaningful differences in terms of safety and effectiveness from the reference product, and only minor differences in clinically inactive components are allowable in biosimilars products. The approval pathway for biosimilars does, however, grant a biologics manufacturer a 12-year period of exclusivity from the date of approval of its biological product before biosimilar competition can be introduced. There is uncertainty, however, as the approval framework for biosimilars originally was enacted as part of the PPACA. In 2017 there were, and there are likely to continue to be, federal legislative and administrative efforts to repeal, substantially modify or invalidate some or all of the provisions of the PPACA. If the PPACA is repealed, substantially modified or invalidated, it is unclear what, if any, impact such action would have on biosimilar regulation.

A biosimilars approval pathway has been in place in the E.U. since 2003. The EMA has issued a number of scientific and product specific biosimilar guidelines, including requirements for approving biosimilars containing monoclonal antibodies. In the E.U., biosimilars are generally approved under the centralized procedure. The approval pathway allows sponsors of a biosimilar to seek and obtain regulatory approval based in part on reliance on the clinical trial data of an innovator product to which the biosimilar has been demonstrated, through comprehensive comparability studies, to be "similar". In many cases, this allows biosimilars to be brought to market without conducting the full complement of clinical trials typically required for novel biologic drugs.

Orphan Drug Act

Under the U.S. Orphan Drug Act, the FDA may grant orphan drug designation to drugs or biologics intended to treat a "rare disease or condition," which generally is a disease or condition that affects fewer than 200,000 individuals in the U.S. If a product which has an orphan drug designation subsequently receives the first FDA approval for the indication for which it has such designation, the product is entitled to orphan exclusivity, i.e., the FDA may not approve any other applications to market the same drug for the same indication for a period of seven years following marketing approval, except in certain very limited circumstances, such as if the later product is shown to be clinically superior to the orphan product. Legislation similar to the U.S. Orphan Drug Act has been enacted in other countries to encourage the research, development and marketing of medicines to treat, prevent or diagnose rare diseases. In the E.U., medicinal products that receive an orphan designation are entitled to 10 years of market exclusivity following approval, protocol assistance and access to the centralized procedure for marketing authorization. SPINRAZA has been granted orphan drug designation in the U.S., E.U. and Japan.

Regulation Pertaining to Pricing and Reimbursement

In both domestic and foreign markets, sales of our products depend, in part, on the availability and amount of reimbursement by third-party payors, including governments, private health plans and other organizations. Substantial uncertainty exists regarding the pricing and reimbursement of our products, and drug prices continue to receive significant scrutiny. Governments may regulate coverage, reimbursement and pricing of our products to control cost or affect utilization of our products. Challenges to our pricing strategies, by either government or private stakeholders, could harm our business. The U.S. and foreign governments have enacted and regularly consider additional reform measures that affect health care coverage and costs. Private health plans may also seek to manage cost and utilization by implementing coverage and reimbursement limitations. Other payors, including managed care organizations, health insurers, pharmacy benefit managers, government health administration authorities and private health insurers, seek price discounts or rebates in connection with the placement of our products on their formularies and, in some cases, may impose restrictions on access, coverage or pricing of particular drugs based on perceived value.

Within the U.S.

- *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, we are required to pay a rebate for each unit of product reimbursed by the state Medicaid programs. The amount of the rebate is established by law and is adjusted upward if average manufacture price (AMP) increases more than inflation (measured by the Consumer Price Index - Urban). The rebate amount is calculated each quarter based on our report of current AMP and best price for each of our products to the Centers for Medicare & Medicaid Services (CMS). The requirements for calculating AMP and best price are complex. We are required to report any revisions to AMP or best price previously reported within a certain period, which revisions could affect our rebate liability for prior quarters. In addition, if we fail to provide information timely or we are found to have knowingly submitted false information to the government, the statute governing the Medicaid Drug Rebate Program provides for civil monetary penalties.

- *Medicare*: Medicare is a federal program that is administered by the federal government. The program covers individuals age 65 and over as well as those with certain disabilities. Medicare Part B generally covers drugs that must be administered by physicians or other health care practitioners; are provided in connection with certain durable medical equipment; or are certain oral anti-cancer drugs and certain oral immunosuppressive drugs. Medicare Part B pays for such drugs under a payment methodology based on the average sales price (ASP) of the drugs. Manufacturers, including us, are required to provide ASP information to the CMS on a quarterly basis. The manufacturer-submitted information is used to calculate Medicare payment rates. If a manufacturer is found to have made a misrepresentation in the reporting of ASP, the governing statute provides for civil monetary penalties.

- Medicare Part D provides coverage to enrolled Medicare patients for self-administered drugs (i.e., drugs that are not administered by a physician). Medicare Part D is administered by private prescription drug plans approved by the U.S. government. Each drug plan establishes its own Medicare Part D formulary for prescription drug coverage and pricing, which the drug plan may modify from time-to-time. The prescription drug plans negotiate pricing with manufacturers and pharmacies, and may condition formulary placement on the availability of manufacturer

discounts. In addition, manufacturers, including us, are required to provide to the CMS a 50% discount on brand name prescription drugs utilized by Medicare Part D beneficiaries when those beneficiaries reach the coverage gap in their drug benefits.

- *Federal Agency Discounted Pricing*: Our products are subject to discounted pricing when purchased by federal agencies via the Federal Supply Schedule (FSS). FSS participation is required for our products to be covered and reimbursed by the Veterans Administration (VA), Department of Defense, Coast Guard and Public Health Service (PHS). Coverage under Medicaid, Medicare and the PHS pharmaceutical pricing program is also conditioned upon FSS participation. FSS pricing is intended not to exceed the price that we charge our most-favored non-federal customer for a product. In addition, prices for drugs purchased by the VA, 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 equal to 76% of the non-federal average manufacturer price (non-FAMP). An additional discount applies if non-FAMP increases more than inflation (measured by the Consumer Price Index - Urban). In addition, if we fail to provide information timely or we are found to have knowingly submitted false information to the government, the governing statute provides for civil monetary penalties.

- *340B Discounted Pricing*: To maintain coverage of our products under the Medicaid Drug Rebate Program and Medicare Part B, we are required to extend significant discounts to certain covered entities that purchase products under Section 340B of the PHS pharmaceutical 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 certain types of grants under the PHSA. For all of our products, we must agree to charge a price that will not exceed the amount determined under statute (the "ceiling price") when we sell outpatient drugs to these covered entities. In addition, we may, but are not required to, offer these covered entities a price lower than the 340B ceiling price. The 340B discount formula is based on AMP and is generally similar to the level of rebates calculated under the Medicaid Drug Rebate Program.

Outside the U.S.

Outside the U.S., our products are paid for by a variety of payors, with governments being the primary source of payment. Governments may determine or influence reimbursement of products and may also set prices or otherwise regulate pricing. Negotiating prices with governmental authorities can delay commercialization of our products. Governments may use a variety of cost-containment measures to control the cost of products, including price cuts, mandatory rebates, value-based pricing and reference pricing (i.e., referencing prices in other countries and using those reference prices to set a price). Budgetary pressures in many countries are continuing to cause governments to consider or implement various cost-containment measures, such as price freezes, increased price cuts and rebates and expanded generic substitution and patient cost-sharing.

Regulation Pertaining to Sales and Marketing

We are subject to various federal and state laws pertaining to health care "fraud and abuse," including anti-kickback laws and false claims laws. Anti-kickback laws generally prohibit a prescription drug manufacturer from soliciting, offering, receiving or paying any remuneration to generate business, including the purchase or prescription of a particular drug. Although the specific provisions of these laws vary, their scope is generally broad and there may be no regulations, guidance or court decisions that clarify how the laws apply to particular industry practices. There is therefore a possibility that our practices might be challenged under anti-kickback or similar laws. False claims laws prohibit anyone from knowingly and willingly presenting, or causing to be presented for payment to third-party payors (including Medicare and Medicaid), claims for reimbursed drugs or services that are false or fraudulent, claims for items or services not provided as claimed, or claims for medically unnecessary items or services. Our activities relating to the sale and marketing of our products may be subject to scrutiny under these laws. Violations of fraud and abuse laws may be punishable by criminal or civil sanctions, including fines and civil monetary penalties, and exclusion from federal health care programs (including Medicare and Medicaid). In the U.S., 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 civil False Claims Act. If we were subject to allegations concerning, or were convicted of violating, these laws, our business could be harmed.

Laws and regulations have 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 or require disclosure to the government and public of such interactions. The laws include federal "sunshine" provisions. The sunshine provisions apply to pharmaceutical manufacturers with products reimbursed under certain government programs and require those manufacturers to disclose annually to the federal government (for re-disclosure to the public) certain payments made to physicians and certain other healthcare practitioners or to teaching hospitals. State laws may also require disclosure of pharmaceutical pricing information and marketing expenditures. Many of these laws and regulations contain ambiguous requirements. Given the lack of clarity in laws and their implementation, our reporting actions could be subject to the penalty provisions of the pertinent federal and state laws and regulations. Outside the U.S., other countries have implemented requirements for disclosure of financial interactions with healthcare providers and additional countries may consider or implement such laws.

Other Regulations

Foreign Anti-Corruption

We are subject to various federal and foreign laws that govern our international business practices with respect to payments to government officials. Those laws include the U.S. Foreign Corrupt Practices Act (FCPA), which 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. The FCPA also requires public companies to make and keep books and records that accurately and fairly reflect their transactions and to devise and maintain an adequate system of internal accounting controls.

The laws to which we are subject also include the U.K. Bribery Act 2010 (Bribery Act), which proscribes giving and receiving bribes in the public and private sectors, bribing a foreign public official and failing to have adequate procedures to prevent employees and other agents from giving bribes. U.S. companies that conduct business in the U.K. generally will be subject to the Bribery Act. Penalties under the Bribery Act include significant fines for companies and criminal sanctions for corporate officers under certain circumstances.

NIH Guidelines

We seek to conduct research at our U.S. facilities in compliance with the current U.S. National Institutes of Health Guidelines for Research Involving Recombinant DNA Molecules (NIH Guidelines). By local ordinance, we are required to, among other things, comply with the NIH Guidelines in relation to our facilities in Research Triangle Park (RTP), NC and are required to operate pursuant to certain permits.

Other Laws

Our present and future business has been and will continue to be subject to various other laws and regulations. Various laws, regulations and recommendations relating to data privacy and protection, safe working conditions, laboratory practices, the experimental use of animals and the purchase, storage, movement, import, export and use and disposal of hazardous or potentially hazardous substances, including radioactive compounds and infectious disease agents, used in connection with our research work are or may be applicable to our activities. Certain agreements entered into by us involving exclusive license rights may be subject to national or international antitrust regulatory control, the effect of which cannot be predicted. The extent of government regulation, which might result from future legislation or administrative action, cannot accurately be predicted.

The European Parliament and the Council of the European Union adopted a comprehensive general data privacy regulation (GDPR) in 2016 to replace the current E.U. Data Protection Directive and related country-specific legislation. The GDPR will take effect in May 2018 and governs the collection and use of personal data in the E.U. The GDPR, which is wide-ranging in scope, will impose several requirements relating to the consent of the individuals to whom the personal data relates, the information provided to the individuals, the security and confidentiality of the personal data, data breach notification and the use of third party processors in connection with the processing of the personal data. The GDPR will also impose strict rules on the transfer of personal data out of the E.U. to the U.S., will provide an enforcement authority and will impose large penalties for noncompliance, including the potential for fines of up to €20 million or 4% of the annual global revenues of the infringer, whichever is greater.

Environmental Matters

We strive to comply in all material respects with applicable laws and regulations concerning the environment. While it is impossible to predict accurately the future costs associated with environmental compliance and potential remediation activities, compliance with environmental laws is not expected to require significant capital expenditures and has not had, and is not expected to have, a material adverse effect on our operations or competitive position.

Manufacturing

We are committed to ensuring an uninterrupted supply of medicines to patients around the world. To that end, we continually review our manufacturing capacity, capabilities, processes and facilities. We believe that our manufacturing facilities, together with the third-party contract manufacturing organizations we outsource to, currently provide sufficient capacity for our products and the contract manufacturing services we provide to Samsung Bioepis, our joint venture that develops, manufactures and markets biosimilars, and other strategic contract manufacturing partners. In light of the development of our pipeline, we are expanding our production capacity by building a large-scale biologics manufacturing facility in Solothurn, Switzerland. We expect this facility to be operational by the end of the decade.

Manufacturing Facilities

Our drug substance manufacturing facilities include:

Facility	Drug Substance Manufactured
RTP, North Carolina	ALPROLIX AVONEX ELOCTATE PLEGRIDY TYSABRI ZINBRYTA Other*
Hillerød, Denmark	TYSABRI Biosimilars

* Other includes products manufactured for contract manufacturing partners

In addition to our drug substance manufacturing facilities, we have a drug product manufacturing facility and supporting infrastructure in RTP, NC including a parenteral facility and an oral solid dose products manufacturing facility.

The parenteral facility adds capabilities and capacity for filling biologics into vials and is principally used for filling product candidates. The oral solid dose products facility supplements our outsourced small molecule manufacturing capabilities, including the manufacture of TECFIDERA.

We also have a new oligonucleotide synthesis manufacturing (OSM) facility in RTP, NC. This facility gives us the capability to manufacture ASO drugs like SPINRAZA as well as our other ASO candidates currently in our clinical pipeline.

During the first quarter of 2016 we purchased land in Solothurn, Switzerland and are building a large-scale biologics manufacturing facility at this site. We expect this facility to be operational by the end of the decade.

Genentech is responsible for all worldwide manufacturing activities for bulk RITUXAN and GAZYVA and has sourced the manufacture of certain bulk RITUXAN and GAZYVA requirements to a third party. Acorda supplies FAMPYRA to us pursuant to its supply agreement with Alkermes, Inc. and Ionis supplies the active pharmaceutical ingredient (API) for SPINRAZA.

Third-Party Suppliers and Manufacturers

We principally use third parties to manufacture the API and the final product for our small molecule products and product candidates, including TECFIDERA and FUMADERM, and the final drug product for our large molecule products and, to a lesser extent, product candidates.

We source all of our fill-finish and the majority of final product assembly and storage operations for our products, along with a substantial part of our packaging operations, to a concentrated group of third-party contract manufacturing organizations. We have internal label and packaging capability for clinical and commercial products at our Hillerød facility. Raw materials, delivery devices, such as syringes and auto-injectors, and other supplies required for the production of our products and product candidates are procured from various third-party suppliers and manufacturers in quantities adequate to meet our needs. Continuity of supply of such raw materials, devices and supplies is assured using a strategy of dual sourcing where possible or by a risk-based inventory strategy. Our third-party service providers, suppliers and manufacturers may be subject to routine cGMP inspections by the FDA or comparable agencies in other jurisdictions and undergo assessment and certification by our quality management group.

Our Employees

As of December 31, 2017, we had approximately 7,300 employees worldwide.

Our Executive Officers (as of February 1, 2018)

Officer	Current Position	Age	Year Joined Biogen
Michel Vounatsos	Chief Executive Officer	56	2016
Susan H. Alexander	Executive Vice President, Chief Legal, Corporate Services and Secretary	61	2006
Jeffrey D. Capello	Executive Vice President and Chief Financial Officer	53	2017
Gregory F. Covino	Vice President, Finance and Chief Accounting Officer	52	2012
Michael D. Ehlers, M.D., Ph.D.	Executive Vice President, Research and Development	49	2016
Ginger Gregory, Ph.D.	Executive Vice President and Chief Human Resources Officer	50	2017
Chirfi Guindo	Executive Vice President and Head of Global Marketing, Market Access and Customer Innovation	52	2017
Paul McKenzie, Ph.D.	Executive Vice President, Pharmaceutical Operations and Technology	52	2016
Alfred W. Sandrock, Jr., M.D., Ph.D.	Executive Vice President and Chief Medical Officer	60	1998

Michel Vounatsos

Experience

Mr. Vounatsos has served as our Chief Executive Officer since January 2017. Prior to that, from April 2016 to December 2016, Mr. Vounatsos served as our Executive Vice President and Chief Commercial Officer. Prior to joining Biogen, Mr. Vounatsos spent 20 years at Merck where he most recently served as President, Primary Care, Customer Business Line. In this role, he led Merck's global primary care business unit, a role which encompassed Merck's cardiology-metabolic, general medicine, women's health and biosimilars groups and developed and instituted a strategic framework for enhancing the company's relationships with key constituents, including the most significant providers, payors and retailers and the world's largest governments. Mr. Vounatsos previously held leadership positions across Europe and in China for Merck. Prior to that, Mr. Vounatsos held management positions at Ciba-Geigy.

Education

- Universite Victor Segalen, Bordeaux II, France, C.S.C.T. Certificate in Medicine
- HEC School of Management - Paris, M.B.A.

Susan H. Alexander

Experience

Ms. Alexander has served as our Executive Vice President, Chief Legal, Corporate Services and Secretary since March 2017. Prior to that, from December 2011 to March 2017, Ms. Alexander served as our Executive Vice President, Chief Legal Officer and Secretary and from 2006 to December 2011, as our Executive Vice President, General Counsel and Corporate Secretary. From 2003 to January 2006, Ms. Alexander served as the Senior Vice President, General Counsel and Corporate Secretary of PAREXEL International Corporation, a biopharmaceutical services company. From 2001 to 2003, Ms. Alexander served as General Counsel of IONA Technologies, a software company. From 1995 to 2001, Ms. Alexander served as Counsel at Cabot Corporation, a specialty chemicals and performance materials company. Prior to that, Ms. Alexander was a partner at the law firms of Hinckley, Allen & Snyder and Fine & Ambrogne.

Public Company Boards

- Board of Directors of Invacare Corporation, a medical and healthcare product company

Education

- Wellesley College, B.A.
- Boston University School of Law, J.D.

Jeffrey D. Capello

Experience

Mr. Capello has served as our Executive Vice President and Chief Financial Officer since December 2017. Prior to that, Mr. Capello served as the Chief Financial Officer of Beacon Health Options, Inc., a behavioral health company, with responsibility for finance, human resources, information technology, real estate and procurement, from October 2016 until November 2017. From July 2015 until September 2016, Mr. Capello was the founder and Chief Executive Officer of Monomoy Advisors which focuses on helping companies drive shareholder value. From July 2014 until June 2015, Mr. Capello served as the Executive Vice President and Chief Financial Officer of Ortho-Clinical Diagnostics, an in vitro diagnostics company that was acquired by the Carlyle Group from Johnson & Johnson, with responsibility for global finance and business development. Prior to his role at Ortho-Clinical Diagnostics, Mr. Capello served as Chief Financial Officer and Executive Vice President of Boston Scientific Corporation, a medical device company, from March 2010 to December 2013. At Boston Scientific, Mr. Capello was responsible for the worldwide management of Boston Scientific's finance, information systems, business development and corporate strategy functions. Mr. Capello joined Boston Scientific in June 2008 and served as Senior Vice President and Chief Accounting Officer until March 2010. Prior to joining Boston Scientific, he was the Senior Vice President and Chief Financial Officer with responsibilities for global finance and business development at PerkinElmer, Inc., a life sciences tool company, from 2006 to 2008. Previously, he served as PerkinElmer's Vice President of Finance, Corporate Controller, Treasurer and Chief Accounting Officer from 2001 to 2006. Prior to his tenure at PerkinElmer, Mr. Capello was a Partner at PricewaterhouseCoopers LLP, both in the United States and in the Netherlands.

Public Company Boards

- OvaScience, Inc., a biotechnology company
- Flex Pharma, Inc., a biotechnology company

Education

- University of Vermont, B.S. in Business Administration
- Harvard Business School, M.B.A.

Gregory F. Covino

Experience

Mr. Covino has served as our Vice President and Chief Accounting Officer since April 2012. From June 2017 to December 2017, Mr. Covino also served as our interim Principal Financial Officer. From March 2010 to April 2012, Mr. Covino served at Boston Scientific Corporation, a medical device company, as Vice President, Corporate Analysis and Control, having responsibility for the company's internal audit function, and as Vice President, Finance, International from February 2008 to March 2010, having responsibility for the financial activities of the company's international division. Prior to that, Mr. Covino held several finance positions at Hubbell Incorporated, an electrical products company, including Vice President, Chief Accounting Officer and Controller from 2002 to January 2008, Interim Chief Financial Officer from 2004 to 2005, and Director, Corporate Accounting from 1999 to 2002.

Education

- Bryant University, B.S. in Business Administration

Michael D. Ehlers, M.D., Ph.D.

Experience

Dr. Ehlers has served as our Executive Vice President, Head of Research and Development since May 2016. Prior to joining Biogen, from August 2010 to April 2016, Dr. Ehlers served in leadership positions at Pfizer, Inc., a biopharmaceutical company, including Senior Vice President & Head BioTherapeutics R&D and Chief Scientific Officer, Neuroscience & Pain. Prior to that, Dr. Ehlers was the George Barth Geller Professor of Neurobiology and an Investigator of the Howard Hughes Medical Institute at Duke University Medical Center. He is the recipient of numerous awards including the Eppendorf & Science Prize in Neurobiology, the John J. Abel Award in Pharmacology, the Society for Neuroscience Young Investigator Award, a National Institute of Mental Health MERIT Award, the National Alliance for Schizophrenia and Depression Distinguished Investigator Award and the Massachusetts Medical Society Honored Business Leader Award. In 2013, Dr. Ehlers became the 11th recipient of the Thudichum Medal of the Biochemical Society of the United Kingdom. Past recipients include two Nobel laureates. Dr. Ehlers has authored over 100 scientific papers, has served on the Editorial Boards of Annual Reviews in Medicine, Annual Reviews in Pharmacology and Toxicology, the Journal of Neuroscience, the Journal of Biological Chemistry, the Journal of Molecular and Cellular Neuroscience and has sat on advisory committees of the National Institutes of Health.

Outside Affiliations

- PhRMA Foundation Basic Pharmacology Advisory Committee
- Janelia Research Institute Advisory Committee
- McKnight Endowment Fund for Neuroscience Board
- World Economic Forum Global Agenda Council on Brain Research

Education

- California Institute of Technology, B.S. Chemistry
- The Johns Hopkins University School of Medicine, M.D.
- The Johns Hopkins University School of Medicine, Ph.D. Neuroscience

Ginger Gregory, Ph.D.

Experience

Dr. Gregory has served as our Executive Vice President and Chief Human Resources Officer since July 2017. Prior to joining Biogen, Dr. Gregory served as Executive Vice President and Chief Human Resources Officer at Shire PLC, a global specialty biopharmaceutical company, from February 2014 to April 2017. Prior to that, Dr. Gregory held executive-level human resources positions for several multinational companies across a variety of industries, including Dunkin' Brands, where she served as Chief Human Resource Officer; Novartis, AG, where she was the division head of Human Resources for Novartis Vaccines and Diagnostics, Novartis Consumer Health and Novartis Institutes of BioMedical Research from 2005 to 2012; and Novo Nordisk, where she served as Senior Vice President, Corporate People & Organization at the company's headquarters in Copenhagen, Denmark. Earlier in her career, she held a variety of human resources generalist and specialist positions at Bristol-Myers Squibb and served as a consultant with Booz Allen & Hamilton in the area of organization change and effectiveness.

Education

- University of Massachusetts B.A., in Psychology
- The George Washington University, Ph.D. Psychology

Chirfi Guindo

Experience

Mr. Guindo has served as our Executive Vice President and Head of Global Marketing, Market Access and Customer Innovation since November 2017. Prior to joining Biogen, Mr. Guindo spent 27 years in the global pharmaceutical industry and has held several leadership positions at Merck in Canada, the U.S., France, Africa and the Netherlands. He worked in several disciplines including Finance, Sales & Marketing, General Management and Global Strategy/Product Development in specialty, acute and hospital care. Most recently Mr. Guindo was Vice President and Managing Director and President and Managing Director of Merck Canada from October 2014 to November 2017. From January 2011 to October 2014, he was Vice President and General Manager, Global HIV Franchise at Merck & Co.

Education

- Ecole Central de Paris (France), Engineering
- Stern School of Business, New York University, M.B.A. in Finance/Economics

Paul McKenzie, Ph.D.

Experience

Dr. McKenzie has served as our Executive Vice President, Pharmaceutical Operations and Technology since July 2016. Prior to that, from February 2016 to June 2016, he served as our Senior Vice President for Global Biologics Manufacturing & Technical Operations. Prior to joining Biogen, since 2008, Dr. McKenzie held a number of positions of increasing responsibility at Johnson & Johnson (J&J), including Vice President of R&D for J&J's Ethicon business where he led the manufacturing and technical operations team responsible for internal and external manufacturing of Janssen's pharmaceutical portfolio. He also ran global Development for Janssen R&D, helping to manage pipeline activities from discovery through clinical development and commercialization. Prior to J&J, Dr. McKenzie also held various R&D and manufacturing positions at Bristol-Myers Squibb and Merck & Co.

Education

- University of Pennsylvania, B.S. Chemical Engineering
- Carnegie Mellon University, Ph.D. Chemical Engineering

Alfred W. Sandrock, Jr., M.D., Ph.D.

Experience

Dr. Sandrock has served as our Executive Vice President and Chief Medical Officer since October 2017. Prior to that, Dr. Sandrock served as our Executive Vice President, Chief Medical Officer Neurology and Neurodegeneration from October 2015 to October 2017, as our Chief Medical Officer and Group Senior Vice President from April 2013 to October 2015 and as our Chief Medical Officer and Senior Vice President of Development Sciences from February 2012 to April 2013. Prior to that, Dr. Sandrock held several senior executive positions since joining us in 1998, including Senior Vice President of Neurology Research and Development and Vice President of Clinical Development, Neurology.

Public Company Boards

- Board of Directors of Neurocrine Biosciences, Inc., a life sciences company

Education

- Stanford University, B.A. in Human Biology
- Harvard Medical School, M.D.
- Harvard University, Ph.D. in Neurobiology
- Massachusetts General Hospital, internship in Medicine, residency and chief residency in Neurology, and clinical fellowship in Neuromuscular Disease and Clinical Neurophysiology (electromyography)

Available Information

Our principal executive offices are located at 225 Binney Street, Cambridge, MA 02142 and our telephone number is (617) 679-2000. Our website address is www.biogen.com. We make available free of charge through the *Investors* section of our website our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and all amendments to those reports as soon as reasonably practicable after such material is electronically filed with or furnished to the Securities and Exchange Commission (SEC). We include our website address in this report only as an inactive textual reference and do not intend it to be an active link to our website. The contents of our website are not incorporated into this report.

Item 1A. Risk Factors

We are substantially dependent on revenues from our principal products.

Our current revenues depend upon continued sales of our principal products, and, unless we develop or acquire rights to new products and technologies, we will be substantially dependent on sales from our principal products for many years. Further, following the completion of the spin-off of our hemophilia business, our revenues are further reliant and concentrated on sales of our MS products in an increasingly competitive market, and revenues from sales of our product for SMA. Any of the following negative developments relating to any of our principal products may adversely affect our revenues and results of operations or could cause a decline in our stock price:

- safety or efficacy issues;
- the introduction or greater acceptance of competing products, including lower-priced competing products;
- constraints and additional pressures on product pricing or price increases, including those resulting from governmental or regulatory requirements, increased competition or changes in, or implementation of, reimbursement policies and practices of payors and other third parties; or
- adverse legal, administrative, regulatory or legislative developments.

SPINRAZA has been approved by, among others, the FDA, the EC and the Japanese Ministry of Health, Labor and Welfare, and is in the early stages of commercial launch in these and other markets. In addition to risks associated with new product launches and the other factors described in these "Risk Factors," our ability to successfully commercialize SPINRAZA may be adversely affected due to:

- our limited marketing experience within the SMA market, which may impact our ability to develop relationships with the associated medical and scientific community;
- the lack of readiness of healthcare providers to treat patients with SMA;
- the effectiveness of our commercial strategy for marketing SPINRAZA; and
- our ability to maintain a positive reputation among patients, healthcare providers and others in the SMA community, which may be impacted by pricing and reimbursement decisions relating to SPINRAZA.

If we fail to compete effectively, our business and market position would suffer.

The biopharmaceutical industry and the markets in which we operate are intensely competitive. We compete in the marketing and sale of our products, the development of new products and processes, the acquisition of rights to new products with commercial potential and the hiring and retention of personnel. We compete with biotechnology and pharmaceutical companies that have a greater number of products on the market and in the product pipeline, greater financial and other resources and other technological or competitive advantages. One or more of our competitors may benefit from significantly greater sales and marketing capabilities, may develop products that are accepted more widely than ours or may receive patent protection that dominates, blocks or adversely affects our product development or business.

Our products are also susceptible to increasing competition from generics and biosimilars in many markets. Generic versions of drugs and biosimilars are likely to be sold at substantially lower prices than branded products. Accordingly, the introduction of generic or biosimilar versions of our marketed products, as well as lower-priced competing products, likely would significantly reduce both the price that we receive for such marketed products and the volume of products that we sell, which may have an adverse impact on our results of operations.

In the MS market, we face intense competition as the number of products and competitors continues to expand. Due to our significant reliance on sales of our MS products, our business may be harmed if we are unable to successfully compete in the MS market. More specifically, our ability to compete, maintain and grow our share in the MS market may be adversely affected due to a number of factors, including:

- the introduction of more efficacious, safer, less expensive or more convenient alternatives to our MS products, including our own products and products of our collaborators;
- the introduction of lower-cost biosimilars, follow-on products or generic versions of branded MS products sold by our competitors, and the possibility of future competition from generic versions or prodrugs of existing therapeutics or from off-label use by physicians of therapies indicated for other conditions to treat MS patients;

- patient dynamics, including the size of the patient population and our ability to attract new patients to our therapies;
- damage to physician and patient confidence in any of our MS products or to our sales and reputation as a result of label changes or adverse experiences or events that may occur with patients treated with our MS products;
- inability to obtain appropriate pricing and reimbursement for our MS products compared to our competitors in key international markets; or
- our ability to obtain and maintain patent, data or market exclusivity for our MS products.

Sales of our products depend, to a significant extent, on adequate coverage, pricing and reimbursement from third-party payors, which are subject to increasing and intense pressure from political, social, competitive and other sources. Our inability to maintain adequate coverage, or a reduction in pricing or reimbursement, could have an adverse effect on our business, revenues and results of operations and could cause a decline in our stock price.

Sales of our products are dependent, in large part, on the availability and extent of coverage, pricing and reimbursement from government health administration authorities, private health insurers and other organizations. When a new pharmaceutical product is approved, the availability of government and private reimbursement for that product may be uncertain, as is the pricing and amount for which that product will be reimbursed.

Pricing and reimbursement for our products may be adversely affected by a number of factors, including:

- changes in, and implementation of, federal, state or foreign government regulations or private third-party payors' reimbursement policies;
- pressure by employers on private health insurance plans to reduce costs;
- consolidation and increasing assertiveness of payors, including managed care organizations, health insurers, pharmacy benefit managers, government health administration authorities, private health insurers and other organizations, seeking price discounts or rebates in connection with the placement of our products on their formularies and, in some cases, the imposition of restrictions on access or coverage of particular drugs or pricing determined based on perceived value; and
- our value-based contracting pilot program pursuant to which we aim to tie the pricing of our products to their clinical values by either aligning price to patient outcomes or adjusting price for patients who discontinue therapy for any reason, including efficacy or tolerability concerns.

Our ability to set the price for our products varies significantly from country to country and as a result so can the price of our products. Certain countries set prices by reference to the prices in other countries where our products are marketed. Thus, our inability to secure favorable prices in a particular country may not only limit the revenues from our products within that country, but may also adversely affect our ability to obtain acceptable prices in other markets. This may create the opportunity for third-party cross-border trade or influence our decision to sell or not to sell a product, thus adversely affecting our geographic expansion plans and revenues.

Our failure to maintain adequate coverage, pricing or reimbursement for our products would have an adverse effect on our business, revenues and results of operations, could curtail or eliminate our ability to adequately fund research and development programs for the discovery and commercialization of new products and could cause a decline in our stock price.

Drug prices are under significant scrutiny in the markets in which our products are prescribed. We expect drug pricing and other health care costs to continue to be subject to intense political and societal pressures on a global basis. In addition, competition from current and future competitors may negatively impact our ability to maintain pricing and our market share. New products or treatments brought to market by our competitors could cause revenues for our products to decrease due to potential price reductions and lower sales volumes. As a result, our business and reputation may be harmed, our stock price may be adversely impacted and experience periods of volatility, and our results of operations may be adversely impacted.

Adverse safety events or restrictions on use and safety warnings for our products can negatively affect our business, product sales and stock price.

Adverse safety events involving our marketed products may have a negative impact on our business. Discovery of safety issues with our products could create product liability and could cause additional regulatory scrutiny and requirements for additional labeling or safety monitoring, withdrawal of products from the market and the imposition of fines or criminal penalties. Adverse safety events may also damage physician, patient and/or investor confidence in our products and our reputation. Any of these could result in liabilities, loss of revenues, material write-offs of inventory, material impairments of intangible assets, goodwill and fixed assets, material restructuring charges and other adverse impacts on our results of operations.

Regulatory authorities are making greater amounts of stand-alone safety information directly available to the public through periodic safety update reports, patient registries and other reporting requirements. The reporting of adverse safety events involving our products or products similar to ours and public rumors about such events may increase claims against us and may also cause our product sales or stock price to decline or experience periods of volatility.

Restrictions on use or significant safety warnings that may be required to be included in the label of our products, such as the risk of developing progressive multifocal leukoencephalopathy, a serious brain infection, or liver injury in the label for certain of our products, may significantly reduce expected revenues for those products and require significant expense and management time.

If we are unable to obtain and maintain adequate protection for our data, intellectual property and other proprietary rights, our business may be harmed.

Our success depends in part on our ability to obtain and defend patent and other intellectual property rights that are important to the commercialization of our products and product candidates. The degree of patent protection that will be afforded to our products and processes in the U.S. and in other important markets remains uncertain and is dependent upon the scope of protection decided upon by the patent offices, courts, administrative bodies and lawmakers in these countries. We can provide no assurance that we will successfully obtain or preserve patent protection for the technologies incorporated into our products and processes, or that the protection obtained will be of sufficient breadth and degree to protect our commercial interests in all countries where we conduct business. If we cannot prevent others from exploiting our inventions, we will not derive the benefit from them that we currently expect. Furthermore, we can provide no assurance that our products will not infringe patents or other intellectual property rights held by third parties.

We also rely on regulatory exclusivity for protection 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.

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 protections 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 the covered products and services.

Our long-term success depends upon the successful development of new products and additional indications for existing products.

Our long-term viability and growth will depend upon successful development of additional indications for our existing products as well as successful development of new products and technologies from our research and development activities, our biosimilars joint venture with Samsung Biologics or licenses or acquisitions from third parties.

Product development is very expensive and involves a high degree of risk. Only a small number of research and development programs result in the commercialization of a product. Clinical trials may indicate that our product candidates lack efficacy, have harmful side effects, result in unexpected adverse events or raise other concerns that may significantly reduce the likelihood of regulatory approval. This may result in terminated programs, significant restrictions on use and safety warnings in an approved label, adverse placement within the treatment paradigm or significant reduction in the commercial potential of the product candidate.

Successful preclinical work or early stage clinical trials does not ensure success in later stage trials, regulatory approval or commercial viability of a product.

Positive results in a trial may not be replicated in subsequent or confirmatory trials. Additionally, success in preclinical work or early stage clinical trials does not ensure that later stage or larger scale clinical trials will be successful or that regulatory approval will be obtained. In addition, even if later stage clinical trials are successful, regulatory authorities may delay or decline approval of our product candidates. Regulatory authorities may disagree with our view of the data, require additional studies or disagree with our trial design or endpoints. Regulatory authorities may also fail to approve the facilities or the processes used to manufacture a product candidate, our dosing or delivery methods or companion devices. Regulatory authorities may grant marketing approval that is more restricted than anticipated. These restrictions may include limiting indications to narrow patient populations and the imposition of safety monitoring, educational requirements and risk evaluation and mitigation strategies. The occurrence of any of these events could result in significant costs and expenses, have an adverse effect on our business, financial condition and results of operations and cause our stock price to decline or experience periods of volatility.

Even if we are able to successfully develop new products or indications, sales of new products or products with additional indications may not meet investor expectations. We may also make a strategic decision to discontinue development of a product or indication if, for example, we believe commercialization will be difficult relative to the standard of care or other opportunities in our pipeline.

Clinical trials and the development of biopharmaceutical products is a lengthy and complex process. If we fail to adequately manage our clinical activities, our clinical trials or potential regulatory approvals may be delayed or denied.

Conducting clinical trials is a complex, time-consuming and expensive process. Our ability to complete clinical trials in a timely fashion depends in large part on a number of key factors. These factors include protocol design, regulatory and institutional review board approval, patient enrollment rates and compliance with cGCP. If we or our third-party clinical trial providers or third-party CROs do not successfully carry out these clinical activities, our clinical trials or the potential regulatory approval of a product candidate may be delayed or be unsuccessful.

We have opened clinical sites and are enrolling patients in a number of countries where our experience is limited. In most cases, we use the services of third parties to carry out our clinical trial related activities and rely on such parties to accurately report their results. Our reliance on third parties for these activities may impact our ability to control the timing, conduct, expense and quality of our clinical trials. One CRO has responsibility for a substantial portion of our clinical trial related activities and reporting. If this CRO does not adequately perform, many of our trials may be affected. We may need to replace our CROs. Although we believe there are a number of other CROs we could engage to continue these activities, the replacement of an existing CRO may result in the delay of the affected trials or otherwise adversely affect our efforts to obtain regulatory approvals and commercialize our product candidates.

Our results of operations may be adversely affected by current and potential future healthcare reforms.

In the U.S., federal and state legislatures, health agencies and third-party payors continue to focus on containing the cost of health care. Legislative and regulatory proposals, enactments to reform health care insurance programs and increasing pressure from social sources could significantly influence the manner in which our products are prescribed and purchased. For example, provisions of the PPACA have resulted in changes in the way health care is paid for by both governmental and private insurers, including increased rebates owed by manufacturers under the Medicaid Drug Rebate Program, annual fees and taxes on manufacturers of certain branded prescription drugs, the requirement that manufacturers participate in a discount program for certain outpatient drugs under Medicare Part D

and the expansion of the number of hospitals eligible for discounts under Section 340B of the PHSA. These changes have had and are expected to continue to have a significant impact on our business.

We may face uncertainties as a result of federal and administrative efforts to repeal, substantially modify or invalidate some or all of the provisions of the PPACA. There is no assurance that the PPACA, as currently enacted or as amended in the future, will not adversely affect our business and financial results, and we cannot predict how future federal or state legislative or administrative changes relating to healthcare reform will affect our business.

The administration has also indicated an intent to address prescription drug pricing and recent Congressional hearings have brought increased public attention to the costs of prescription drugs. These actions and the uncertainty about the future of the PPACA and healthcare laws may put downward pressure on pharmaceutical pricing and increase our regulatory burdens and operating costs.

There is also significant economic pressure on state budgets that results in states increasingly seeking to achieve budget savings through mechanisms that limit coverage or payment for our drugs. In recent years, some states have considered legislation and ballot initiatives that would control the prices of drugs, including laws to allow importation of pharmaceutical products from lower cost jurisdictions outside the U.S. and laws intended to impose price controls on state drug purchases. State Medicaid programs are increasingly requesting manufacturers to pay supplemental rebates and requiring prior authorization by the state program for use of any drug for which supplemental rebates are not being paid. Government efforts to reduce Medicaid expenses may lead to increased use of managed care organizations by Medicaid programs. This may result in managed care organizations influencing prescription decisions for a larger segment of the population and a corresponding constraint on prices and reimbursement for our products.

In the E.U. and some other international markets, the government provides health care at low cost to consumers and regulates pharmaceutical prices, patient eligibility or reimbursement levels to control costs for the government-sponsored health care system. Many countries have announced or implemented measures to reduce health care costs to limit their overall level of government expenditures. These measures vary by country and may include, among other things, patient access restrictions, suspensions on price increases, prospective and possibly retroactive price reductions and other recoupments and increased mandatory discounts or rebates, recoveries of past price increases and greater importation of drugs from lower-cost countries. These measures have negatively impacted our revenues, and may continue to adversely affect our revenues and results of operations in the future.

Manufacturing issues could substantially increase our costs, limit supply of our products and/or reduce our revenues.

The process of manufacturing our products is complex, highly regulated and subject to numerous risks, including:

- *Risk of Product Loss.* The manufacturing process for our products is extremely susceptible to product loss due to contamination, oxidation, equipment failure or improper installation or operation of equipment or vendor or operator error. Even minor deviations from normal manufacturing processes could result in reduced production yields, product defects and other supply disruptions. If microbial, viral or other contaminations are discovered in our products or manufacturing facilities, we may need to close our manufacturing facilities for an extended period of time to investigate and remediate the contaminant.

- *Risks of Reliance on Third Parties and Single Source Providers.* We rely on third-party suppliers and manufacturers for many aspects of our manufacturing process for our products and product candidates. In some cases, due to the unique manner in which our products are manufactured, we rely on single source providers of raw materials and manufacturing supplies. These third parties are independent entities subject to their own unique operational and financial risks that are outside of our control. These third parties may not perform their obligations in a timely and cost-effective manner or in compliance with applicable regulations, and they may be unable or unwilling to increase production capacity commensurate with demand for our existing or future products. Finding alternative providers could take a significant amount of time and involve significant expense due to the specialized nature of the services and the need to obtain regulatory approval of any significant changes to our suppliers or manufacturing methods. We cannot be certain that we could reach agreement with alternative providers or that the FDA or other regulatory authorities would approve our use of such alternatives.

- *Global Bulk Supply Risks.* We rely on our principal manufacturing facilities for the production of drug substance for our large molecule products and product candidates. Our global bulk supply of these products and product candidates depends on the uninterrupted and efficient operation of these facilities, which could be adversely affected by equipment failures, labor shortages, natural disasters, power failures and numerous other factors.

- *Risks Relating to Compliance with cGMP.* We and our third-party providers are generally required to maintain compliance with cGMP and other stringent requirements and are subject to inspections by the FDA and comparable agencies in other jurisdictions to confirm such compliance. Any delay, interruption or other issues that arise in the manufacture, fill-finish, packaging or storage of our products as a result of a failure of our facilities or the facilities or operations of third parties to pass any regulatory agency inspection could significantly impair our ability to develop and commercialize our products. Significant noncompliance could also result in the imposition of monetary penalties or other civil or criminal sanctions and damage our reputation.

Any adverse developments affecting our manufacturing operations or the operations of our third-party suppliers and manufacturers may result in shipment delays, inventory shortages, lot failures, product withdrawals or recalls or other interruptions in the commercial supply of our products. We may also have to take inventory write-offs and incur other charges and expenses for products that fail to meet specifications, undertake costly remediation efforts or seek more costly manufacturing alternatives. Such developments could increase our manufacturing costs, cause us to lose revenues or market share as patients and physicians turn to competing therapeutics, diminish our profitability or damage our reputation.

A breakdown or breach of our technology systems could subject us to liability or interrupt the operation of our business.

We are increasingly dependent upon technology systems and data. Our computer systems continue to increase in multitude and complexity due to the growth in our business, making them potentially vulnerable to breakdown, malicious intrusion and random attack. Likewise, data privacy or security breaches by individuals authorized to access our technology systems or others may pose a risk that sensitive data, including intellectual property, trade secrets or personal information belonging to us, our patients, customers or other business partners, may be exposed to unauthorized persons or to the public. Cyber-attacks are increasing in their frequency, sophistication and intensity, and are becoming increasingly difficult to detect. They are often carried out by motivated, well-resourced, skilled and persistent actors including nation states, organized crime groups, “hacktivists” and employees or contractors acting with malicious intent. Cyber-attacks could include the deployment of harmful malware and key loggers, ransomware, a denial-of-service attack, a malicious website, the use of social engineering and other means to affect the confidentiality, integrity and availability of our technology systems and data. Our key business partners face similar risks and any security breach of their systems could adversely affect our security posture. While we continue to build and improve our systems and infrastructure and believe we have taken appropriate security measures to reduce these risks to our data and information technology systems, there can be no assurance that our efforts will prevent breakdowns or breaches in our systems that could adversely affect our business and operations and/or result in the loss of critical or sensitive information, which could result in financial, legal, business or reputational harm to us. In addition, our liability insurance may not be sufficient in type or amount to cover us against claims related to security breaches, cyber-attacks and other related breaches.

We depend on relationships with collaborators and other third parties for revenues, and for the development, regulatory approval, commercialization and marketing of certain of our products and product candidates, which are outside of our full control.

We rely on a number of significant collaborative and other third-party relationships for revenues, and for the development, regulatory approval, commercialization and marketing of certain of our products and product candidates. We also outsource to third parties certain aspects of our regulatory affairs and clinical development relating to our products and product candidates. Reliance on collaborative and other third-party relationships subjects us to a number of risks, including:

- we may be unable to control the resources our collaborators or third parties devote to our programs or products;

- disputes may arise under the agreement, including with respect to the achievement and payment of milestones or ownership of rights to technology developed with our collaborators or other third parties, and the underlying contract with our collaborators or other third parties may fail to provide significant protection or may fail to be effectively enforced if the collaborators or third parties fail to perform;

- the interests of our collaborators or third parties may not always be aligned with our interests, and such parties may not pursue regulatory approvals or market a product in the same manner or to the same extent that we would, which could adversely affect our revenues;
- third-party relationships and collaborations often require the parties to cooperate, and failure to do so effectively could adversely affect product sales, or the clinical development or regulatory approvals of products under joint control or could result in termination of the research, development or commercialization of product candidates or result in litigation or arbitration; and
- any failure on the part of our collaborators or other third parties to comply with applicable laws and regulatory requirements in the marketing, sale and maintenance of the marketing authorization of our products or to fulfill any responsibilities our collaborators or other third parties may have to protect and enforce any intellectual property rights underlying our products could have an adverse effect on our revenues as well as involve us in possible legal proceedings.

Given these risks, there is considerable uncertainty regarding the success of our current and future collaborative efforts. If these efforts fail, our product development or commercialization of new products could be delayed or revenues from products could decline.

Our business may be adversely affected if we do not successfully execute our growth initiatives.

We anticipate growth through internal development projects, commercial initiatives and external opportunities, which may include the acquisition, partnering and in-licensing of products, technologies and companies or the entry into strategic alliances and collaborations. While we believe we have a number of promising programs in our pipeline, failure of internal development projects to advance or difficulties in executing on our commercial initiatives could impact our current and future growth, resulting in additional reliance on external development opportunities for growth. The availability of high quality, cost-effective development opportunities is limited and competitive, and we are not certain that we will be able to identify candidates that we and our shareholders consider suitable or complete transactions on terms that are acceptable to us and our shareholders. We may fail to complete transactions for other reasons, including if we are unable to obtain desired financing on favorable terms, if at all. Even if we are able to successfully identify and complete acquisitions and other strategic alliances and collaborations, we may face unanticipated costs or liabilities in connection with the transaction or we may not be able to integrate them or take full advantage of them or otherwise realize the benefits that we expect.

Supporting our growth initiatives and the further development of our existing products and potential new products in our pipeline will require significant capital expenditures and management resources, including investments in research and development, sales and marketing, manufacturing capabilities and other areas of our business. If we do not successfully execute our growth initiatives, then our business and financial results may be adversely affected and we may incur asset impairment or restructuring charges.

Management and key personnel changes may disrupt our operations, and we may have difficulty retaining key personnel or attracting and retaining qualified replacements on a timely basis for management and other key personnel who may leave the Company.

We have experienced changes in management and other key personnel in critical functions across our organization, including our chief executive officer and our chief financial officer. Changes in management and other key personnel have the potential to disrupt our business, and any such disruption could adversely affect our operations, programs, growth, financial condition and results of operations. Further, new members of management may have different perspectives on programs and opportunities for our business, which may cause us to focus on new business opportunities or reduce or change emphasis on our existing business programs.

Our success is dependent upon our ability to attract and retain qualified management and key personnel in a highly competitive environment. Qualified individuals are in high demand, and we may incur significant costs to attract them, particularly at the executive level. We may face difficulty in attracting and retaining key talent for a number of reasons, such as management changes, the underperformance or discontinuation of one or more late stage programs or recruitment by competitors. We cannot assure you that we will be able to hire or retain the personnel necessary for our operations or that the loss of any such personnel will not have a material impact on our financial condition and results of operations.

We are pursuing opportunities to expand our manufacturing capacity for future clinical and commercial requirements for product candidates, which will result in the incurrence of significant investment with no assurance that such investment will be recouped.

While we believe we currently have sufficient large scale manufacturing capacity to meet our near-term manufacturing requirements, it is probable that we would need additional large scale manufacturing capacity to support future clinical and commercial manufacturing requirements for product candidates in our pipeline, if such candidates are successful and approved. We are building a large-scale biologics manufacturing facility in Solothurn, Switzerland. Due to the long lead times necessary for the expansion of manufacturing capacity, we expect to make significant investments to build or obtain third-party contract manufacturers with no assurance that such investment will be recouped. If we are unable to adequately and timely manufacture and supply our products and product candidates or if we do not fully utilize our manufacturing facilities, our business may be harmed.

If we fail to comply with the extensive legal and regulatory requirements affecting the health care industry, we could face increased costs, penalties and a loss of business.

Our activities, and the activities of our collaborators, distributors and other third-party providers, are subject to extensive government regulation and oversight both in the U.S. and in foreign jurisdictions. The FDA and comparable agencies in other jurisdictions directly regulate many of our most critical business activities, including the conduct of preclinical and clinical studies, product manufacturing, advertising and promotion, product distribution, adverse event reporting and product risk management. Our interactions in the U.S. or abroad with physicians and other health care providers that prescribe or purchase our products are also subject to government regulation designed to prevent fraud and abuse in the sale and use of the products and place significant restrictions on the marketing practices of health care companies. Health care companies such as ours are facing heightened scrutiny of their relationships with health care providers from anti-corruption enforcement officials. In addition, health care companies such as ours have been the target of lawsuits and investigations alleging violations of government regulation, including claims asserting submission of incorrect pricing information, impermissible off-label promotion of pharmaceutical products, payments intended to influence the referral of health care business, submission of false claims for government reimbursement, antitrust violations or violations related to environmental matters. There is also enhanced scrutiny of company-sponsored patient assistance programs, including insurance premium and co-pay assistance programs and donations to third party charities that provide such assistance. If we, or our vendors or donation recipients, are deemed to fail to comply with relevant laws, regulations or government guidance in the operation of these programs, we could be subject to significant fines or penalties. Risks relating to compliance with laws and regulations may be heightened as we continue to expand our global operations and enter new therapeutic areas with different patient populations, which may have different product distribution methods, marketing programs or patient assistance programs from those we currently utilize or support.

Regulations governing the health care industry are subject to change, with possibly retroactive effect, including:

- new laws, regulations or judicial decisions, or new interpretations of existing laws, regulations or judicial decisions, related to health care availability, pricing or marketing practices, compliance with wage and hour laws and other employment practices, method of delivery, payment for health care products and services, compliance with health information and data privacy and security laws and regulations, tracking and reporting payments and other transfers of value made to physicians and teaching hospitals, extensive anti-bribery and anti-corruption prohibitions, product serialization and labeling requirements and used product take-back requirements;
- changes in the FDA and foreign regulatory approval processes that may delay or prevent the approval of new products and result in lost market opportunity;
- the hiring freeze implemented by the federal government in 2017, including at the FDA, could impact the review and potential approval of new products, which may adversely affect our business and financial condition;
- requirements that provide for increased transparency of clinical trial results and quality data, such as the EMA's clinical transparency policy, which could impact our ability to protect trade secrets and competitively-sensitive information contained in approval applications or could be misinterpreted leading to reputational damage, misperception or legal action which could harm our business; and
- changes in FDA and foreign regulations that may require additional safety monitoring, labeling changes, restrictions on product distribution or use, or other measures after the introduction of our products to market, which could increase our costs of doing business, adversely affect the future permitted uses of approved products or otherwise adversely affect the market for our products.

Violations of governmental regulation may be punishable by criminal and civil sanctions against us, including fines and civil monetary penalties and exclusion from participation in government programs, including Medicare and Medicaid, as well as against executives overseeing our business. In addition to penalties for violation of laws and regulations, we could be required to repay amounts we received from government payors, or pay additional rebates and interest if we are found to have miscalculated the pricing information we have submitted to the government. We cannot ensure you that our compliance controls, policies and procedures will in every instance protect us from acts committed by our employees, collaborators, partners or third-party providers that would violate the laws or regulations of the jurisdictions in which we operate. Whether or not we have complied with the law, an investigation into alleged unlawful conduct could increase our expenses, damage our reputation, divert management time and attention and/or adversely affect our business.

Our effective tax rate fluctuates, and we may incur obligations in tax jurisdictions in excess of accrued amounts.

As a global biopharmaceutical company, we are subject to taxation in numerous countries, states and other jurisdictions. As a result, our effective tax rate is derived from a combination of applicable tax rates in the various places that we operate. In preparing our financial statements, we estimate the amount of tax that will become payable in each of such places. Our effective tax rate, however, may be different than experienced in the past due to numerous factors, including changes in the mix of our profitability from country to country, the results of examinations and audits of our tax filings, adjustments to the value of our uncertain tax positions, changes in accounting for income taxes and changes in tax laws, including the 2017 Tax Act. Any of these factors could cause us to experience an effective tax rate significantly different from previous periods or our current expectations.

In addition, our inability to secure or sustain acceptable arrangements with tax authorities and future changes in the tax laws, among other things, may result in tax obligations in excess of amounts accrued in our financial statements.

The 2017 Tax Act has resulted in significant changes to the U.S. corporate income tax system. These changes include a federal statutory rate reduction from 35% to 21%, the elimination or reduction of certain domestic deductions and credits and limitations on the deductibility of interest expense and executive compensation. The 2017 Tax Act also transitions international taxation from a worldwide system to a modified territorial system and includes base erosion prevention measures on non-U.S. earnings, which has the effect of subjecting certain earnings of our foreign subsidiaries to U.S. taxation as GILTI. These changes are effective beginning in 2018.

The 2017 Tax Act also includes the Transition Toll Tax, which is a one-time mandatory deemed repatriation tax on accumulated foreign subsidiaries' previously untaxed foreign earnings. The Transition Toll Tax will be paid over an eight-year period, starting in 2018, and will not accrue interest.

Our preliminary estimate of the Transition Toll Tax and the remeasurement of our deferred tax assets and liabilities is subject to the finalization of management's analysis related to certain matters, such as developing interpretations of the provisions of the 2017 Tax Act, changes to certain estimates and amounts related to the earnings and profits of certain subsidiaries and the filing of our tax returns. U.S. Treasury regulations, administrative interpretations or court decisions interpreting the 2017 Tax Act may require further adjustments and changes in our estimates, which could have a material adverse effect on our business, results of operations or financial conditions. The final determination of the Transition Toll Tax and the remeasurement of our deferred tax assets and liabilities will be completed as additional information becomes available, but no later than one year from the enactment of the 2017 Tax Act.

In addition, the adoption of some or all of the recommendations set forth in the Organization for Economic Co-operation and Development’s project on “Base Erosion and Profit Shifting” (BEPS) by tax authorities in the countries in which we operate, could negatively impact our effective tax rate. These recommendations focus on payments from affiliates in high tax jurisdictions to affiliates in lower tax jurisdictions and the activities that give rise to a taxable presence in a particular country.

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

We are increasing our presence in international markets, particularly 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 and net income;

- 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 Bribery Act, and elsewhere and escalation of investigations and prosecutions pursuant to such laws;
- the effects of the implementation of the U.K.'s decision to voluntarily depart from the E.U., known as Brexit;
- compliance with complex import and export control laws;
- restrictions on direct investments by foreign entities and trade restrictions;
- greater political or economic instability; and
- changes in tax laws and tariffs.

In addition, our international operations are subject to regulation under U.S. law. For example, the 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.

Our operating results are subject to significant fluctuations.

Our quarterly revenues, expenses and net income (loss) have fluctuated in the past and are likely to fluctuate significantly in the future due to the risks described in these *"Risk Factors"* as well as the timing of charges and expenses that we may take. We have recorded, or may be required to record, charges that include:

- the cost of restructurings or other initiatives to streamline our operations and reallocate resources;
- impairments with respect to investments, fixed assets and long-lived assets, including in-process R&D and other intangible assets;
- inventory write-downs for failed quality specifications, charges for excess or obsolete inventory and charges for inventory write downs relating to product suspensions, expirations or recalls;
- changes in the fair value of contingent consideration;
- bad debt expenses and increased bad debt reserves;
- outcomes of litigation and other legal or administrative proceedings, regulatory matters and tax matters;
- milestone payments under license and collaboration agreements; and
- payments in connection with acquisitions and other business development activities.

Our revenues are also subject to foreign currency exchange rate fluctuations due to the global nature of our operations. Although we have foreign currency forward contracts to hedge specific forecasted transactions denominated in foreign currencies, our efforts to mitigate the impact of fluctuating currency exchange rates may not be successful. As a result, currency fluctuations among our reporting currency, the U.S. dollar, and the other currencies in which we do business will affect our operating results, often in unpredictable ways. Our net income may also fluctuate due to the impact of charges we may be required to take with respect to foreign currency hedge transactions. In particular, we may incur higher than expected charges from hedge ineffectiveness or from the termination of a hedge relationship.

Our operating results during any one period do not necessarily suggest the anticipated results of future periods.

Our investment in Samsung Bioepis, and our success in commercializing biosimilars developed by Samsung Bioepis, is subject to risks and uncertainties inherent in the development, manufacture and commercialization of biosimilars.

Our investment in Samsung Bioepis, and our success in commercializing biosimilars developed by Samsung Bioepis, is subject to a number of risks, including:

- *Reliance on Third Parties.* We are dependent on the efforts of Samsung Bioepis and other third parties over whom we have limited or no control in the development and manufacturing of biosimilars products. If Samsung Bioepis or such other third parties fail to perform successfully, we may not realize the anticipated benefits of our investment in Samsung Bioepis;
- *Regulatory Compliance.* Biosimilar products may face regulatory hurdles or delays due to the evolving and uncertain regulatory and commercial pathway of biosimilars products in certain jurisdictions;
- *Intellectual Property and Regulatory Challenges.* Biosimilar products may face extensive patent clearances, patent infringement litigation, injunctions or regulatory challenges, which could prevent the commercial launch of a product or delay it for many years;
- *Failure to Gain Market and Patient Acceptance.* Market success of biosimilar products will be adversely affected if patients, physicians and/or payors do not accept biosimilar products as safe and efficacious products offering a more competitive price or other benefit over existing therapies;
- *Ability to Provide Adequate Supply.* Manufacturing biosimilars is complex. If we encounter any manufacturing or supply chain difficulties, we may be unable to meet higher than anticipated demand; and
- *Competitive Challenges.* Biosimilar products face significant competition, including from innovator products and from biosimilar products offered by other companies. In some jurisdictions, local tendering processes may restrict biosimilar products from being marketed and sold in those jurisdictions. The number of competitors in a jurisdiction, the timing of approval and the ability to market biosimilar products successfully in a timely and cost-effective matter are additional factors that may impact our success and/or the success of Samsung Bioepis in this business area.

Our investments in properties may not be fully realized.

We own or lease real estate primarily consisting of buildings that contain research laboratories, office space and manufacturing operations. For strategic or other operational reasons, we may decide to consolidate or co-locate certain aspects of our business operations or dispose of one or more of our properties, some of which may be located in markets that are experiencing high vacancy rates and decreasing property values. If we determine that the fair value of any of our owned properties is lower than their book value we may not realize the full investment in these properties and incur significant impairment charges or additional depreciation when the expected useful lives of certain assets have been shortened due to the anticipated closing of facilities. If we decide to fully or partially vacate a leased property, we may incur significant cost, including facility closing costs, employee separation and retention expenses, lease termination fees, rent expense in excess of sublease income and impairment of leasehold improvements and accelerated depreciation of assets. Any of these events may have an adverse impact on our results of operations.

Our portfolio of marketable securities is subject to market, interest and credit risk that may reduce its value.

We maintain a portfolio of marketable securities for investment of our cash. Changes in the value of our portfolio of marketable securities could adversely affect our earnings. In particular, the value of our investments may decline due to increases in interest rates, downgrades of the bonds and other securities included in our portfolio, instability in the global financial markets that reduces the liquidity of securities included in our portfolio, declines in the value of collateral underlying the securities included in our portfolio and other factors. Each of these events may cause us to record charges to reduce the carrying value of our investment portfolio or sell investments for less than our acquisition cost. Although we attempt to mitigate these risks through diversification of our investments and continuous monitoring of our portfolio's overall risk profile, the value of our investments may nevertheless decline.

There can be no assurance that we will continue to repurchase stock or that we will repurchase stock at favorable prices.

From time to time our Board of Directors authorizes stock repurchase programs, including most recently a program to repurchase up to $5.0 billion of our common stock, which was authorized by our Board of Directors in July 2016 (2016 Share Repurchase Program). The amount and timing of stock repurchases are subject to capital availability and our determination that stock repurchases are in the best interest of our shareholders and are in compliance with all respective laws and our agreements applicable to the repurchase of stock. Our ability to repurchase stock will depend upon, among other factors, our cash balances and potential future capital requirements for strategic transactions, our results of operations, our financial condition and other factors beyond our control that we may deem relevant. A reduction in, or the completion or expiration of, our stock repurchase programs could have a negative effect on our stock price. We can provide no assurance that we will repurchase stock at favorable prices, if at all.

We may not be able to access the capital and credit markets on terms that are favorable to us.

We may seek access to the capital and credit markets to supplement our existing funds and cash generated from operations for working capital, capital expenditure and debt service requirements and other business initiatives. The capital and credit markets have experienced extreme volatility and disruption in the past, which leads to uncertainty and liquidity issues for both borrowers and investors. In the event of adverse capital and credit market conditions, we may be unable to obtain capital or credit market financing on favorable terms. Changes in credit ratings issued by nationally recognized credit rating agencies could also adversely affect our cost of financing and the market price of our securities.

Our indebtedness could adversely affect our business and limit our ability to plan for or respond to changes in our business.

Our indebtedness, together with our significant contingent liabilities, including milestone and royalty payment obligations, could have important consequences to our business; for example, such obligations could:

- increase our vulnerability to general adverse economic and industry conditions;
- limit our ability to access capital markets and incur additional debt in the future;
- require us to dedicate a substantial portion of our cash flow from operations to payments on our indebtedness, thereby reducing the availability of our cash flow for other purposes, including business development efforts, research and development and mergers and acquisitions; and
- limit our flexibility in planning for, or reacting to, changes in our business and the industry in which we operate, thereby placing us at a competitive disadvantage compared to our competitors that have less debt.

Our business involves environmental risks, which include the cost of compliance and the risk of contamination or injury.

Our business and the business of several of our strategic partners involve the controlled use of hazardous materials, chemicals, biologics and radioactive compounds. Although we believe that our safety procedures for handling and disposing of such materials comply with state, federal and foreign standards, there will always be the risk of accidental contamination or injury. If we were to become liable for an accident, or if we were to suffer an extended facility shutdown, we could incur significant costs, damages and penalties that could harm our business. Manufacturing of our products and product candidates also requires permits from government agencies for water supply and wastewater discharge. If we do not obtain appropriate permits, including permits for sufficient quantities of water and wastewater, we could incur significant costs and limits on our manufacturing volumes that could harm our business.

The illegal distribution and sale by third parties of counterfeit versions of our products or stolen products could have a negative impact on our reputation and business.

Third parties might illegally distribute and sell counterfeit or unfit versions of our products, which do not meet our rigorous manufacturing, distribution and testing standards. A patient who receives a counterfeit or unfit drug may be at risk for a number of dangerous health consequences. Our reputation and business could suffer harm as a result of counterfeit or unfit drugs sold under our brand name. Stolen inventory that is not properly stored or sold through unauthorized channels could adversely impact patient safety, our reputation and our business. In addition, inventory that is stolen from warehouses, plants or while in-transit, and that is subsequently improperly stored and sold through unauthorized channels, could adversely impact patient safety, our reputation and our business.

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

Social media is increasingly being used to communicate about our products and the diseases our therapies 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 products. 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.

Some of our collaboration agreements contain change in control provisions that may discourage a third party from attempting to acquire us.

Some of our collaboration agreements include change in control provisions that could reduce the potential acquisition price an acquirer is willing to pay or discourage a takeover attempt that could be viewed as beneficial to shareholders. Upon a change in control, some of these provisions could trigger reduced milestone, profit or royalty payments to us or give our collaboration partner rights to terminate our collaboration agreement, acquire operational control or force the purchase or sale of the programs that are the subject of the collaboration.

We may incur operational difficulties or be exposed to claims and liabilities as a result of the spin-off of our hemophilia business.

On February 1, 2017, we distributed all of the then outstanding shares of Bioverativ common stock to Biogen shareholders in connection with the spin-off of our hemophilia business. In connection with the distribution, we entered into a separation and distribution agreement and various other agreements (including a transition services agreement, a tax matters agreement, a manufacturing and supply agreement, an employee matters agreement, an intellectual property matters agreement and certain other commercial agreements). These agreements govern the separation and distribution and the relationship between us and Bioverativ going forward, including with respect to potential tax-related losses associated with the separation and distribution. They also provide for the performance of services by each company for the benefit of the other for a period of time (including under the manufacturing and supply agreement pursuant to which we will manufacture and supply certain products and materials to Bioverativ).

The spin-off of our hemophilia business as an independent public company is intended to qualify for tax-free treatment to Biogen and its shareholders under the Internal Revenue Code. Completion of the spin-off was conditioned upon, among other things, our receipt of a favorable opinion from our tax advisors with respect to the tax-free nature of the transaction. The opinion is not binding on the U.S. Internal Revenue Service (IRS) or the courts, and there can be no assurance that the IRS or the courts will not challenge the qualification of the spin-off as a tax-free transaction or that any such challenge would not prevail. If the spin-off is determined to be taxable, the full financial benefits expected to result from the separation may not be achieved and/or Biogen and its shareholders could incur significant tax liabilities, which could adversely affect our business, financial condition or results of operations and the value of our stock could be adversely impacted.

Bioverativ has agreed to indemnify us for certain potential liabilities that may arise, but we cannot guarantee that Bioverativ will be able to satisfy its indemnification obligations. The separation and distribution agreement provides for indemnification obligations designed to make Bioverativ financially responsible for many liabilities that may exist relating to its business activities, whether incurred prior to or after the distribution, including any pending or future litigation. It is possible that a court would disregard the allocation agreed to between us and Bioverativ and

require us to assume responsibility for obligations allocated to Bioverativ. Third parties could also seek to hold us responsible for any of these liabilities or obligations, and the indemnity rights we have under the separation and distribution agreement may not be sufficient to fully cover all of these liabilities and obligations. Even if we are successful in obtaining indemnification, we may have to bear costs temporarily. In addition, our indemnity obligations to Bioverativ may be significant. These risks could negatively affect our business, financial condition or results of operations.

The spin-off of Bioverativ continues to involve a number of risks, including, among other things, the indemnification risks described above. Certain of the agreements described above provide for the performance of services by each company for the benefit of the other for a period of time. If Bioverativ is unable to satisfy its obligations under these agreements, including its indemnification obligations, we could incur losses. These arrangements could also lead to disputes over rights to certain shared property and over the allocation of costs and revenues for products and operations. Our inability to effectively manage the separation activities and related events could adversely affect our business, financial condition or results of operations.

We may not achieve some or all of the anticipated benefits of the spin-off of our hemophilia business, which may adversely affect our business.

We may not be able to achieve the full strategic and financial benefits expected to result from the spin-off of our hemophilia business, or such benefits may not occur at all. If we fail to achieve some or all of the expected benefits of the spin-off, our business, financial condition, results of operations and the value of our stock could be adversely impacted.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Below is a summary of our owned and leased properties as of December 31, 2017.

Massachusetts

In Cambridge, MA, we own approximately 508,000 square feet of real estate space, consisting of a building that houses a research laboratory and a cogeneration plant totaling approximately 263,000 square feet and a building that contains research, development and quality laboratories totaling approximately 245,000 square feet.

In addition, we lease a total of approximately 1,157,000 square feet in Massachusetts, which is summarized as follows:

- 800,000 square feet in Cambridge, MA, which is comprised of offices for our corporate headquarters, and other administrative and development functions and laboratories, of which 242,000 square feet is subleased by multiple companies for general office space, laboratories and manufacturing facilities; and
- 357,000 square feet of office space in Weston, MA, of which 174,000 square feet has been subleased through the remaining term of our lease agreement.

Our Massachusetts lease agreements expire at various dates through the year 2028.

North Carolina

In RTP, NC, we own approximately 1,022,000 square feet of real estate space, which is summarized as follows:

- 357,000 square feet of laboratory and office space;
- 188,000 square feet related to an oral solid dose manufacturing facility;
- 175,000 square feet related to a large-scale biologics manufacturing facility;
- 105,000 square feet related to a small-scale biologics manufacturing facility;
- 84,000 square feet of warehouse space and utilities;
- 70,000 square feet related to a parenteral fill-finish facility; and

- 43,000 square feet related to a large-scale purification facility.

In addition, we own approximately 40,000 square feet of warehouse space in Durham, NC.

Denmark

We own a large-scale biologics manufacturing facility totaling approximately 228,000 square feet located in Hillerød, Denmark.

We also own approximately 306,000 square feet of additional space, which is summarized as follows:

- 139,000 square feet of warehouse, utilities and support space;
- 70,000 square feet related to a label and packaging facility;
- 50,000 square feet related to a laboratory facility; and
- 47,000 square feet of administrative space.

Switzerland

In December 2015 we purchased land in Solothurn, Switzerland and are building a large-scale biologics manufacturing facility at this site. We expect this facility to be operational by the end of the decade. Upon completion, the facility will include 393,000 square feet related to a large-scale biologics manufacturing facility, 290,000 square feet of warehouse, utilities and support space and 51,000 square feet of administrative space.

Other International

We lease office space in Zug, Switzerland, our international headquarters, the U.K., Germany, France, Denmark and numerous other countries. Our international lease agreements expire at various dates through the year 2028.

Item 3. Legal Proceedings

For a discussion of legal matters as of December 31, 2017, please read Note 21, *Litigation,* to our consolidated financial statements included in this report, which is incorporated into this item by reference.

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 and Stockholder Information

Our common stock trades on The Nasdaq Global Select Market under the symbol "BIIB." The following table shows the high and low sales price for our common stock as reported by The Nasdaq Global Select Market for each quarter in the years ended December 31, 2017 and 2016:

	Common Stock Price			
	2017		2016	
	High	Low	High	Low
First Quarter	$ 298.00	$ 254.15	$ 301.02	$ 242.07
Second Quarter	$ 291.90	$ 244.28	$ 292.69	$ 223.02
Third Quarter	$ 330.00	$ 269.50	$ 333.65	$ 240.07
Fourth Quarter	$ 348.84	$ 301.81	$ 329.83	$ 268.00

The sales prices in the first quarter of 2017 in the tables above have been adjusted for the impact of the spin-off of our hemophilia business. For additional information on the spin-off of our hemophilia business, please read Note 3, *Hemophilia Spin-Off*, to our consolidated financial statements included in this report.

As of January 26, 2018, there were approximately 665 shareholders of record of our common stock.

Dividends

We have not paid cash dividends since our inception. While we historically have not paid cash dividends and do not have a current intention to pay cash dividends, we continually review our capital allocation strategies, including, among other things, payment of cash dividends, stock repurchases or acquisitions.

Issuer Purchases of Equity Securities

In July 2016 our Board of Directors authorized our 2016 Share Repurchase Program, which is a program to repurchase up to $5.0 billion of our common stock. This authorization does not have an expiration date. All share repurchases under this authorization will be retired.

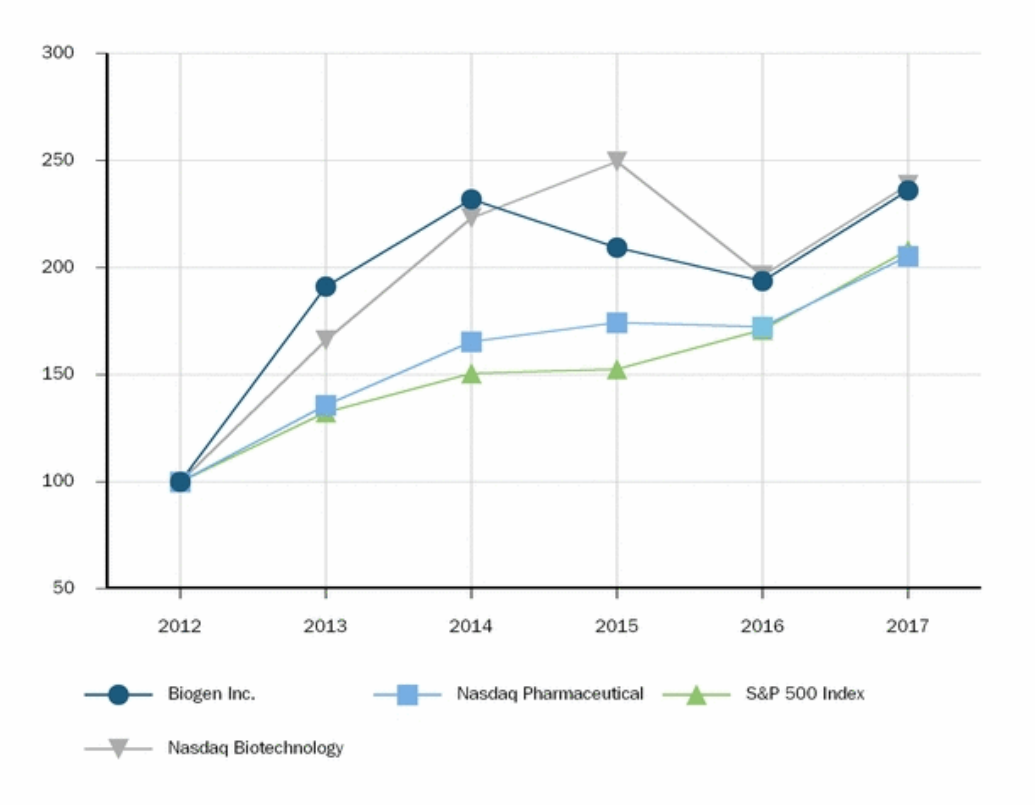
During the year ended December 31, 2017, we repurchased and retired approximately 3.7 million shares of common stock at a cost of $1.0 billion under our 2016 Share Repurchase Program. As of December 31, 2017, approximately $3.0 billion remains available for share repurchases under our 2016 Share Repurchase Program.

In February 2011 our Board of Directors authorized a program to repurchase up to 20.0 million shares of our common stock (2011 Share Repurchase Program). Shares repurchased under this authorization were principally used to offset common stock issuances under our share-based compensation programs.

During the year ended December 31, 2017, we repurchased approximately 1.2 million shares of common stock at a cost of $365.4 million under our 2011 Share Repurchase Program. Our 2011 Share Repurchase Program was completed as of March 31, 2017.

Stock Performance Graph

The graph below compares the five-year cumulative total stockholder return on our common stock, the S&P 500 Index, the Nasdaq Pharmaceutical Index and the Nasdaq Biotechnology Index assuming the investment of $100.00 on December 31, 2012 with dividends being reinvested. The stock price performance in the graph below is not necessarily indicative of future price performance. The table below reflects the stock prices as adjusted for the spin-off of our hemophilia business, which was effected on February 1, 2017. For additional information on the spin-off of our hemophilia business, please read Note 3, *Hemophilia Spin-Off*, to our consolidated financial statements included in this report.



	2012	2013	2014	2015	2016	2017
Biogen Inc.	100.00	191.00	231.91	209.30	193.74	235.96
Nasdaq Pharmaceutical	100.00	135.68	165.29	174.27	172.37	205.33
S&P 500 Index	100.00	132.39	150.51	152.59	170.84	208.14
Nasdaq Biotechnology	100.00	166.02	223.13	249.39	196.15	238.64

Item 6. Selected Financial Data

BIOGEN INC. AND SUBSIDIARIES
SELECTED FINANCIAL DATA

Our results of operations are summarized as follows:

	For the Years Ended December 31,				
(In millions, except per share amounts)	2017 (a) (b) (c) (d) (e)	2016 (c) (e)	2015 (e) (f)	2014	2013 (g)
Results of Operations (1)					
Product revenues, net (2)	$ 10,354.7	$ 9,817.9	$ 9,188.5	$ 8,203.4	$ 5,542.3
Revenues from anti-CD20 therapeutic programs	1,559.2	1,314.5	1,339.2	1,195.4	1,126.0
Other revenues	360.0	316.4	236.1	304.5	263.9
Total revenues	12,273.9	11,448.8	10,763.8	9,703.3	6,932.2
Total cost and expenses	6,929.7	6,298.4	5,872.8	5,747.7	4,441.6
Gain on sale of rights	—	—	—	16.8	24.9
Income from operations	5,344.2	5,150.4	4,891.0	3,972.4	2,515.5
Other income (expense), net	(215.4)	(217.4)	(123.7)	(25.8)	(34.9)
Income before income tax expense and equity in loss of investee, net of tax	5,128.8	4,933.0	4,767.3	3,946.6	2,480.6
Income tax expense	2,458.7	1,237.3	1,161.6	989.9	601.0
Equity in loss of investee, net of tax	—	—	12.5	15.1	17.2
Net income	2,670.1	3,695.7	3,593.2	2,941.6	1,862.3
Net income (loss) attributable to noncontrolling interests, net of tax	131.0	(7.1)	46.2	6.8	—
Net income attributable to Biogen Inc.	$ 2,539.1	$ 3,702.8	$ 3,547.0	$ 2,934.8	$ 1,862.3
Diluted Earnings Per Share					
Diluted earnings per share attributable to Biogen Inc.	$ 11.92	$ 16.93	$ 15.34	$ 12.37	$ 7.81
Weighted-average shares used in calculating diluted earnings per share attributable to Biogen Inc.	213.0	218.8	231.2	237.2	238.3

Our financial condition is summarized as follows:

	As of December 31,				
(In millions)	2017	2016	2015	2014	2013
Financial Condition (1)					
Cash, cash equivalents and marketable securities	$ 6,746.3	$ 7,724.5	$ 6,188.9	$ 3,316.0	$ 1,848.5
Total assets	$ 23,652.6	$ 22,876.8	$ 19,504.8	$ 14,314.7	$ 11,863.3
Notes payable and other financing arrangements, less current portion (3)	$ 5,935.0	$ 6,512.7	$ 6,521.5	$ 580.3	$ 592.4
Total Biogen Inc. shareholders' equity (4)	$ 12,612.8	$ 12,140.1	$ 9,372.8	$ 10,809.0	$ 8,620.2

In addition to the following notes, the financial data included within the tables above should be read in conjunction with our consolidated financial statements and related notes and Item 7. *Management's Discussion and Analysis of Financial Condition and Results of Operations* included in this report and our previously filed Annual Reports on Form 10-K.

(1) On February 1, 2017, we completed the spin-off of our hemophilia business, Bioverativ, as an independent, publicly traded company. Our consolidated results of operations and financial position reflect the financial results of our hemophilia business for all periods through January 31, 2017. For additional information on the spin-off of our hemophilia business, please read Note 3, *Hemophilia Spin-Off*, to our consolidated financial statements included in this report.

(2) Product revenues, net reflect the impact of the following product launches:

- Commercial sales of SPINRAZA in the U.S. began in the fourth quarter of 2016 and in rest of world markets in the first quarter of 2017.
- Under our collaboration agreement with AbbVie, we began to recognize revenues on sales of ZINBRYTA to third parties in the E.U. in the third quarter of 2016.
- Under our commercial agreement with Samsung Bioepis, we began to recognize revenues on sales of BENEPALI and FLIXABI to third parties in the E.U. in the first quarter of 2016 and third quarter of 2016, respectively.
- Commercial sales of ALPROLIX commenced in the second quarter of 2014 and commercial sales of ELOCTATE and PLEGRIDY commenced in the third quarter of 2014.
- Commercial sales of TECFIDERA began in April 2013.

(3) Notes payable and other financing arrangements reflects:

- Our 2017 repayment of our 6.875% notes that were issued in 2008 with an aggregate principal amount of $550.0 million, and
- The issuance of our senior unsecured notes for an aggregate principal amount of $6.0 billion in September 2015.

(4) Total Biogen Inc. shareholders' equity reflects the repurchase of approximately 29.9 million shares of our common stock at a cost of approximately $8.7 billion between 2013 and 2017:

- During 2017 we repurchased and retired approximately 3.7 million shares of our common stock at a cost of $1.0 billion under our 2016 Share Repurchase Program.
- During 2017 we repurchased approximately 1.2 million shares of our common stock at a cost of $365.4 million under our 2011 Share Repurchase Program.
- During 2016 we repurchased and retired approximately 3.3 million shares of our common stock at a cost of $1.0 billion under our 2016 Share Repurchase Program.
- During 2015 we repurchased and retired approximately 16.8 million shares of our common stock at a cost of $5.0 billion under a program authorized by our Board of Directors in May 2015 for the repurchase of up to $5.0 billion of our common stock (2015 Share Repurchase Program).
- During 2014 and 2013 we repurchased approximately 2.9 million and 2.0 million shares, respectively, of our common stock at a cost of approximately $1.3 billion under our 2011 Share Repurchase Program.

(a) Total cost and expenses for the year ended December 31, 2017, includes a pre-tax charge to acquired in-process research and development of $120.0 million for an upfront payment made to Remedy upon closing of our asset purchase transaction for BIIB093.

(b) Net income (loss) attributable to noncontrolling interests, net of tax for the year ended December 31, 2017, includes a pre-tax charge of $150.0 million for a payment to Neurimmune in exchange for a 15% reduction in royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab.

(c) Total cost and expenses for the year ended December 31, 2016, includes a pre-tax charge of $454.8 million related to our January 2017 settlement and license agreement with Forward Pharma.

Total cost and expenses for the year ended December 31, 2017, includes $444.2 million of amortization and impairment charges related to our U.S. and rest of world licenses to Forward Pharma's intellectual property, including Forward Pharma's intellectual property related to TECFIDERA. For additional information on our

settlement and license agreement with Forward Pharma and related intangible assets, please read Note 7, *Intangible Assets and Goodwill*, to our consolidated financial statements included in this report.

(d) Income tax expense for the year ended December 31, 2017, includes $1,173.6 million related to our current estimate of the provisions of the 2017 Tax Act, including a $989.6 million expense under the Transition Toll Tax. For additional information on the 2017 Tax Act, please read Note 17, *Income Taxes*, to our consolidated financial statements included in this report.

(e) Total cost and expenses for the years ended December 31, 2017, 2016 and 2015, include restructuring charges of $0.9 million, $33.1 million and $93.4 million, respectively. In addition, total cost and expenses for the year ended December 31, 2016, also include charges to cost of sales totaling $52.4 million of expenses incurred as a result of our determination to cease manufacturing and vacate our small-scale biologics facility in Cambridge, MA as well as close and vacate our warehouse in Somerville, MA. Total cost and expenses for the years ended December 31, 2017 and 2016, also includes $19.2 million and $18.1 million, respectively, of costs incurred directly related to the spin-off of our hemophilia business into an independent, publicly traded company.

(f) Net income attributable to Biogen Inc. for the year ended December 31, 2015, includes a pre-tax charge to noncontrolling interest of $60.0 million for a milestone payment due to Neurimmune upon the enrollment of the first patient in a Phase 3 trial for aducanumab.

(g) Commencing in the second quarter of 2013 product and total revenues include 100% of net revenues related to sales of TYSABRI as a result of our acquisition of all remaining rights to TYSABRI from Elan Pharma International, Ltd (Elan), an affiliate of Elan Corporation, plc. Upon closing of this transaction, our collaboration agreement was terminated.

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

The following discussion should be read in conjunction with our consolidated financial statements and related notes beginning on page F-1 of this report. Certain totals may not sum due to rounding.

Executive Summary

Introduction

Biogen is a global biopharmaceutical company focused on discovering, developing and delivering worldwide innovative therapies for people living with serious neurological and neurodegenerative diseases, including in our core growth areas of MS and neuroimmunology, AD and dementia, movement disorders and neuromuscular disorders, including SMA and ALS. We also plan to invest in emerging growth areas such as pain, ophthalmology, neuropsychiatry and acute neurology. In addition, we are employing innovative technologies to discover potential treatments for rare and genetic disorders, including new ways of treating diseases through gene therapy in the previously mentioned areas. We also manufacture and commercialize biosimilars of advanced biologics.

Our marketed products include TECFIDERA, AVONEX, PLEGRIDY, TYSABRI, ZINBRYTA and FAMPYRA for the treatment of MS, SPINRAZA for the treatment of SMA and FUMADERM for the treatment of severe plaque psoriasis. We also have certain business and financial rights with respect to RITUXAN for the treatment of non-Hodgkin's lymphoma, CLL and other conditions, GAZYVA for the treatment of CLL and follicular lymphoma, OCREVUS for the treatment of PPMS and RMS, and other potential anti-CD20 therapies under a collaboration agreement with Genentech.

Our current revenues depend upon continued sales of our principal products and, unless we develop, acquire rights to and/or commercialize new products and technologies, we may be substantially dependent on sales from our principal products for many years.

In the longer term, our revenue growth will be dependent upon the successful clinical development, regulatory approval and launch of new commercial products as well as additional indications for our existing products, our ability to obtain and maintain patents and other rights related to our marketed products, assets originating from our research and development efforts and/or successful execution of external business development opportunities.

Our innovative drug development and commercialization activities are complemented by our biosimilar therapies, which expand access to medicines and reduce the cost burden for healthcare systems. We are leveraging our manufacturing capabilities and know-how to develop, manufacture and market biosimilars through Samsung Bioepis, our joint venture with Samsung Biologics. Under our commercial agreement, we market and sell BENEPALI, an etanercept biosimilar referencing ENBREL, and FLIXABI, an infliximab biosimilar referencing REMICADE, in the E.U.

2017 Corporate Strategy

In July 2017 we announced an updated strategic framework to optimize the value of our MS business while investing for the future across our core growth areas of MS and neuroimmunology, AD and dementia, movement disorders, and neuromuscular diseases, including SMA and ALS. We also plan to invest in emerging growth areas such as pain, ophthalmology, neuropsychiatry, and acute neurology.

We expect the continued performance of our commercial assets and the expiration of the contingent payments related to TECFIDERA, discussed further in the *"Contractual Obligations and Off-Balance Sheet Arrangements"* section of this report, to enable us to invest in and build an industry leading neuroscience pipeline. We view investment in growth as our top priority, but also recognize the value of opportunistically returning excess capital to shareholders through share repurchases.

In order to deliver positive results in the near term while investing in the next stages of our growth, we will focus on the following strategic priorities:

- maximizing the resilience of our MS core business;
- accelerating efforts in SMA as a significant new growth opportunity;
- developing and expanding our neuroscience portfolio;
- focusing our capital allocation efforts to drive investment for future growth; and
- creating a leaner and simpler operating model to streamline our operations and reallocate resources towards prioritized research and development and commercial value creation opportunities.

In October 2017, in connection with creating a leaner and simpler operating model, we approved a corporate restructuring program intended to streamline our operations and reallocate resources. We expect to make total non-recurring operating and

capital expenditures of up to $170.0 million, primarily in 2018, and our goal is to redirect resources of up to $400.0 million annually by 2020 to prioritized research and development and other value creation opportunities.

Tax Reform

The 2017 Tax Act has resulted in significant changes to the U.S. corporate income tax system. These changes include a federal statutory rate reduction from 35% to 21%, the elimination or reduction of certain domestic deductions and credits and limitations on the deductibility of interest expense and executive compensation. The 2017 Tax Act also transitions international taxation from a worldwide system to a modified territorial system and includes base erosion prevention measures on non-U.S. earnings, which has the effect of subjecting certain earnings of our foreign subsidiaries to U.S. taxation as GILTI. These changes are effective beginning in 2018.

The 2017 Tax Act also includes the Transition Toll Tax, which is a one-time mandatory deemed repatriation tax on accumulated foreign subsidiaries' previously untaxed foreign earnings.

Changes in tax rates and tax laws are accounted for in the period of enactment. Therefore, during the year ended December 31, 2017, we recorded a charge totaling $1,173.6 million related to our current estimate of the provisions of the 2017 Tax Act, including a $989.6 million expense under the Transition Toll Tax. The Transition Toll Tax will be paid over an eight-year period, starting in 2018, and will not accrue interest.

The 2017 Tax Act will provide us with flexibility in deploying our cash resources to advance our business interests. We expect that it will have a modest positive effect on our income tax rate in 2018 and a potential incremental benefit thereafter.

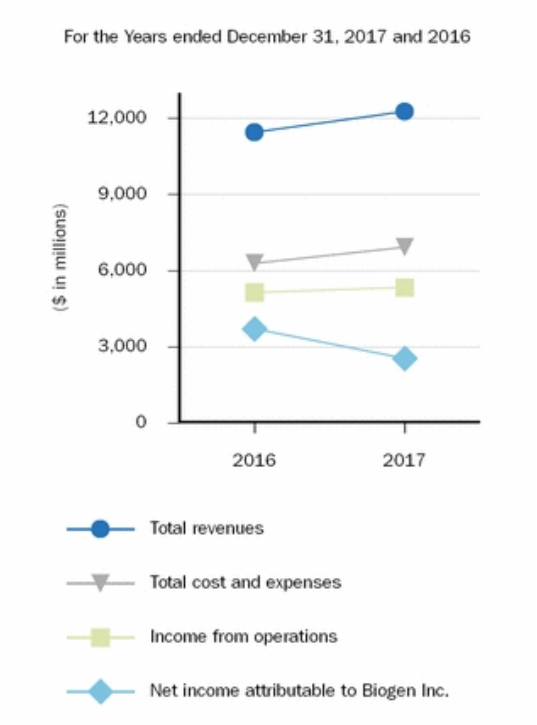
Hemophilia Spin-Off

On February 1, 2017, we completed the spin-off of our hemophilia business, Bioverativ, as an independent, publicly traded company trading under the symbol "BIVV" on the Nasdaq Global Select Market. The spin-off was accomplished through the distribution of all the then outstanding shares of common stock of Bioverativ to Biogen shareholders, who received one share of Bioverativ common stock for every two shares of Biogen common stock they owned. The separation and distribution was structured to be tax-free for shareholders for federal income tax purposes. Bioverativ assumed all of our rights and obligations under our collaboration agreement with Sobi and our collaboration and license agreement with Sangamo.

Our consolidated results of operations and financial position included in this report reflect the financial results of our hemophilia business for all periods through January 31, 2017.

For additional information on the spin-off of our hemophilia business, please read Note 3, *Hemophilia Spin-Off,* to our consolidated financial statements included in this report.

Financial Highlights



Diluted earnings per share attributable to Biogen Inc. were $11.92 for 2017, representing a decrease of 29.6% versus the same period in 2016.

As described below under *"Results of Operations,"* our income from operations for the year ended December 31, 2017 reflects the following:

- Total revenues were $12,273.9 million for 2017, representing an increase of 7.2% over the same period in 2016.
- Product revenues, net totaled $10,354.7 million for 2017, representing an increase of 5.5% over the same period in 2016. This increase was primarily driven by revenues from SPINRAZA, TECFIDERA and BENEPALI, partially offset by the elimination of worldwide ALPROLIX and ELOCTATE revenues resulting from the spin-off of our hemophilia business on February 1, 2017 and a net decrease in total Interferon sales.

- Revenues from anti-CD20 therapeutic programs totaled $1,559.2 million for 2017, representing an increase of 18.6% over the same period in 2016. This increase was primarily driven by royalty revenues on sales of OCREVUS and Biogen's share of pre-tax profits on RITUXAN.
- Other revenues totaled $360.0 million for 2017, representing an increase of 13.8% from the same period in 2016. This increase was primarily driven by an increase in other royalty and corporate revenues.
- Total cost and expenses totaled $6,929.7 million for 2017, representing an increase of 10.0%, compared to the same period in 2016. This increase was primarily driven by $444.2 million of amortization and impairment charges related to our U.S. and rest of world licenses to Forward Pharma's intellectual property, including Forward Pharma's intellectual property related to TECFIDERA, a 14.2% increase in research and development primarily related to higher milestone and upfront expenses, a 10.2% increase in cost of goods sold, a $120.0 million pre-tax charge to acquired in-process research and development for an upfront payment made to Remedy upon the closing of the asset purchase transaction for BIIB093 and an increase in collaboration profit sharing. These increases were partially offset by a $454.8 million litigation settlement charge in the prior year.

As described below under *"Financial Condition, Liquidity and Capital Resources"*:

- We generated $4,551.0 million of net cash flows from operations for 2017, which were primarily driven by earnings.
- Cash, cash equivalents and marketable securities totaled approximately $6,746.3 million as of December 31, 2017.
- We repurchased approximately 4.9 million shares of common stock at a cost of $1.4 billion during 2017 under our share repurchase programs.

Acquisitions

BIIB093 Acquisition

In May 2017 we completed an asset purchase of the Phase 3-ready candidate BIIB093 (intravenous glibencamide) (formerly known as CIRARA) from Remedy. The target indication for BIIB093 is LHI, a severe form of ischemic stroke where cerebral edema often leads to a disproportionately large share of stroke-related morbidity and mortality. The FDA recently granted BIIB093 Orphan Drug Designation for severe cerebral edema in patients with acute ischemic stroke. The FDA has also granted BIIB093 Fast Track designation.

Under this agreement, we are responsible for the future development and commercialization of BIIB093. Remedy will share in the cost of development for the target indication for BIIB093 in LHI stroke.

For additional information on our transaction with Remedy, please read Note 2, *Acquisitions*, to our consolidated financial statements included in this report.

Collaborative and Other Relationships

BIIB092 License Agreement

In June 2017 we completed an exclusive license agreement with BMS for BIIB092 (formerly known as BMS-986168), a Phase 2-ready experimental medicine with potential in AD and PSP. BIIB092 is an antibody targeting tau, the protein that forms the deposits, or tangles, in the brain associated with AD and other neurodegenerative tauopathies such as PSP.

Under this agreement, we received worldwide rights to BIIB092 and are responsible for the full development and global commercialization of BIIB092 in AD and PSP.

For additional information on our collaboration arrangement with BMS, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Eisai Collaboration Agreement

In October 2017 we entered into a new collaboration agreement with Eisai for the joint development and commercialization of aducanumab (the Aducanumab Collaboration Agreement). Under the Aducanumab Collaboration Agreement, we will continue to lead the ongoing Phase 3 development of aducanumab and will remain responsible for 100% of development costs for aducanumab until April 2018. Eisai will then reimburse us for 15% of aducanumab development expenses for the period April 2018 through December 2018, and 45% thereafter. Upon commercialization, both companies will co-promote aducanumab with a region-based profit split.

In addition, we and Eisai will continue to jointly develop BAN2401 and E2609.

We and Eisai will co-promote AVONEX, TYSABRI and TECFIDERA in Japan in certain settings and Eisai will distribute AVONEX, TYSABRI, TECFIDERA and PLEGRIDY in India and other Asia-Pacific markets, excluding China.

For additional information on our collaboration arrangement with Eisai, please read Note 20, *Collaborative and Other Relationships*, to our consolidated financial statements included in this report.

Neurimmune Collaboration Agreement

In October 2017 we amended the terms of our collaboration and license agreement with Neurimmune. Under the amended agreement, we made a $150.0 million payment to Neurimmune, which is reflected as a charge to noncontrolling interests, in exchange for a 15% reduction in royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab. Our royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab, will now range from the high single digits to low-teens.

Under the amended agreement, we also have an option that will expire in April 2018 to further reduce our royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab, by an additional 5% in exchange for a $50.0 million payment to Neurimmune.

For additional information on our collaboration arrangement with Neurimmune, please read Note 19, *Investments in Variable Interest Entities*, to our consolidated financial statements included in this report.

BIIB098 License Agreement

In November 2017 we entered into an exclusive license and collaboration agreement with Alkermes for BIIB098 (formerly known as ALKS 8700), an oral MMF prodrug in Phase 3 development for the treatment of relapsing forms of MS.

Under this agreement, we received an exclusive, worldwide license to develop and commercialize BIIB098 and will pay Alkermes a royalty on potential worldwide net sales of BIIB098. Beginning in 2018 we are responsible for all development expenses related to BIIB098. Alkermes will maintain responsibility for regulatory interactions with the FDA through the potential approval of the NDA for BIIB098 for the treatment of MS.

For additional information on our collaboration arrangement with Alkermes, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Ionis Collaboration Agreement

In December 2017 we entered into a new collaboration agreement with Ionis to identify new ASO drug candidates for the treatment of SMA. Under this agreement, we have the option to license therapies arising out of this collaboration and will be responsible for the development and commercialization of these therapies.

For additional information on our new collaboration arrangement with Ionis, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Business Environment

The biopharmaceutical industry and the markets in which we operate are intensely competitive. Many of our competitors are working to develop or have commercialized products similar to those we market or are developing and have considerable experience in undertaking clinical trials and in obtaining regulatory approval to market pharmaceutical products. In addition, the commercialization of certain of our own approved MS products, products of our collaborators and pipeline product candidates may negatively impact future sales of our existing MS products. Our products may also face increased competitive pressures from the introduction of generic versions, prodrugs of existing therapies or biosimilars of existing products and other technologies.

Sales of our products are dependent, in large part, on the availability and extent of coverage, pricing and reimbursement from government health administration authorities, private health insurers and other organizations. Drug prices are under significant scrutiny in the markets in which our products are prescribed. Drug pricing and other health care costs continue to be subject to intense political and societal pressures on a global basis.

In addition, our sales and operations are subject to the risks of doing business internationally. For example, the effects of the implementation of the U.K.'s decision to voluntarily depart from the E.U., known as Brexit, remain unclear; compliance with any resulting regulatory mandates may prove challenging and the macroeconomic impact on our sales and consolidated results of operations from these developments remains unknown.

For additional information on our competition and pricing risks that could negatively impact our product sales, please read Item 1A. *Risk Factors* and Item 7A. *Quantitative and Qualitative Disclosures About Market Risk* included in this report.

Results of Operations

Revenues

Revenues are summarized as follows:

(In millions, except percentages)	For the Years Ended December 31, 2017	2016	2015	% Change 2017 compared to 2016	% Change 2016 compared to 2015
Product Revenues:					
United States	$ 7,017.1	$ 7,050.4	$ 6,545.8	(0.5)%	7.7 %
Rest of world	3,337.6	2,767.5	2,642.7	20.6 %	4.7 %
Total product revenues	10,354.7	9,817.9	9,188.5	5.5 %	6.8 %
Revenues from anti-CD20 therapeutic programs	1,559.2	1,314.5	1,339.2	18.6 %	(1.8)%
Other revenues	360.0	316.4	236.1	13.8 %	34.0 %
Total revenues	$ 12,273.9	$ 11,448.8	$ 10,763.8	7.2 %	6.4 %

Product Revenues

Product revenues are summarized as follows:

(In millions, except percentages)	For the Years Ended December 31, 2017	2016	2015	% Change 2017 compared to 2016	% Change 2016 compared to 2015
Multiple Sclerosis:					
TECFIDERA	$ 4,214.0	$ 3,968.1	$ 3,638.4	6.2 %	9.1 %
Interferon*	2,645.8	2,795.2	2,968.7	(5.3)%	(5.8)%
TYSABRI	1,973.1	1,963.8	1,886.1	0.5 %	4.1 %
FAMPYRA	91.6	84.9	89.7	7.9 %	(5.4)%
ZINBRYTA	52.7	7.8	—	**	**
Spinal Muscular Atrophy:					
SPINRAZA	883.7	4.6	—	**	**
Hemophilia:					
ELOCTATE	48.4	513.2	319.7	(90.6)%	60.5 %
ALPROLIX	26.0	333.7	234.5	(92.2)%	42.3 %
Other product revenues:					
FUMADERM	39.6	45.9	51.4	(13.7)%	(10.7)%
BENEPALI	370.8	100.6	—	**	**
FLIXABI	9.0	0.1	—	**	**
Total product revenues	$ 10,354.7	$ 9,817.9	$ 9,188.5	5.5 %	6.8 %

* Interferon includes AVONEX and PLEGRIDY.
** Percentage not meaningful.

Multiple Sclerosis (MS)

TECFIDERA

For 2017 compared to 2016, the increase in U.S. TECFIDERA revenues was primarily due to price increases, partially offset by higher discounts and allowances and a decrease in unit sales volume of 3%.

For 2016 compared to 2015, the increase in U.S. TECFIDERA revenues was primarily due to price increases, partially offset by higher discounts and allowances and a decrease in unit sales volume of 1%.

For 2017 compared to 2016, the increase in rest of world TECFIDERA revenues was primarily due to increases in unit sales volume of 19% primarily in the E.U., partially offset by pricing reductions in certain European countries.

For 2016 compared to 2015, the increase in rest of world TECFIDERA revenues was primarily due to increases in unit sales volume of 32% in existing markets and new markets where we continue to launch the product and expand our presence around the world. These increases were partially offset by pricing reductions in certain European countries. Rest of world TECFIDERA revenues for 2016, compared to 2015, were also negatively impacted by a $50.2 million decrease in hedge gains recognized under our foreign currency hedging program in the comparative period.

We anticipate a modest increase in TECFIDERA demand on a global basis in 2018, compared to 2017, with expected volume growth in our international markets partially offset by declines in the U.S., due to increased competition from additional treatments for MS, including OCREVUS.

Interferon

AVONEX and PLEGRIDY

For 2017 compared to 2016, the decrease in U.S. Interferon revenues was primarily due to an overall decrease in Interferon unit sales volumes of 12%, which was primarily attributable to patients transitioning to other MS therapies, partially offset by price increases.

For 2016 compared to 2015, the decrease in U.S. Interferon revenues was primarily due to an overall decrease in Interferon unit sales volume of 10%, which was attributable to a decrease in AVONEX unit sales volume primarily due to patients transitioning to other oral MS therapies, as well as higher discounts and allowances. These decreases were partially offset by price increases.

For 2017 compared to 2016, the decrease in rest of world Interferon revenues was primarily due to an overall decrease in AVONEX unit sales volume of 14% primarily due to patients transitioning to other MS therapies in the E.U.

For 2016 compared to 2015, the decrease in rest of world Interferon revenues was primarily due to pricing reductions in certain European countries and an overall decrease in AVONEX unit sales volume of 10% due primarily to patients transitioning to other oral MS therapies, including TECFIDERA. Rest of world Interferon revenues for 2016, compared to 2015, were also negatively impacted by a $66.1 million decrease in hedge gains recognized under our hedging program in the comparative period.

We expect that overall Interferon revenues will continue to decline compared to prior year periods as a result of increasing competition from our other products as well as other treatments for MS, including biosimilars.

AVONEX

For 2017, 2016 and 2015, U.S. AVONEX revenues totaled $1,593.6 million, $1,675.3 million and $1,790.2 million, respectively.

For 2017, 2016 and 2015 rest of world AVONEX revenues totaled $557.9 million, $638.2 million and $840.0 million, respectively.

PLEGRIDY

For 2017, 2016 and 2015, U.S. PLEGRIDY revenues totaled $295.5 million, $305.0 million and $227.1 million, respectively.

For 2017, 2016 and 2015, rest of world PLEGRIDY revenues totaled $198.8 million, $176.7 million and $111.4 million, respectively.

TYSABRI

For 2017 compared to 2016, the decrease in U.S. TYSABRI revenues was primarily due to higher discounts and allowances and a decrease in unit sales volume of 4%, partially offset by price increases.

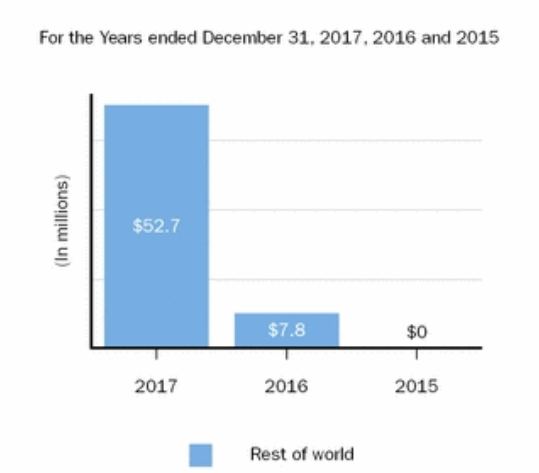
For 2016 compared to 2015, the increase in U.S. TYSABRI revenues was primarily due to an increase in unit sales volume of 4% and increases in price, partially offset by higher discounts and allowances.

For 2017 compared to 2016, the increase in rest of world TYSABRI revenues was primarily due to the recognition of approximately $45.0 million of previously deferred revenue in Italy relating to the pricing agreement with AIFA and a 12% increase in unit sales volume primarily in our international partner markets, partially offset by a prior year favorable adjustment of approximately $20.0 million to previous reserves estimates related to a government price reimbursement program included in our discounts and allowances. For information on our agreement with AIFA relating to sales of TYSABRI in Italy, please read Note 18, *Other Consolidated Financial Statement Detail*, to our consolidated financial statements included in this report.

For 2016 compared to 2015, the decrease in rest of world TYSABRI revenues was primarily due to the impact of a $46.1 million decrease in hedge gains recognized under our hedging program in the comparative period. This decrease was partially offset by an increase in unit sales volume of 8%, primarily in Europe.

We anticipate a decline in TYSABRI demand on a global basis in 2018, compared to 2017, with expected volume declines in the U.S., due to increased competition from additional treatments for MS, including OCREVUS, offsetting volume growth in our international markets.

ZINBRYTA



Under our collaboration agreement with AbbVie, we began to recognize revenues on sales of ZINBRYTA to third parties in the E.U. in the third quarter of 2016.

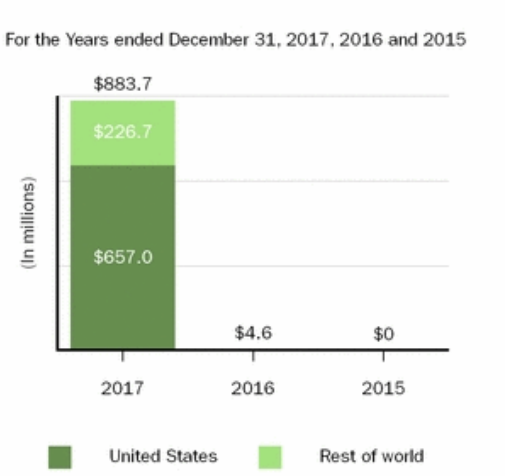
For 2017 compared to 2016, the increase in ZINBRYTA revenues was primarily due to an increase in unit sales volume.

We expect that the future sales growth of ZINBRYTA will be negatively impacted as a result of the EC approved restrictions on the use of ZINBRYTA.

For additional information on our relationship with AbbVie, including information on the Article 20 Procedure of ZINBRYTA and resulting impairment of ZINBRYTA related assets, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Spinal Muscular Atrophy (SMA)

SPINRAZA



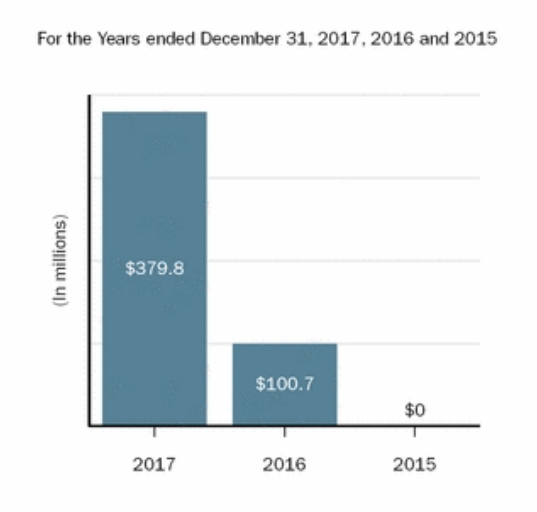
We began to recognize revenues on sales of SPINRAZA in the U.S. in the fourth quarter of 2016 and the rest of world in the first quarter of 2017.

We expect that the rate at which SPINRAZA revenues will grow will moderate over time due to the loading dynamics as patients transition to dosing once every four months.

For additional information on our relationship with Ionis, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Biosimilars

BENEPALI and FLIXABI



Under our commercial agreement with Samsung Bioepis, we began to recognize revenues on sales of BENEPALI and FLIXABI to third parties in the E.U. in the first and third quarters of 2016, respectively.

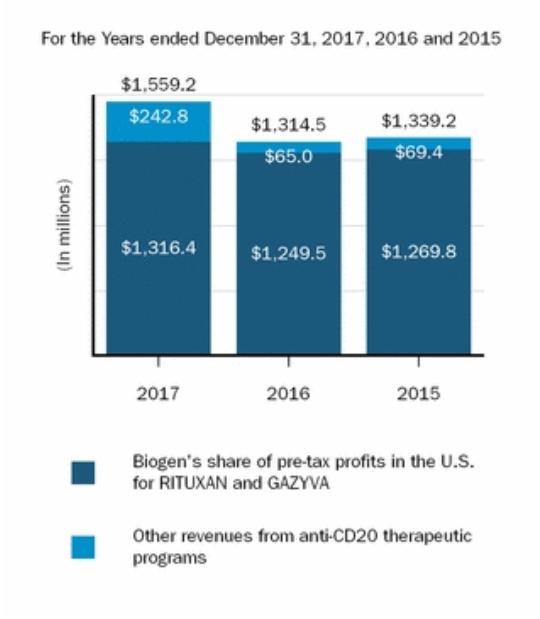
For 2017 compared to 2016, the increase in biosimilar revenues was primarily due to an increase in BENEPALI unit sales volume in new and existing markets.

For additional information on our relationship with Samsung Bioepis, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Revenues from Anti-CD20 Therapeutic Programs

Genentech (Roche Group)

Our share of RITUXAN and GAZYVA collaboration operating profits in the U.S. and other revenues on anti-CD20 therapeutic programs are summarized as follows:



Biogen's Share of Pre-tax Profits in the U.S. for RITUXAN and GAZYVA

The following table provides a summary of amounts comprising our share of pre-tax profits on RITUXAN and GAZYVA in the U.S.:

	For the Years Ended December 31,		
(In millions)	**2017**	**2016**	**2015**
Product revenues, net	$ 4,206.9	$ 3,941.8	$ 3,847.9
Cost and expenses	755.2	744.5	673.7
Pre-tax profits in the U.S.	$ 3,451.7	$ 3,197.3	$ 3,174.2
Biogen's share of pre-tax profits	$ 1,316.4	$ 1,249.5	$ 1,269.8

Our share of RITUXAN annual pre-tax co-promotion profits in the U.S. in excess of $50.0 million decreased to 39% from 40% in February 2016 when GAZYVA was approved by the FDA as a new treatment for follicular lymphoma and further decreased to 37.5% in the third quarter of 2017 as gross sales of GAZYVA in the U.S. for the preceding 12-month period exceeded $150.0 million.

In November 2017 the FDA approved GAZYVA in combination with chemotherapy, followed by GAZYVA alone, for people with previously untreated advanced follicular lymphoma.

In June 2017 the FDA approved RITUXAN HYCELA for subcutaneous injection for the treatment of adults with previously untreated and relapsed or refractory follicular lymphoma, previously untreated diffuse large B-cell lymphoma and CLL. This new treatment includes the same monoclonal antibody as intravenous RITUXAN in combination with hyaluronidase human, an enzyme that helps to deliver rituximab under the skin.

For 2017 compared to 2016, the increase in U.S. product revenues was primarily due to selling price increases and an increase in RITUXAN and GAZYA unit sales volume of 2% and 6%, respectively, partially offset by higher discounts and allowances.

For 2016 compared to 2015, the increase in U.S. product revenues was primarily due to an increase in GAZYVA unit sales volume of 41%, an increase in RITUXAN unit sales of 1% and selling price increases, partially offset by higher RITUXAN discounts and allowances.

Collaboration costs and expenses for 2017, as depicted in the table above, excludes certain expenses charged to the collaboration by Genentech that we believe remain the responsibility of Genentech and that we are not obligated to pay under the terms of the collaboration agreement. Accordingly, we did not recognize the effect of those expenses in the determination of our share of pre-tax collaboration profits and Genentech has withheld approximately $120 million from amounts due to us in relation to collaboration activity for 2017, representing Genentech's estimate of our share of these expenses. We remain in discussions with Genentech about a resolution relating to these amounts.

Excluding amounts under dispute, collaboration costs and expenses for 2017 compared to 2016 increased primarily due to higher branded pharmaceutical drug fees and an increase in RITUXAN selling and marketing costs, partially offset by a decrease in GAZYVA research and development costs.

Collaboration costs and expenses for 2016 compared to 2015 increased primarily due to an increase in RITUXAN product cost of sales.

Other Revenues from Anti-CD20 Therapeutic Programs

Other revenues from anti-CD20 therapeutic programs primarily consist of royalty revenues on sales of OCREVUS and our share of pre-tax co-promotion profits on RITUXAN in Canada.

For 2017 compared to 2016, other revenues from anti-CD20 therapeutic programs increased primarily due to the launch of OCREVUS in the second quarter of 2017.

For 2016 compared to 2015, other revenues from anti-CD20 therapeutic programs decreased as a result of lower pre-tax co-promotion profits on RITUXAN in Canada.

OCREVUS

In March 2017 the FDA approved OCREVUS, a humanized anti-CD20 monoclonal antibody, for the treatment of RMS and PPMS. Under our agreement with Genentech, we will receive a tiered royalty on U.S. net sales from 13.5% and increasing up to 24% if annual net sales exceed $900.0 million. There will be a 50% reduction to these royalties if a biosimilar to OCREVUS is approved in the U.S.

In addition, we will receive a 3% royalty on net sales of OCREVUS outside the U.S., with the royalty period lasting 11 years from the first commercial sale of OCREVUS on a country-by-country basis. OCREVUS was approved for treatment of RMS and PPMS in Australia, Switzerland and the E.U. in July 2017, September 2017 and January 2018, respectively. Marketing applications for OCREVUS are currently under review in numerous markets worldwide, including in Latin America and the Middle East.

The commercialization of OCREVUS does not impact the percentage of the co-promotion profits we receive for RITUXAN or GAZYVA. Genentech is solely responsible for development and commercialization of OCREVUS and funding future costs. OCREVUS royalty revenues were based on our estimates from third party and market research data of OCREVUS sales occurring during the corresponding period. Differences between actual and estimated royalty revenues will be adjusted for in the period in which they become known, which is expected to be the following quarter.

For additional information on our collaboration with Genentech, including information regarding the pre-tax profit sharing formula and its impact on future revenues from anti-CD20 therapeutic programs, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Other Revenues

Other revenues are summarized as follows:

	For The Years Ended December 31,			% Change	
(In millions, except percentages)	2017	2016	2015	2017 compared to 2016	2016 compared to 2015
Revenues from collaborative and other relationships	$ 36.5	$ 39.3	$ 69.1	(7.1)%	(43.1)%
Other royalty and corporate revenues	323.5	277.1	167.0	16.7 %	65.9 %
Total other revenues	$ 360.0	$ 316.4	$ 236.1	13.8 %	34.0 %

Revenues from Collaborative and Other Relationships

Other revenues from collaborative and other relationships include revenues earned under our 50% share of the co-promotion profits or losses of ZINBRYTA in the U.S. with AbbVie and revenues from our technical development and manufacturing services agreements with Samsung Bioepis. Prior to the spin-off of our hemophilia business, other revenues from collaborative and other relationships also included revenues earned under our manufacturing services agreement with Sobi on shipments of ELOCTA and ALPROLIX to Sobi and royalties from Sobi on sales of ELOCTA and ALPROLIX in their territory, which included substantially all of Europe, Russia and certain markets in Northern Africa and the Middle East. Bioverativ assumed all of our rights and obligations under our agreement with Sobi on February 1, 2017.

For 2017 compared to 2016, the decrease in other revenues from collaborative and other relationships was primarily due to the impact of the spin-off of our hemophilia business on February 1, 2017, partially offset by higher revenues earned under our manufacturing services agreement with Samsung Bioepis.

For 2016 compared to 2015, the decrease in other revenues from collaborative and other relationships was primarily due to a net overall loss in the collaboration with AbbVie of $21.9 million within the U.S. and lower revenues earned under our manufacturing services agreement with Samsung Bioepis, partially offset by an increase in ELOCTA shipments made under our manufacturing services agreement with Sobi.

For additional information on our collaborative and other relationships, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Other Royalty and Corporate Revenues

We receive royalties from net sales on products related to patents that we have out-licensed and we record other corporate revenues primarily from amounts earned under contract manufacturing agreements.

For 2017 compared to 2016, the increase in royalty and other corporate revenues was primarily due to an increase in sales of the underlying products from which we receive royalties and higher contract manufacturing revenues related to the volume of shipments of drug substance production provided to our strategic partners, including Bioverativ.

For 2016 compared to 2015, the increase in royalty and other corporate revenues was primarily due to higher contract manufacturing revenues related to drug substance manufacturing provided to a strategic partner.

Reserves for Discounts and Allowances

Revenues from product sales are recorded net of reserves established for applicable discounts and allowances, including those associated with the implementation of pricing actions in certain international markets where we operate.

These reserves are based on estimates of the amounts earned or to be claimed on the related sales and are classified as reductions of accounts receivable (if the amount is payable to our customer) or a liability (if the amount is payable to a party other than our customer). Our estimates take into consideration our historical experience, current contractual and statutory requirements, specific known market events and trends, industry data and forecasted customer buying and payment patterns. Actual amounts may ultimately differ from our estimates. If actual results vary, we adjust these estimates, which will have an effect on earnings in the period of adjustment.

Reserves for discounts, contractual adjustments and returns that reduced gross product revenues are summarized as follows:

For the years ended December 31, 2017, 2016 and 2015, reserves for discounts and allowances as a percentage of gross product revenues were 22.0%, 21.3% and 19.3%, respectively.

Discounts

Discounts include trade term discounts and wholesaler incentives.

For 2017 compared to 2016, the decrease in discounts was primarily driven by the impact from the spin-off of our hemophilia business on February 1, 2017, partially offset by an increase in rest of world product revenues, due in part to an increase in biosimilar revenues, as well as an increase in gross selling prices.

For 2016 compared to 2015, the increase in discounts was primarily driven by increases in gross selling price, contractual discount rates and volume related to our hemophilia products.

Contractual Adjustments

Contractual adjustments primarily relate to Medicaid and managed care rebates, co-payment assistance (copay), VA and PHS discounts, specialty pharmacy program fees and other government rebates or applicable allowances.

For 2017 compared to 2016, the increase in contractual adjustments was primarily due to higher managed care rebates and Medicaid and other governmental rebates and allowances in the U.S., due in part to an increase in gross selling prices and the launch of SPINRAZA in the U.S. in the fourth quarter of 2016, partially offset by the impact from the spin-off of our hemophilia business on February 1, 2017.

For 2016 compared to 2015, the increase in contractual adjustments was primarily due to higher Medicaid and other governmental rebates and allowances in the U.S. and managed care rebates, due in part to an increase in gross selling prices.

Returns

Product return reserves are established for returns made by wholesalers. In accordance with contractual terms, wholesalers are permitted to return product for reasons such as damaged or expired product. The majority of wholesaler returns are due to product expiration. Provisions for product returns are recorded in the period the related revenue is recognized, resulting in a reduction to product sales.

For 2017 compared to 2016, return provisions were relatively consistent.

For 2016 compared to 2015, return reserves decreased primarily due to a reduction in return rates based on recent experiences of returned products.

For additional information on our reserves, please read Note 5, *Reserves for Discounts and Allowances,* to our consolidated financial statements included in this report.

Cost and Expenses

A summary of total cost and expenses is as follows:

(In millions, except percentages)	For the Years Ended December 31, 2017	2016	2015	% Change 2017 compared to 2016	% Change 2016 compared to 2015
Cost of sales, excluding amortization of acquired intangible assets	$ 1,630.0	$ 1,478.7	$ 1,240.4	10.2 %	19.2 %
Research and development	2,253.6	1,973.3	2,012.8	14.2 %	(2.0)%
Selling, general and administrative	1,935.5	1,947.9	2,113.1	(0.6)%	(7.8)%
Amortization of acquired intangible assets	814.7	385.6	382.6	111.3 %	0.8 %
Acquired in-process research and development	120.0	—	—	**	**
Collaboration profit sharing	112.3	10.2	—	**	**
Loss (gain) on fair value remeasurement of contingent consideration	62.7	14.8	30.5	323.6 %	(51.5)%
Restructuring charges	0.9	33.1	93.4	(97.3)%	(64.6)%
TECFIDERA litigation settlement charge	—	454.8	—	(100.0)%	**
Total cost and expenses	$ 6,929.7	$ 6,298.4	$ 5,872.8	10.0 %	7.2 %

** Percentage not meaningful.

Cost of Sales, Excluding Amortization of Acquired Intangible Assets (Cost of Sales)

Product Cost of Sales

For 2017 compared to 2016, the increase in product cost of sales was primarily driven by higher unit sales volume related to our biosimilar product shipments, higher contract manufacturing shipments of drug substance production provided to our strategic partners, including Bioverativ, and an increase in inventory amounts written down as a result of excess, obsolescence, unmarketability or other reasons. These increases were partially offset by the impact from the spin-off of our hemophilia business on February 1, 2017, and the accelerated depreciation recorded in the second, third and fourth quarters of 2016 as a result of our decision to cease manufacturing in Cambridge, MA.

For 2016 compared to 2015, the increase in product cost of sales was primarily driven by costs noted below as well as increased contract manufacturing shipments and higher unit sales volume related to our biosimilars and hemophilia products, partially offset by favorable production costs and mix of products.

Product cost of sales for 2016 reflects the recognition of $45.5 million of accelerated depreciation as a result of the determination to cease manufacturing in Cambridge, MA and vacate our small-scale biologics manufacturing facility in Cambridge, MA and warehouse space in Somerville, MA.

Inventory amounts written down as a result of excess, obsolescence, unmarketability or other reasons totaled $76.9 million, $48.2 million and $41.9 million for the years ended December 31, 2017, 2016 and 2015, respectively. Amounts written down during the year ended December 31, 2017, includes the impairment of $14.4 million related to the EC approved restrictions on the use of ZINBRYTA.

For additional information on the Article 20 Procedure of ZINBRYTA and resulting impairment of ZINBRYTA related assets, please read Note 20, *Collaborative and Other Relationships*, to our consolidated financial statements included in this report.

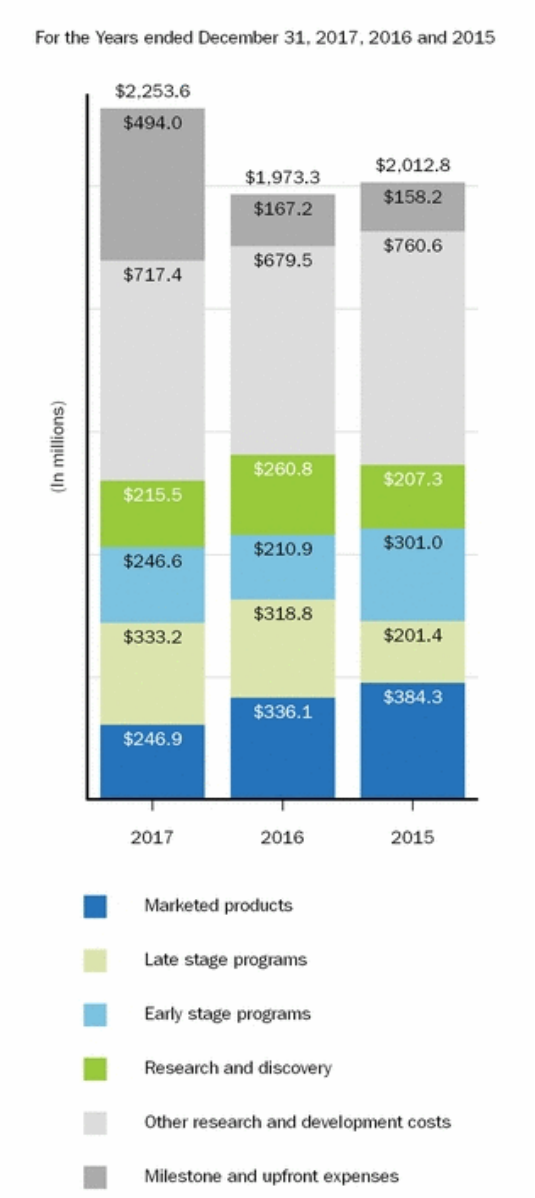
Royalty Cost of Sales

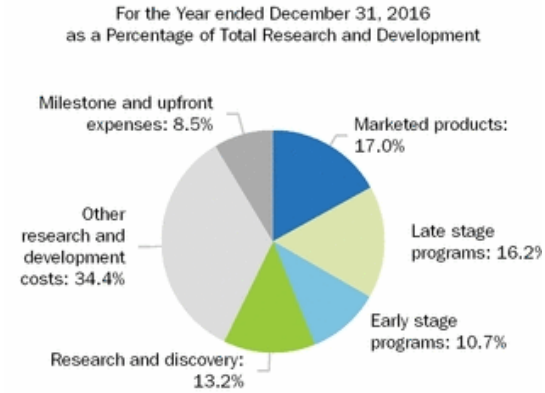
For 2017 compared to 2016, the increase in royalty cost of sales was primarily driven by the recognition of royalties payable to Ionis on sales of SPINRAZA and higher royalties on sales of AVONEX and PLEGRIDY in the U.S., as described below. These increases were partially offset by the elimination of royalties payable on sales of hemophilia product resulting from the spin-off of our hemophilia business on February 1, 2017 and lower royalties on sales of TYSABRI resulting from the expiration of certain third-party royalties.

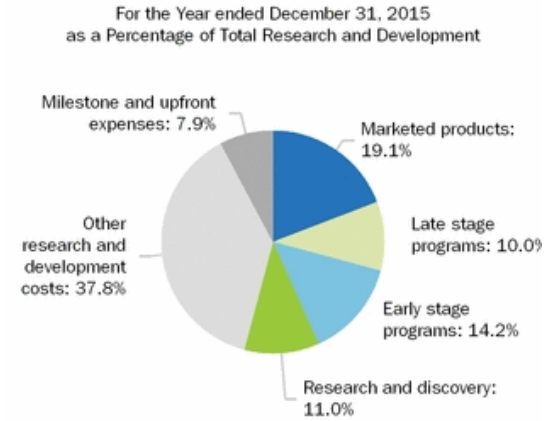
For 2016 compared to 2015, the increase in royalty cost of sales was primarily driven by the increase in royalty rates payable to Sobi, increased sales of our hemophilia products and higher royalties on sales of AVONEX and PLEGRIDY in the U.S., partially offset by a decrease in TYSABRI royalties due to the expiration of certain third-party royalties.

On June 28, 2016, the U.S. Patent and Trademark Office issued to the Japanese Foundation for Cancer Research (JFCR) a patent related to recombinant interferon-beta protein. This patent, U.S. Patent No. 9,376,478, expires in June 2033. This patent was issued following an interference proceeding between JFCR and us. This patent is relevant to AVONEX and PLEGRIDY, and we will pay royalties in the mid-single digits in relation to this patent during the life of the patent.

Research and Development







We support our drug discovery and development efforts through the commitment of significant resources to discovery, research and development programs and business development opportunities, particularly within our core and emerging growth areas.

A significant amount of our research and development costs consist of indirect costs incurred in support of overall research and development activities and non-specific programs, including activities that benefit multiple programs, such as management costs, as well as depreciation, information technology and facility-based expenses. These costs are considered other research and development costs in the table above and are not allocated to a specific program or stage.

Research and development expense incurred in support of our marketed products includes costs associated with product lifecycle management activities including, if applicable, costs associated with the development of new indications for existing products. Late stage programs are programs in Phase 3 development or in registration stage. Early stage programs are programs in Phase 1 or Phase 2 development. Research and discovery represents costs incurred to support our discovery research and translational science efforts. Costs are reflected in the development stage based upon the program status when incurred. Therefore, the same program could be reflected in different development stages in the same year. For several of our programs, the research and development activities are part of our collaborative and other relationships. Our costs reflect our share of the total costs incurred.

For 2017 compared to 2016, the increase in research and development expense was primarily related to milestone and upfront expenses and costs incurred in connection with our early stage and late stage programs, partially offset by decreased costs incurred in connection with our marketed products.

For 2016 compared to 2015, the decrease in research and development expense was primarily related to a decrease in costs incurred in connection with our early stage programs, marketed products and other research and development costs. These decreases were partially offset by increased costs incurred in connection with our late stage and research and discovery programs.

We intend to continue committing significant resources to targeted research and development opportunities where there is a significant unmet need and where a drug candidate has the potential to be highly differentiated.

Milestone and Upfront Expenses included in Research and Development Expense

Research and development expense for 2017 includes:

- $300.0 million upfront payment made to BMS upon entering into our agreement to exclusively license BIIB092;
- $60.0 million developmental milestone payment due to the former shareholders of iPierian, Inc. (iPierian), which became payable upon dosing of the first patient in the Phase 2 PSP study for BIIB092;
- $28.0 million upfront payment made to Alkermes upon entering into our agreement to exclusively license BIIB098, representing our share of BIIB098 development costs already incurred in 2017;
- $50.0 million accrual based upon the expected continuation of our agreement with Alkermes to develop and exclusively license BIIB098; and
- $25.0 million upfront payment recognized upon entering into a new collaboration agreement with Ionis to identify new ASO drug candidates for the treatment of SMA.

Research and development expense for 2016 includes:

- $75.0 million license fee paid to Ionis as we exercised our option to develop and commercialize SPINRAZA from Ionis;
- $50.0 million milestone payment to Eisai related to the initiation of a Phase 3 trial for E2609; and
- $20.0 million upfront payment recognized upon entering into a collaboration and alliance agreement with UPenn.

Research and development expense for 2015 includes:

- $60.0 million recognized upon entering into our collaboration with Mitsubishi Tanabe Pharma Corporation;
- $48.1 million recognized upon entering into our collaboration with AGTC;
- $30.0 million in milestones recognized in relation to our collaboration agreements with Ionis; and
- $16.0 million paid to AbbVie related to milestones for the development of ZINBRYTA as a result of filing with the FDA and EMA during 2015.

These payments are classified as research and development expense as the programs they relate to had not achieved regulatory approval as of the payment date.

For additional information about these collaborations, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Early Stage Programs

The increase in spending associated with our early stage programs for 2017 compared to 2016 was primarily related to spending associated with the development of BIIB092 in AD and PSP pursuant to our license agreement with BMS, BIIB074 in trigeminal neuralgia (TGN) and BIIB076 in AD. These increases were partially offset by a reduction in costs resulting from our discontinuance of development of amiselimod in the third quarter of 2016.

The decrease in spending associated with our early stage programs for 2016 compared to 2015 was primarily due to the advancement of our aducanumab program in AD to a late stage program in the third quarter of 2015, decreased costs incurred in connection with opicinumab in MS and the discontinuance of development of anti-TWEAK in lupus nephritis. These decreases were partially offset by increased costs of BIIB074 in TGN and increased costs associated with our discontinuance of development of amiselimod in the third quarter of 2016.

Late Stage Programs

The increase in spending associated with our late stage programs for 2017 compared to 2016 was primarily related the increased costs associated with the development of aducanumab in AD and costs incurred associated with the development of E2609, a BACE inhibitor that was advanced to a late stage program in the fourth quarter of 2016. These increases were partially offset by advancement of SPINRAZA to marketed products following its approval in the U.S. in the fourth quarter of 2016.

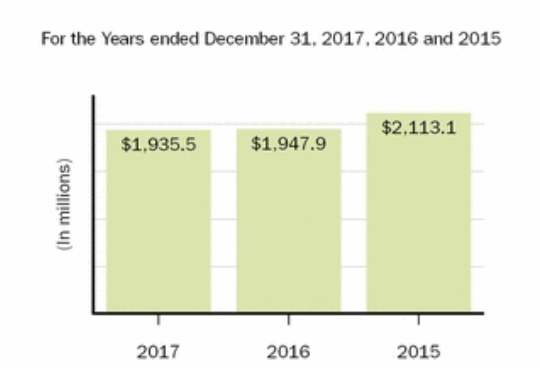
The increase in spending associated with our late stage programs for 2016 compared to 2015 was primarily driven by costs incurred to advance our aducanumab program in AD, the increased costs incurred to advance our SPINRAZA program and the advancement of E2609 to a late stage program in the fourth quarter of 2016, partially offset by the approval of ZINBRYTA in the third quarter of 2016.

Marketed Products

The decrease in spending associated with our marketed products for 2017 compared to 2016 was primarily due to a reduction in spending resulting from the spin-off of our hemophilia business on February 1, 2017 and a reduction in spending related to TECFIDERA. These decreases were partially offset by increased spending related to SPINRAZA following its approval in the U.S. in the fourth quarter of 2016.

The decrease in spending associated with our marketed products for 2016 compared to 2015 was primarily due to the discontinuance of development of TYSABRI and TECFIDERA in secondary primary MS in the third and fourth quarters of 2015, respectively, and decreased costs incurred in connection with our hemophilia products. These decreases were partially offset by the approvals of ZINBRYTA and SPINRAZA in the third and fourth quarters of 2016, respectively.

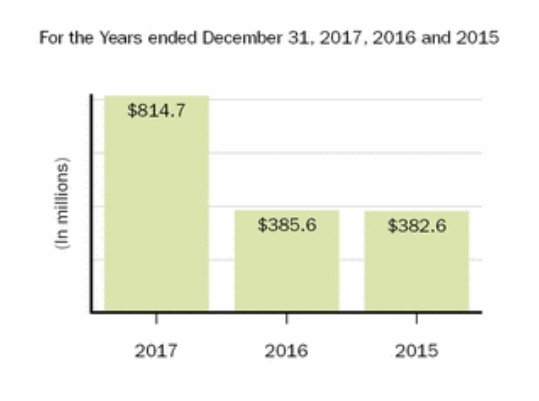
Selling, General and Administrative



For 2017 compared to 2016, the decrease in selling, general and administrative expenses was primarily due to a reduction in operational spending resulting from the spin-off of our hemophilia business on February 1, 2017, the execution of targeted cost reduction initiatives and a reduction in costs resulting from the discontinuance of our TECFIDERA television advertising campaign in the second quarter of 2016. These decreases were offset by an increase in SPINRAZA commercialization costs and an increase in corporate giving.

For 2016 compared to 2015, the decrease in selling, general and administrative expenses reflect cost savings in connection with our corporate restructuring, which are described below under the heading "*Restructuring, Business Transformation and Other Cost Savings Initiatives*," partially offset by an increase in costs associated with developing commercial capabilities for ZINBRYTA and SPINRAZA.

Amortization of Acquired Intangible Assets



Our amortization expense is based on the economic consumption and impairment of intangible assets. Our most significant intangible assets are related to our TECFIDERA, AVONEX and TYSABRI products. Annually, during our long-range planning cycle, we perform an analysis of anticipated lifetime revenues of TECFIDERA, AVONEX and TYSABRI. This analysis is also updated whenever events or changes in circumstances would significantly affect the anticipated lifetime revenues of any of these products.

Our most recent long-range planning cycle was completed in the third quarter of 2017. The results of our TECFIDERA, AVONEX and TYSABRI analyses were impacted by changes in the estimated timing of the impact of other alternative MS formulations, including OCREVUS, which may compete with TYSABRI, TECFIDERA and AVONEX. The outcome of this most recent analysis did not result in a significant net change in our expected rate of amortization for acquired intangible assets.

Based upon this most recent analysis, the estimated future amortization of acquired intangible assets for the next five years is expected to be as follows:

(In millions)	As of December 31, 2017
2018	$ 423.5
2019	401.8
2020	381.6
2021	254.3
2022	242.3

We monitor events and expectations regarding product performance. If new information indicates that the assumptions underlying our most recent analysis are substantially different than those utilized in our current estimates, our analysis would be updated and may result in a significant change in the anticipated lifetime revenues of the relevant products. The occurrence of an adverse event could substantially increase the amount of amortization expense associated with our acquired intangible assets as compared to previous periods or our current expectations, which may result in a significant negative impact on our future results of operations.

For 2017 compared to 2016, the increase in amortization of acquired intangible assets was primarily due to $444.2 million of amortization and impairment charges associated with our U.S. and rest of world licenses to Forward Pharma's intellectual property, including Forward Pharma's intellectual property related to TECFIDERA, acquired in the first quarter of 2017, as discussed further below. Amortization of acquired intangible assets for 2017 also reflects the $31.2 million impairment of our acquired and in-licensed rights and patents intangible asset related to the Article 20 Procedure of ZINBRYTA.

For additional information on the Article 20 Procedure of ZINBRYTA and resulting impairment of ZINBRYTA related assets, please read Note 20, *Collaborative and Other Relationships*, to our consolidated financial statements included in this report.

For 2016 compared to 2015, amortization of acquired intangible assets was relatively consistent as our most recent analysis completed during the third quarter of 2016 resulted in no significant net change in our expected rate of amortization for acquired intangible assets. Amortization of acquired intangible assets for 2016 also reflects impairment charges recognized upon the termination of our collaboration agreements with Rodin Therapeutics, Inc. and Ataxion Inc., which resulted in impairment losses of $8.7 million and $3.5 million, respectively, related to the IPR&D assets recorded upon entering into the collaboration agreements.

Impairment charges related to intangible assets during 2015 were insignificant.

TECFIDERA License Rights

In January 2017 we entered into a settlement and license agreement with Forward Pharma. Pursuant to this agreement, we obtained U.S. and rest of world licenses to Forward Pharma's intellectual property, including Forward Pharma's intellectual property related to TECFIDERA. In exchange, we paid Forward Pharma $1.25 billion in cash. During the fourth quarter of 2016, we recognized a pre-tax charge of $454.8 million and in the first quarter of 2017 we recognized an intangible asset of $795.2 million related to this agreement. The pre-tax charge recognized in the fourth quarter of 2016 represented the fair value of our licenses to Forward Pharma’s intellectual property for the period April 2014, when we started selling TECFIDERA, through December 31, 2016. The intangible asset represented the fair value of the U.S. and rest of world licenses to Forward Pharma’s intellectual property related to TECFIDERA revenues for the period January 2017, the month in which we entered into this agreement, through December 2020, the last month before royalty payments could first commence pursuant to this agreement.

We have two intellectual property disputes with Forward Pharma, one in the U.S. and one in the E.U., concerning intellectual property related to TECFIDERA. In March 2017 the U.S. intellectual property dispute was decided in our favor. Forward Pharma appealed to the U.S. Court of Appeals for the Federal Circuit and the appeal is pending. We evaluated the recoverability of the U.S. asset acquired from Forward Pharma and recorded an impairment charge in the first quarter of 2017 to adjust the carrying value of the acquired U.S. asset to fair value reflecting the impact of the developments in the U.S. legal dispute. In January 2018 the EPO announced its decision revoking Forward Pharma’s European Patent No. 2 801 355. Forward Pharma has stated that it expects to file an appeal to the Technical Board of Appeal of the EPO. Based upon our assessment of these rulings, we continue to amortize the remaining net book value of the U.S. and rest of world intangible assets in our consolidated statements of income utilizing an economic consumption model.

For additional information on our settlement and license agreement with Forward Pharma and related intangible assets, please read Note 7, *Intangible Assets and Goodwill*, to our consolidated financial statements included in this report. For additional information on these disputes, please read Note 21, *Litigation*, to our consolidated financial statements included in this report.

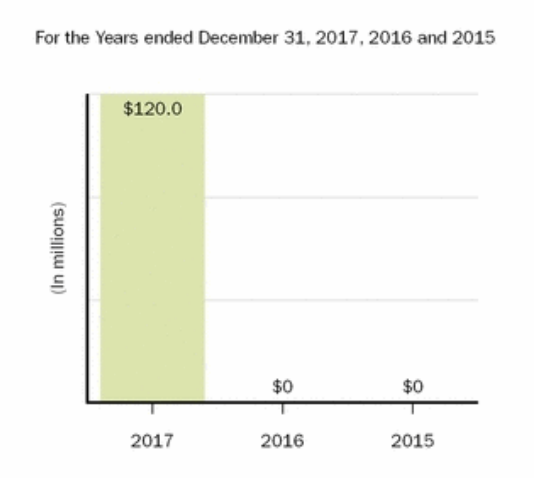
In Process Research & Development (IPR&D) related to Business Combinations

Overall, the value of our acquired IPR&D assets is dependent upon a number of variables, including estimates of future revenues and the effects of competition, the level of anticipated development costs and the probability and timing of successfully advancing a particular research program from a clinical trial phase to the next. We are continually reevaluating our estimates concerning these variables and evaluating industry data regarding the productivity of clinical research and the development process. Changes in our estimates of items may result in a significant change to our valuation of these assets.

We review amounts capitalized as acquired IPR&D for impairment at least annually, as of October 31, and whenever events or changes in circumstances indicate to us that the carrying value of the assets might not be recoverable. Our most recent impairment assessment as of October 31, 2017, resulted in no impairments. Changes to clinical development plans, regulatory feedback received, life cycle management strategies and changes in program economics, including foreign currency exchange rates, are evaluated regularly. The field of developing treatments for forms of neuropathic pain, such as TGN, is highly competitive and can be affected by changes to expected market candidates and changes in timing and the clinical development of our product candidates. There can be no assurance that we will be able to successfully develop BIIB074 for the treatment of TGN or other indications, including our ability to confirm safety and efficacy based on data from clinical trials, or that a successfully developed therapy will be able to secure sufficient pricing in a competitive market. Changes in events and circumstances for these programs may have a material impact on the value of our related IPR&D.

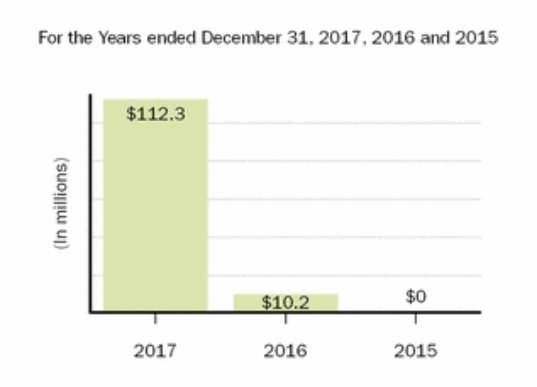
For additional information on the impairment and amortization of acquired intangible assets, including our TECFIDERA settlement and license agreement, please read Note 7, *Intangible Assets and Goodwill,* to our consolidated financial statements included in this report.

Acquired In-Process Research and Development



In May 2017 we completed an asset purchase of the Phase 3-ready candidate, BIIB093, from Remedy. In connection with the closing of this transaction, we made an upfront $120.0 million payment to Remedy, which was recorded as acquired in-process research and development in our consolidated statements of income as BIIB093 had not yet reached technological feasibility. For additional information on our transaction with Remedy, please read Note 2, *Acquisitions*, to our consolidated financial statements included in this report.

Collaboration Profit (Loss) Sharing



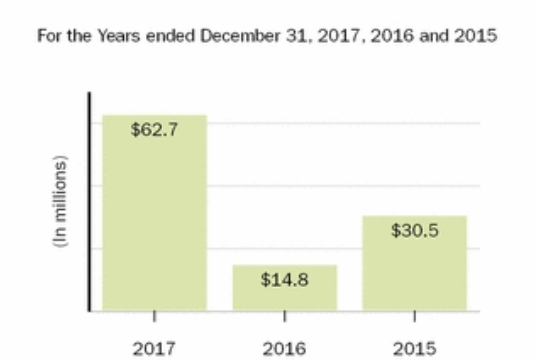
Collaboration profit (loss) sharing includes our partner's 50% share of the profit or loss related to our biosimilars commercial agreement with Samsung Bioepis and our partner's 50% share of the co-promotion profits or losses in the E.U. and Canada related to our collaboration agreement with AbbVie on the commercialization of ZINBRYTA.

We began to recognize revenues on sales of biosimilars in the first quarter of 2016. For 2017 we shared collaboration profits and therefore recognized net expense of $111.0 million as compared to net expense of $15.1 million in the prior year comparative period. The increase in profit sharing expense for the comparative period was primarily due to increased collaboration profits resulting from increased biosimilar product sales.

We began to recognize revenues on sales of ZINBRYTA in the E.U. in the third quarter of 2016. For 2017 we recognized net expense of $1.3 million to reflect AbbVie's 50% sharing of the net collaboration profits in the E.U. and Canada as compared to net income recognized of $4.9 million in the prior year comparative period, to reflect AbbVie's 50% sharing of the net collaboration losses in the E.U. and Canada. The increase in profit sharing expense for the comparative period was primarily due to increased collaboration profits resulting from increased ZINBRYTA product sales.

We expect that the future sales growth of ZINBRYTA will be negatively impacted as a result of the EC approved restrictions on the use of ZINBRYTA. For additional information on our relationship with AbbVie, including information on the Article 20 Procedure of ZINBRYTA and resulting impairment of ZINBRYTA related assets, please read Note 20, *Collaborative and Other Relationships*, to our consolidated financial statements included in this report.

Loss (Gain) on Fair Value Remeasurement of Contingent Consideration



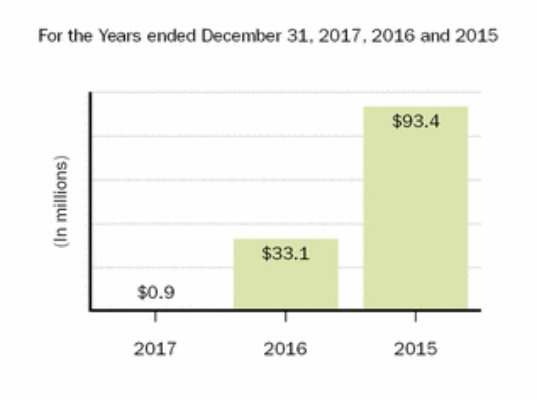
Consideration payable for certain of our business combinations includes future payments that are contingent upon the occurrence of a particular event or events. We record an obligation for such contingent consideration payments at fair value on the acquisition date. We then revalue our contingent consideration obligations each reporting period. Changes in the fair value of our contingent consideration obligations, other than changes due to payments, are recognized as a (gain) loss on fair value remeasurement of contingent consideration in our consolidated statements of income.

The loss on fair value remeasurement of contingent consideration for 2017 was primarily due to the increase in the probability of achieving certain developmental milestones based upon the progression of the underlying clinical programs.

The loss on fair value remeasurement of contingent consideration for 2016 was primarily due to changes in the probability of achieving certain developmental milestones based upon the progression of the underlying clinical programs and changes in the discount rate.

The loss on fair value remeasurement of contingent consideration for 2015 was primarily due to changes in the expected timing and probabilities of success related to the achievement of certain developmental milestones and in the discount rate.

Restructuring, Business Transformation and Other Cost Saving Initiatives



2017 Corporate Strategy

In July 2017 we announced an updated strategic framework to optimize the value of our MS business while investing for the future across our core growth areas of MS and neuroimmunology, AD and dementia, Parkinson's disease and movement disorders and neuromuscular diseases including SMA and ALS. We also plan to invest in emerging growth areas such as pain, ophthalmology, neuropsychiatry and acute neurology.

We expect the continued performance of our commercial assets and the expiration of the contingent payments related to TECFIDERA, discussed further in the *"Contractual Obligations and Off-Balance Sheet Arrangements"* section of this report, to enable us to invest in and build an industry leading neuroscience pipeline. We view investment in growth as our top priority, but also recognize the value of opportunistically returning excess capital to shareholders through share repurchases.

In order to deliver positive results in the near term while investing in the next stages of our growth, we will focus on the following strategic priorities:

- maximizing the resilience of our MS core business;
- accelerating efforts in SMA as a significant new growth opportunity;
- developing and expanding our neuroscience portfolio;
- focusing our capital allocation efforts to drive investment for future growth; and
- creating a leaner and simpler operating model to streamline our operations and reallocate resources towards prioritized research and development and commercial value creation opportunities.

In October 2017, in connection with creating a leaner and simpler operating model, we approved a corporate restructuring program intended to streamline our operations and reallocate resources. We expect to make total non-recurring operating and capital expenditures of up to $170.0 million, primarily in 2018, and our goal is to redirect resources of up to $400.0 million annually by 2020 to prioritized research and development and other value creation opportunities.

For the year ended December 31, 2017, we recognized charges in our consolidated statements of income totaling $19.4 million related to this effort, of which $18.5 million is included in selling, general and administrative expense and $0.9 million is reflected as restructuring charges. These restructuring charges, which were substantially incurred and paid in 2017, were primarily related to severance.

2016 Organizational Changes and Cost Saving Initiatives

2016 Restructuring Charges

During the third quarter of 2016 we initiated cost saving measures primarily intended to realign our organizational structure due to the changes in roles and workforce resulting from our decision to spin-off our hemophilia business, and to achieve further targeted cost reductions. For the year ended December 31, 2016, we recognized charges totaling $17.7 million related to this effort, which are in addition to, and separate from, the 2015 restructuring charges described below. These amounts, which were substantially incurred and paid by the end of 2016, were primarily related to severance and are reflected in restructuring charges in our consolidated statements of income.

Cambridge, MA Manufacturing Facility

In June 2016 following an evaluation of our current and future manufacturing capabilities and capacity needs, we determined that we intended to cease manufacturing and vacate our 67,000 square foot small-scale biologics manufacturing facility in Cambridge, MA and close and vacate our 46,000 square foot warehouse space in Somerville, MA.

In December 2016 we subleased our rights to the Cambridge, MA manufacturing facility to Brammer Bio MA, LLC (Brammer). Brammer also purchased from us certain manufacturing equipment, leasehold improvements and other assets in exchange for shares of Brammer common LLC interests and assumed manufacturing operations effective January 1, 2017. In December 2016 we closed and vacated our warehouse space in Somerville, MA.

Our departure from these facilities shortened the expected useful lives of certain leasehold improvements and other assets at these facilities. As a result, we recorded additional depreciation expense to reflect the assets' new shorter useful lives. For the year ended December 31, 2016, we recognized approximately $45.5 million of this additional depreciation, which was recorded as cost of sales in our consolidated statements of income.

In the fourth quarter of 2016 we also recognized charges totaling $7.4 million for severance costs related to certain employees separated from Biogen in connection with this transaction. These amounts were substantially incurred and paid by the end of first quarter of 2017 and are reflected in restructuring charges in our consolidated statements of income.

2015 Cost Saving Initiatives

2015 Restructuring Charges

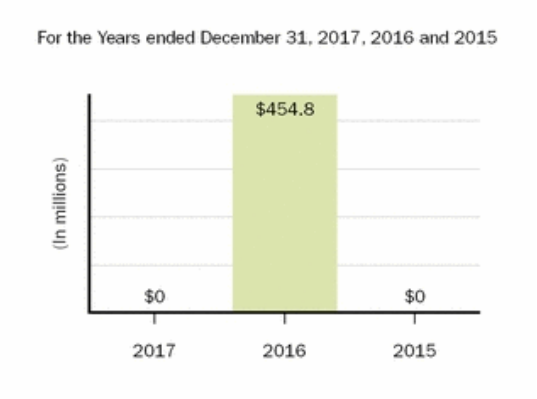
In October 2015 we announced a corporate restructuring, which included the termination of certain pipeline programs and an 11% reduction in workforce. Under this restructuring, cash payments were estimated to total approximately $120.0 million, of which $15.9 million were related to previously accrued 2015 incentive compensation, resulting in net restructuring charges totaling approximately $102.0 million. These amounts were substantially paid by the end of 2016.

During the years ended December 31, 2016 and 2015, we recognized $8.0 million and $93.4 million, respectively, of restructuring charges related to our 2015 restructuring program in our consolidated statements of income. Our restructuring reserve is included in accrued expenses and other in our consolidated balance sheets.

The following table summarizes the charges and spending related to our 2015 restructuring program:

(In millions)	Workforce Reduction	Pipeline Programs	Total
Restructuring reserve as of December 31, 2015	$ 33.7	$ 3.6	$ 37.3
Expense	4.9	5.4	10.3
Payment	(31.2)	(9.0)	(40.2)
Adjustments to previous estimates, net	(5.2)	2.9	(2.3)
Restructuring reserve as of December 31, 2016	$ 2.2	$ 2.9	$ 5.1
Payment	(1.7)	(2.9)	(4.6)
Restructuring reserve as of December 31, 2017	$ 0.5	$ —	$ 0.5

TECFIDERA Litigation Settlement Charge



As described above under *"Amortization of Acquired Intangible Assets - TECFIDERA License Rights,"* in January 2017 we entered into a settlement and license agreement with Forward Pharma pursuant to which we obtained U.S. and rest of world licenses to Forward Pharma's intellectual property, including Forward Pharma's intellectual property related to TECFIDERA. In exchange, we paid Forward Pharma $1.25 billion in cash. During the fourth quarter of 2016, we recognized a pre-tax charge of $454.8 million and in the first quarter of 2017 we recognized an intangible asset of $795.2 million related to this agreement. The pre-tax charge recognized in the fourth quarter of 2016 represented the fair value of our licenses to Forward Pharma's intellectual property for the period April 2014, when we started selling TECFIDERA, through December 31, 2016.

For additional information on our TECFIDERA settlement and license agreement, please read Note 7, *Intangible Assets and Goodwill*, to our consolidated financial statements included in this report.

Other Income (Expense), Net

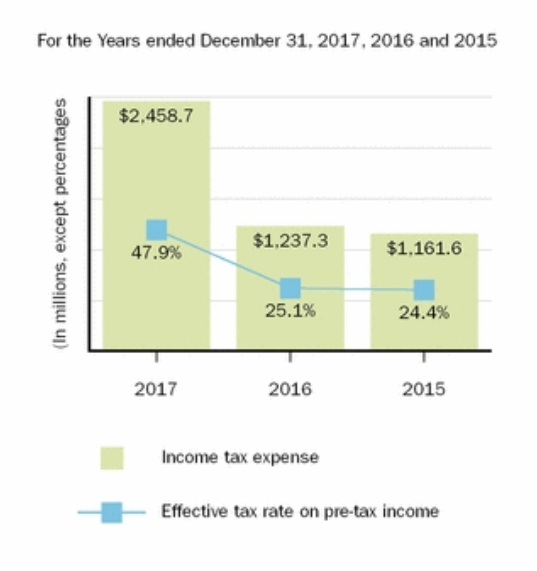
For 2017 compared to 2016, the change in other income (expense), net was primarily due to an increase in foreign currency exchange gains, an increase in interest income and a decrease in interest expense, partially offset by other than temporary impairments recorded on strategic investments and marketable debt securities during the year.

Interest expense for the year ended December 31, 2017, includes a net $5.2 million debt extinguishment charge recognized in November 2017 upon redemption of our 6.875% Senior Notes due March 1, 2018.

For additional information on this redemption and our outstanding indebtedness, please read Note 12, *Indebtedness*, to our consolidated financial statements included in this report.

For 2016 compared to 2015, the change in other income (expense), net was primarily due to an increase in interest expense as a result of the issuance of our senior unsecured notes in the third quarter of 2015. This increase was partially offset by an increase in interest income on higher yields and cash, cash equivalents and marketable securities balances as well as a decrease in foreign exchange losses recognized during the year ended December 31, 2016, compared to the prior year comparative period.

Income Tax Provision



Our effective tax rate fluctuates from year to year due to the global nature of our operations. The factors that most significantly impact our effective tax rate include changes in tax laws, variability in the allocation of our taxable earnings among multiple jurisdictions, the amount and characterization of our research and development expenses, the levels of certain deductions and credits, acquisitions and licensing transactions.

Our effective tax rate for 2017 compared to 2016 increased primarily due to the effect of the 2017 Tax Act and the impairment of prepaid tax assets related to our ZINBRYTA program.

On December 22, 2017, the 2017 Tax Act was signed into law and has resulted in significant changes to the U.S. corporate income tax system. The 2017 Tax Act includes a federal statutory rate reduction from 35% to 21%, the elimination or reduction of certain domestic deductions and credits, the Transition Toll Tax and other changes to taxation of foreign subsidiaries.

Changes in tax rates and tax laws are accounted for in the period of enactment. Therefore, during the year ended December 31, 2017, we recorded a charge totaling $1,173.6 million related to our current estimate of the provisions of the 2017 Tax Act, including a $989.6 million expense under the Transition Toll Tax. The Transition Toll Tax will be paid over an eight-year period, starting in 2018, and will not accrue interest.

The 2017 Tax Act will provide us with flexibility in deploying our cash resources to advance our business interests. We expect that it will have a modest positive effect on our income tax rate in 2018 and a potential incremental benefit thereafter.

Article 20 Procedure of ZINBRYTA

As a result of the CHMP's recommendation of restrictions on the use of ZINBRYTA, we impaired prepaid tax balances totaling $142.6 million. Offsetting these amounts was an unrecorded tax benefit related to certain ZINBRYTA related assets totaling approximately $93.8 million. For additional information on the Article 20 Procedure of ZINBRYTA and resulting impairment of ZINBRYTA related assets, please read Note 20, *Collaborative and Other Relationships*, to our consolidated financial statements included in this report.

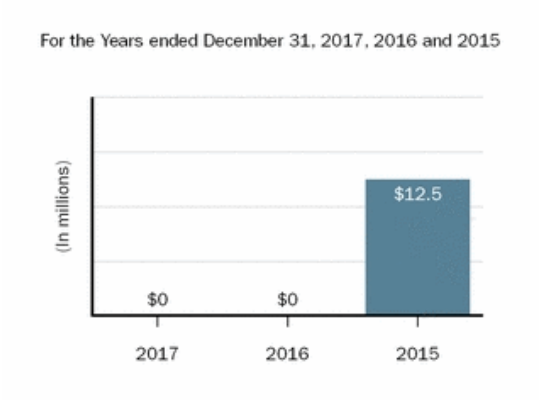
Excluding the effect of the 2017 Tax Act and the ZINBRTYA impairments, our income tax rate would have decreased due to a lower percentage of our earnings being recognized in the U.S., a higher tax jurisdiction. The geographic split of our earnings was affected by milestone and upfront payments in the current year and the spin-off of our hemophilia business, partially offset by growth from the U.S. launch of SPINRAZA and increases in our revenues from anti-CD20 therapeutic programs in the U.S. In addition, in 2017 we earned a lower benefit from the orphan drug credit due to the FDA's approval of SPINRAZA.

Our effective tax rate for 2016 compared to 2015 increased primarily due to a net state tax benefit in 2015 of $27.0 million resulting from the remeasurement of one of our uncertain tax positions and a higher relative percentage of our earnings being attributed to the U.S., a higher tax jurisdiction.

Accounting for Uncertainty in Income Taxes

For additional information on our uncertain tax positions and income tax rate reconciliation for 2017, 2016 and 2015, please read Note 17, *Income Taxes,* to our consolidated financial statements included in this report.

Equity in Loss of Investee, Net of Tax

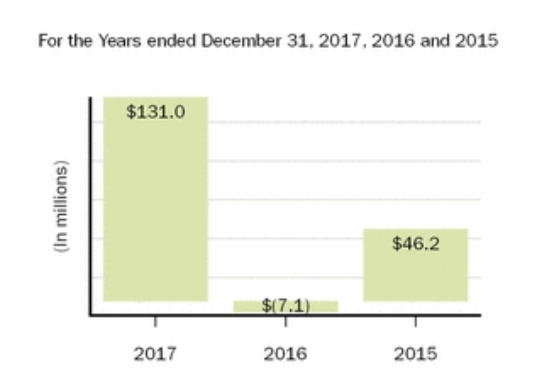


In February 2012 we entered into an agreement with Samsung Biologics, establishing an entity, Samsung Bioepis, to develop, manufacture and market biosimilar pharmaceuticals. We account for this investment under the equity method of accounting. We recognize our share of the results of operations related to our investment in Samsung Bioepis one quarter in arrears.

During 2015 our share of losses exceeded the carrying value of our investment. We therefore suspended recognizing additional losses and will continue to do so unless we commit to providing additional funding.

For additional information on this transaction, please read Note 20, *Collaborative and Other Relationships,* to our consolidated financial statements included in this report.

Noncontrolling Interest



For 2017 compared to 2016, the change in net income (loss) attributable to noncontrolling interests, net of tax, was primarily related to a $150.0 million pre-tax upfront payment made to Neurimmune in exchange for a 15% reduction in royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab.

Under the amended agreement, we also have an option that will expire in April 2018 to further reduce our royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab, by an additional 5% in exchange for a $50.0 million payment to Neurimmune.

For 2016 compared to 2015, the change in net income (loss) attributable to noncontrolling interests, net of tax, was primarily related to a $60.0 million pre-tax milestone payment made to Neurimmune in 2015.

For additional information on our collaboration arrangement with Neurimmune, please read Note 19, *Investments in Variable Interest Entities,* to our consolidated financial statements included in this report.

Financial Condition, Liquidity and Capital Resources

Our financial condition is summarized as follows:

	As of December 31,		% Change
(In millions, except percentages)	2017	2016	2017 compared to 2016
Financial assets:			
Cash and cash equivalents	$ 1,573.8	$ 2,326.5	(32.4)%
Marketable securities — current	2,115.2	2,568.6	(17.7)%
Marketable securities — non-current	3,057.3	2,829.4	8.1 %
Total cash, cash equivalents and marketable securities	$ 6,746.3	$ 7,724.5	(12.7)%
Borrowings:			
Current portion of notes payable and other financing arrangements	$ 3.2	$ 4.7	(31.9)%
Notes payable and other financing arrangements	5,935.0	6,512.7	(8.9)%
Total borrowings	$ 5,938.2	$ 6,517.4	(8.9)%
Working Capital:			
Current assets	$ 7,873.3	$ 8,732.2	(9.8)%
Current liabilities	(3,368.2)	(3,419.9)	(1.5)%
Total working capital	$ 4,505.1	$ 5,312.3	(15.2)%

For the year ended December 31, 2017, certain significant cash flows were as follows:

- $4.6 billion in net cash flows provided by operating activities, net of:
  - $1.1 billion in total net payments for income taxes;
  - $463.0 million in upfront and milestone payments to BMS, iPierian, Eisai, Alkermes and Ionis; and
  - $454.8 million payment made to Forward Pharma for the litigation settlement charge that was accrued as of December 31, 2016;
- $1.4 billion used for share repurchases;
- $1.2 billion in contingent payments made to former shareholders of Fumapharm AG and holders of their rights;
- $867.4 million used for purchases of property, plant and equipment;
- $795.2 million payment made to Forward Pharma to license Forward Pharma's intellectual property, including Forward Pharma's intellectual property related to TECFIDERA;
- $557.7 million payment made for the redemption of our 6.875% Senior Notes due March 1, 2018 prior to their maturity;
- $302.7 million net cash contribution made in connection with the spin-off of our hemophilia business;
- $295.0 million in upfront and milestone payments made to Remedy, Ionis and Samsung Bioepis; and
- $132.4 million payment, net of tax, made to Neurimmune in exchange for a 15% reduction in royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab.

For the year ended December 31, 2016, certain significant cash flows were as follows:

- $4.6 billion in net cash flows provided by operating activities, net of:
  - $1.6 billion in total net payments for income taxes;
  - $75.0 million license fee payment made to Ionis; and
  - $20.0 million upfront payment to UPenn;
- $1.2 billion in contingent payments made to former shareholders of Fumapharm AG and holders of their rights;
- $1.0 billion used for share repurchases;
- $616.1 million used for purchases of property, plant and equipment; and
- $82.0 million in milestone payments made to Samsung Bioepis and AbbVie.

Overview

We have historically financed our operating and capital expenditures primarily through cash flows earned through our operations. We expect to continue funding our current and planned operating requirements principally through our cash flows from operations, as well as our existing cash resources. We believe that our existing funds, when combined with cash generated from operations and our access to additional financing resources, if needed, are sufficient to satisfy our operating, working capital, strategic alliance, milestone payment, capital expenditure and debt service requirements for the foreseeable future. In addition, we may choose to opportunistically return cash to shareholders and pursue other business initiatives, including acquisition and licensing activities. We may, from time to time, also seek additional funding through a combination of new collaborative agreements, strategic alliances and additional equity and debt financings or from other sources should we identify a significant new opportunity.

Tax Reform

On December 22, 2017, the 2017 Tax Act was signed into law and has resulted in significant changes to the U.S. corporate income tax system.

The 2017 Tax Act eliminates the deferral of U.S. income tax on the historical unrepatriated earnings by imposing the Transition Toll Tax, which is a one-time mandatory deemed repatriation tax on undistributed foreign earnings. The Transition Toll Tax is assessed on the U.S. shareholder's share of the foreign corporation's accumulated foreign earnings that have not previously been taxed. Earnings in the form of cash and cash equivalents will be taxed at a rate of 15.5% and all other earnings will be taxed at a rate of 8.0%. As of December 31, 2017, we have accrued income tax liabilities of $989.6 million under the Transition Toll Tax, of which $78.3 million is expected to be paid within one year. The Transition Toll Tax will be paid over an eight-year period, starting in 2018, and will not accrue interest.

Of the total cash, cash equivalents and marketable securities at December 31, 2017, approximately $4.0 billion was generated in foreign

jurisdictions and may now be deployed with greater flexibility to advance our business interests.

For additional information on certain risks that could negatively impact our consolidated financial position or future results of operations, please read Item 1A. R*isk Factor*s and Item 7A. *Quantitative and Qualitative Disclosures About Market Risk* included in this report.

Share Repurchase Programs

In July 2016 our Board of Directors authorized our 2016 Share Repurchase Program to repurchase up to $5.0 billion of our common stock. This authorization does not have an expiration date. All share repurchases under this authorization will be retired. Under this authorization, we repurchased and retired 3.7 million and 3.3 million shares of our common stock during the years ended December 31, 2017 and 2016, respectively, at a cost of $1.0 billion for each year. As of December 31, 2017, approximately $3.0 billion remains available for share repurchases under this authorization.

In May 2015 our Board of Directors authorized our 2015 Share Repurchase Program to repurchase up to $5.0 billion of our common stock. All share repurchases under this authorization were retired. Our 2015 Share Repurchase Program was completed as of December 31, 2015. Under this authorization, we repurchased and retired 16.8 million shares of our common stock at a cost of $5.0 billion during the year ended December 31, 2015.

In February 2011 our Board of Directors authorized our 2011 Share Repurchase Program to repurchase up to 20.0 million shares of our common stock. Shares repurchased under this authorization have been principally used to offset common stock issuances under our share-based compensation plans. Our 2011 Share Repurchase Program was completed as of March 31, 2017. Under this authorization, we repurchased 1.2 million shares of our common stock at a cost of $365.4 million during the year ended December 31, 2017. We did not repurchase any shares of our common stock under this authorization during the years ended December 31, 2016 and 2015.

Cash, Cash Equivalents and Marketable Securities

Until required for another use in our business, we typically invest our cash reserves in bank deposits, certificates of deposit, commercial paper, corporate notes, U.S. and foreign government instruments and other interest bearing marketable debt instruments in accordance with our investment policy. It is our policy to mitigate credit risk in our cash reserves and marketable securities by maintaining a well-diversified portfolio that limits the amount of exposure as to institution, maturity and investment type.

The net decrease in cash, cash equivalents and marketable securities at December 31, 2017, from December 31, 2016, was primarily due to the payment made to Forward Pharma in connection with our January 2017 settlement and license agreement, the payment made for the redemption of our 6.875% Senior Notes due March 1, 2018 prior to their maturity in November 2017, cash used for share repurchases, the net cash contribution made in connection with the spin-off of our hemophilia business in February 2017, net purchases of property, plant and equipment, upfront and milestone payments made to Remedy, Ionis and Samsung Bioepis and the payment to Neurimmune in exchange for a 15% reduction in royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab.

Borrowings

The following is a summary of our principal indebtedness as of December 31, 2017:

- $1.5 billion aggregate principal amount of 2.90% Senior Notes due September 15, 2020, valued at 99.792% of par;
- $1.0 billion aggregate principal amount of 3.625% Senior Notes due September 15, 2022, valued at 99.920% of par;
- $1.75 billion aggregate principal amount of 4.05% Senior Notes due September 15, 2025, valued at 99.764% of par; and
- $1.75 billion aggregate principal amount of 5.20% Senior Notes due September 15, 2045, valued at 99.294% of par.

These senior unsecured notes were issued at a discount and are amortized as additional interest expense over the period from issuance through maturity.

In November 2017 we redeemed our 6.875% Senior Notes due March 1, 2018, with an aggregate principal amount of $550.0 million. For additional information on this redemption please read Note 12, *Indebtedness,* to our consolidated financial statements included in this report.

During the third quarter of 2015, we entered into a $1.0 billion, five-year senior unsecured revolving credit facility under which we are permitted to draw funds for working capital and general corporate purposes. The terms of the revolving credit facility include a financial covenant that requires us not to exceed a maximum consolidated leverage ratio. As of December 31, 2017, we had no outstanding borrowings and were in compliance with all covenants under this facility.

In connection with our 2006 distribution agreement with Fumedica, we issued notes totaling 61.4 million Swiss Francs that are payable to Fumedica in varying amounts from June 2008 through June 2018. Our remaining note payable to Fumedica, payable in June 2018, had a carrying value of 3.1 million Swiss Francs ($3.2 million) and 6.2 million Swiss Francs ($6.0 million) as of December 31, 2017 and 2016, respectively.

For a summary of the fair values of our outstanding borrowings as of December 31, 2017 and 2016, please read Note 8, *Fair Value Measurements,* to our consolidated financial statements included in this report.

Working Capital

We define working capital as current assets less current liabilities. The change in working capital at December 31, 2017, from December 31, 2016, reflects a decrease in total current assets of $858.9 million, partially offset by a decrease in current liabilities of $51.7 million.

The decrease in total current assets was driven by a decrease in net cash, cash equivalents and marketable securities, as described above, partially offset by an increase in accounts receivable due to an increase in revenues and the timing of customer payments, including amounts due in connection with anti-CD20 therapeutic programs.

The decrease in total current liabilities primarily resulted from a reduction in taxes payable and accrued expenses primarily due to the payment of the $454.8 million charge that was accrued as of December 31, 2016, in relation to our settlement and license agreement with Forward Pharma, offset by an increase in the accrual of contingent payments related to FUMADERM and TECFIDERA (together, the Fumapharm Products) upon reaching $15.0 billion and $16.0 billion in total cumulative sales of Fumapharm Products in the fourth quarter of 2017.

Cash Flows

The following table summarizes our cash flow activity:

	For the Years Ended December 31,			% Change	
(In millions, except percentages)	2017	2016	2015	2017 compared to 2016	2016 compared to 2015
Net cash flows provided by operating activities	$ 4,551.0	$ 4,587.2	$ 3,919.4	(0.8)%	17.0 %
Net cash flows used in by investing activities	$ (2,963.1)	$ (2,484.8)	$ (4,553.6)	19.2 %	(45.4)%
Net cash flows (used in) provided by financing activities	$ (2,380.0)	$ (1,052.6)	$ 783.1	126.1 %	(234.4)%

Operating Activities

Cash flows from operating activities represent the cash receipts and disbursements related to all of our activities other than investing and financing activities. We expect cash provided from operating activities will continue to be our primary source of funds to finance operating needs and capital expenditures for the foreseeable future.

Operating cash flow is derived by adjusting our net income for:

- Non-cash operating items such as depreciation and amortization, impairment charges, acquired in-process research and development and share-based compensation;
- Changes in operating assets and liabilities which reflect timing differences between the receipt and payment of cash associated with transactions and when they are recognized in results of operations; and
- Changes associated with the fair value of contingent payments associated with our acquisitions of businesses and payments related to collaborations.

For 2017 compared to 2016, net cash flows provided by operations were relatively consistent. Higher sales and lower income tax payments were offset by the $454.8 million payment related to our settlement and license agreement with Forward Pharma, which had been accrued as of December 31, 2016, and the timing of customer payments, including

amounts due in connection with anti-CD20 therapeutic programs.

Net income was lower in 2017, primarily due to the Transition Toll Tax under the 2017 Tax Act and higher depreciation and amortization.

For 2016 compared to 2015, the increase in cash provided by operating activities was primarily driven by higher net income, non-cash charges for depreciation and amortization, a comparative increase in accrued expenses and other liabilities, partially offset by a comparative increase in accounts receivable.

Investing Activities

For 2017 compared to 2016, the increase in net cash flows used in investing activities was primarily due to:

- the $795.2 million payment made to Forward Pharma to license Forward Pharma's intellectual property, including Forward Pharma's intellectual property related to TECFIDERA;
- an increase in purchases of property, plant and equipment primarily related to the construction of our Solothurn, Switzerland facility;
- $175.0 million in milestone payments made to Ionis and Samsung Bioepis; and
- the $120.0 million payment made to Remedy for the purchase of BIIB093.

These increases were partially offset by an increase in net proceeds of marketable securities.

For 2016 compared to 2015, the decrease in net cash flows used in investing activities was primarily due to a decrease in net purchases of marketable securities and cash paid for the acquisition of Convergence Pharmaceuticals (Convergence) in February 2015, partially offset by an increase in the contingent consideration related to the Fumapharm AG acquisition.

Financing Activities

For 2017 compared to 2016, the increase in net cash flows used in financing activities was primarily due to an increase in cash used for share repurchases, the payment made for the redemption of our 6.875% Senior Notes due March 1, 2018 prior to their maturity, the $302.7 million net cash contribution made in connection with the spin-off of our hemophilia business on February 1, 2017, and the net distributions to noncontrolling interest, including the payment made to Neurimmune in exchange for a 15% reduction in royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab.

For 2016 compared to 2015, the decrease in net cash flows provided by financing activities was primarily due to the issuance of our senior unsecured notes issued in the third quarter of 2015, partially offset by a decrease in the purchases of common stock.

Contractual Obligations and Off-Balance Sheet Arrangements

Contractual Obligations

The following table summarizes our contractual obligations as of December 31, 2017, excluding amounts related to uncertain tax positions, funding commitments, contingent development, regulatory and commercial milestone payments, TYSABRI contingent payments and contingent consideration related to our business combinations, as described below.

	Payments Due by Period				
(In millions)	Total	Less than 1 Year	1 to 3 Years	3 to 5 Years	After 5 Years
Non-cancellable operating leases (1), (2)	$ 428.5	$ 48.3	$ 92.1	$ 88.3	$ 199.8
Long-term debt obligations (3)	9,430.0	244.8	1,983.3	1,396.3	5,805.6
Purchase and other obligations (4)	1,657.1	637.3	344.9	234.6	440.3
Defined benefit obligation	91.8	—	—	—	91.8
Total contractual obligations	$ 11,607.4	$ 930.4	$ 2,420.3	$ 1,719.2	$ 6,537.5

(1) We lease properties and equipment for use in our operations. Amounts reflected within the table above detail future minimum rental commitments under non-cancelable operating leases as of December 31 for each of the periods presented. In addition to the minimum rental commitments, these leases may require us to pay additional amounts for taxes, insurance, maintenance and other operating expenses.

(2) Obligations are presented net of sublease income expected to be received for the vacated small-scale biologics manufacturing facility in Cambridge, MA, the vacated portion of our Weston, MA facility and other facilities throughout the world.

(3) Long-term debt obligations are primarily related to our Senior Notes, including principal and interest payments.

(4) Purchase and other obligations primarily includes our obligations to purchase direct materials, $989.6 million related to our current estimate of the impact of the 2017 Tax Act, $270.0 million in contractual commitments for the construction of our large-scale biologics manufacturing facility in Solothurn, Switzerland and $111.3 million related to the fair value of net liabilities on derivative contracts.

TYSABRI Contingent Payments

In 2013 we acquired from Elan full ownership of all remaining rights to TYSABRI that we did not already own or control. Under the acquisition agreement, we are obligated to make contingent payments to Elan of 18% on annual worldwide net sales up to $2.0 billion and 25% on annual worldwide net sales that exceed $2.0 billion. Royalty payments to Elan and other third parties are recognized as cost of sales in our consolidated statements of income. Elan was acquired by Perrigo Company plc (Perrigo) in December 2013, and Perrigo subsequently sold its rights to these payments to a third party effective January 2017.

Contingent Consideration related to Business Combinations

In connection with our acquisitions of Convergence, Stromedix, Inc. (Stromedix) and Biogen International Neuroscience GmbH (BIN), we agreed to make additional payments based upon the achievement of certain milestone events.

As the acquisitions of Convergence, Stromedix and BIN occurred after January 1, 2009, we recorded the contingent consideration liabilities associated with these transactions at their fair value on the acquisition date and revalue these obligations each reporting period. We may pay up to approximately $1.1 billion in remaining milestones related to these acquisitions. For additional information on our acquisition of Convergence please read Note 2, *Acquisitions*, to our consolidated financial statements included in this report.

Fumapharm AG

In 2006 we acquired Fumapharm AG. As part of this acquisition we acquired FUMADERM and TECFIDERA (together, Fumapharm Products). We are required to make contingent payments to the former shareholders of Fumapharm AG or holders of their rights based on the attainment of certain cumulative sales levels of Fumapharm Products and the level of total net sales of Fumapharm Products in the prior 12-month period, as defined in the acquisition agreement.

During 2017 we paid $1.2 billion in contingent payments as we reached the $11.0 billion, $12.0 billion, $13.0 billion and $14.0 billion cumulative sales levels related to the Fumapharm Products in the fourth quarter of 2016 and the first, second and third quarters of 2017, respectively, and accrued $600.0 million upon reaching $15.0 billion and $16.0 billion in total cumulative sales of Fumapharm Products in the fourth quarter of 2017.

We will owe an additional $300.0 million contingent payment for every additional $1.0 billion in cumulative sales level of Fumapharm Products reached if the prior 12 months sales of the Fumapharm Products exceed $3.0 billion, until such time as the cumulative sales level reaches $20.0 billion, at which time no further contingent payments shall be due. If the prior 12 months sales of Fumapharm Products are less than $3.0 billion, contingent payments remain payable on a decreasing tiered basis. These payments will be accounted for as an increase to goodwill as incurred, in accordance with the accounting standard applicable to business combinations when we acquired Fumapharm. Any portion of the payment that is tax deductible will be recorded as a reduction to goodwill. Payments are due within 60 days following the end of the quarter in which the applicable cumulative sales level has been reached.

Contingent Development, Regulatory and Commercial Milestone Payments

Based on our development plans as of December 31, 2017, we could make potential future milestone payments to third parties of up to approximately $4.2 billion, including approximately $0.7 billion in development milestones, approximately $1.5 billion in regulatory milestones and approximately $2.0 billion in commercial milestones

as part of our various collaborations, including licensing and development programs. Payments under these agreements generally become due and payable upon achievement of certain development, regulatory or commercial milestones. Because the achievement of these milestones was not considered probable as of December 31, 2017, such contingencies have not been recorded in our financial statements. Amounts related to contingent milestone payments are not considered contractual obligations as they are contingent on the successful achievement of certain development, regulatory approval and commercial milestones.

Provided various development, regulatory or commercial milestones are achieved, we anticipate that we may pay approximately $110.0 million of milestone payments in 2018.

Other Funding Commitments

As of December 31, 2017, we have several on-going clinical studies in various clinical trial stages. Our most significant clinical trial expenditures are to CROs. The contracts with CROs are generally cancellable, with notice, at our option. We have recorded accrued expenses of approximately $40.0 million in our consolidated balance sheet for expenditures incurred by CROs as of December 31, 2017. We have approximately $460.0 million in cancellable future commitments based on existing CRO contracts as of December 31, 2017.

Tax Related Obligations

We exclude liabilities pertaining to uncertain tax positions from our summary of contractual obligations as we cannot make a reliable estimate of the period of cash settlement with the respective taxing authorities. As of December 31, 2017, we have approximately $77.3 million of net liabilities associated with uncertain tax positions.

As of December 31, 2017, we have accrued income tax liabilities of $989.6 million under the Transition Toll Tax, of which $78.3 million is expected to be paid within one year. The Transition Toll Tax will be paid over an eight-year period, starting in 2018, and will not accrue interest.

Other Off-Balance Sheet Arrangements

We do not have any relationships with entities often referred to as structured finance or special purpose entities that were established for the purpose of facilitating off-balance sheet arrangements. As such, we are not exposed to any financing, liquidity, market or credit risk that could arise if we had engaged in such relationships. We consolidate variable interest entities if we are the primary beneficiary.

Legal Matters

For a discussion of legal matters as of December 31, 2017, please read Note 21, *Litigation,* to our consolidated financial statements included in this report.

Critical Accounting Estimates

The preparation of our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the U.S. (U.S. GAAP), requires us to make estimates, judgments and assumptions that may affect the reported amounts of assets, liabilities, equity, revenues and expenses and related disclosure of contingent assets and liabilities. On an on-going basis we evaluate our estimates, judgments and methodologies. We base our estimates on historical experience and on various other assumptions that we believe are reasonable, the results of which form the basis for making judgments about the carrying values of assets, liabilities and equity and the amount of revenues and expenses. Actual results may differ from these estimates under different assumptions or conditions. Other significant accounting policies are outlined in Note 1, *Summary of Significant Accounting Policies*, to our consolidated financial statements included in this report.

Revenue Recognition and Related Allowances

We recognize revenues when all of the following criteria are met: persuasive evidence of an arrangement exists; delivery has occurred or services have been rendered; our price to the customer is fixed or determinable; and collectability is reasonably assured. For additional information on the new accounting standard for revenues from contracts with customers please read Note 1, *Summary of Significant Accounting Policies: New Accounting Pronouncements,* to our consolidated financial statements included in this report.

Product Revenues

Revenues from product sales are recognized when title and risk of loss have passed to the customer, which is typically upon delivery. Product revenues are recorded net of applicable reserves for discounts and allowances. The timing of distributor orders and shipments can cause variability in earnings.

Reserves for Discounts and Allowances

Revenues from product sales are recorded net of reserves established for applicable discounts and allowances, including those associated with the implementation of pricing actions in certain of the international markets in which we operate. These reserves are based on estimates of the amounts

earned or to be claimed on the related sales and are classified as reductions of accounts receivable (if the amount is payable to our customer) or a liability (if the amount is payable to a party other than our customer). Our estimates take into consideration our historical experience, current contractual and statutory requirements, specific known market events and trends, industry data and forecasted customer buying and payment patterns. Actual amounts may ultimately differ from our estimates. If actual results vary, we adjust these estimates, which could have an effect on earnings in the period of adjustment.

In addition to the discounts and rebates described above and classified as a reduction of revenue, we also maintain certain customer service contracts with distributors and other customers in the distribution channel that provide us with inventory management, data and distribution services, which are generally reflected as a reduction of revenue. To the extent we can demonstrate a separable benefit and fair value for these services we classify these payments within selling, general and administrative expenses.

Concentrations of Credit Risk

The majority of our accounts receivable arise from product sales in the U.S. and Europe and are primarily due from wholesale distributors, public hospitals and other government entities. We monitor the financial performance and creditworthiness of our customers so that we can properly assess and respond to changes in their credit profile. We continue to monitor these conditions, including the volatility associated with international economies and the relevant financial markets, and assess their possible impact on our business. Credit and economic conditions in the E.U. continue to remain uncertain, which has, from time to time, led to longer collection periods for our accounts receivable and greater collection risk in certain countries.

Where our collections continue to be subject to significant payment delays due to government funding and reimbursement practices and a portion of these receivables are routinely being collected beyond our contractual payment terms and over periods in excess of one year, we have discounted our receivables and reduced related revenues based on the period of time that we estimate those amounts will be paid, to the extent such period exceeds one year, using the country's market-based borrowing rate for such period. The related receivables are classified at the time of sale as non-current assets.

To date, we have not experienced any significant losses with respect to the collection of our accounts receivable. If economic conditions worsen and/or the financial condition of our customers were to further deteriorate, our risk of collectability may increase, which may result in additional allowances and/or significant bad debts.

For additional information on our concentration of credit risk associated with our accounts receivable balances, please read the subsection entitled *"Credit Risk"* in Item 7A. *Quantitative and Qualitative Disclosures About Market Risk* included in this report.

Capitalization of Inventory Costs

We capitalize inventory costs associated with our products prior to regulatory approval, when, based on management's judgment, future commercialization is considered probable and the future economic benefit is expected to be realized. We consider numerous attributes in evaluating whether the costs to manufacture a particular product should be capitalized as an asset. We assess the regulatory approval process and where the particular product stands in relation to that approval process, including any known safety or efficacy concerns, potential labeling restrictions and other impediments to approval. We evaluate our anticipated research and development initiatives and constraints relating to the product and the indication in which it will be used. We consider our manufacturing environment including our supply chain in determining logistical constraints that could hamper approval or commercialization. We consider the shelf life of the product in relation to the expected timeline for approval and we consider patent related or contract issues that may prevent or delay commercialization. We also base our judgment on the viability of commercialization, trends in the marketplace and market acceptance criteria. Finally, we consider the reimbursement strategies that may prevail with respect to the product and assess the economic benefit that we are likely to realize. We expense previously capitalized costs related to pre-approval inventory upon a change in such judgment, due to, among other potential factors, a denial or significant delay of approval by necessary regulatory bodies. All changes in judgment in relation to pre-approval inventory have historically been insignificant.

Acquired Intangible Assets, including In-process Research and Development (IPR&D)

When we purchase a business, the acquired IPR&D is measured at fair value, capitalized as an intangible asset and tested for impairment at least annually, as of October 31, until commercialization, after which time the IPR&D is amortized over its estimated useful life. If we acquire an asset or group of assets that do not meet the definition of a business under applicable accounting standards, the acquired IPR&D is expensed upon its acquisition date. Future costs to develop these assets are recorded to research and development expense as they are incurred.

We have acquired, and expect to continue to acquire, intangible assets through the acquisition of biotechnology companies or through the consolidation of variable interest entities. These intangible assets primarily consist of technology associated with human therapeutic products and IPR&D product candidates. When significant identifiable intangible assets are acquired, we generally engage an independent third-party valuation firm to assist in determining the fair values of these assets as of the acquisition date. Management will determine the fair value of less significant identifiable intangible assets acquired. Discounted cash flow models are typically used in these valuations, and these models require the use of significant estimates and assumptions including but not limited to:

- estimating the timing of and expected costs to complete the in-process projects;
- projecting regulatory approvals;
- estimating future cash flows from product sales resulting from completed products and in process projects; and
- developing appropriate discount rates and probability rates by project.

We believe the fair values assigned to the intangible assets acquired are based upon reasonable estimates and assumptions given available facts and circumstances as of the acquisition dates.

If these projects are not successfully developed, the sales and profitability of the company may be adversely affected in future periods. Additionally, the value of the acquired intangible assets may become impaired. We believe that the foregoing assumptions used in the IPR&D analysis were reasonable. No assurance can be given that the underlying assumptions used to estimate expected project sales, development costs or profitability, or the events associated with such projects, will transpire as estimated.

Certain IPR&D programs have a fair value that is not significantly in excess of carrying value, including our program for the treatment of TGN. Such programs could become impaired if assumptions used in determining the fair value change.

Impairment and Amortization of Long-lived Assets and Accounting for Goodwill

Long-lived Assets Other than Goodwill

Long-lived assets to be held and used include property, plant and equipment as well as intangible assets, including IPR&D and trademarks. Property, plant and equipment are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of the assets may not be recoverable. We review our intangible assets with indefinite lives for impairment annually, as of October 31, and whenever events or changes in circumstances indicate that the carrying value of an asset may not be recoverable.

When performing our impairment assessment, we calculate the fair value using the same methodology as described above under *"Acquired Intangible Assets, including In-process Research and Development (IPR&D)"*. If the carrying value of our acquired IPR&D exceeds its fair value, then the intangible asset is written-down to its fair value. Certain IPR&D programs have a fair value that is not significantly in excess of carrying value, including treatments for forms of neuropathic pain, such as TGN. Such programs could become impaired if assumptions used in determining the fair value change.

Our most significant intangible assets are our acquired and in-licensed rights and patents and developed technology. Acquired and in-licensed rights and patents primarily relate to obtaining the fair value of the U.S. and rest of world licenses to Forward Pharma's intellectual property, including Forward Pharma's intellectual property related to TECFIDERA, and our acquisition of all remaining rights to TYSABRI from Elan. Developed technology primarily relates to our AVONEX product, which was recorded in connection with the merger of Biogen, Inc. and IDEC Pharmaceuticals Corporation in 2003. We amortize the intangible assets related to TECFIDERA, TYSABRI and AVONEX using the economic consumption method based on revenues generated from the products underlying the related intangible assets. An analysis of the anticipated lifetime revenues of TECFIDERA, TYSABRI and AVONEX is performed annually during our long-range planning cycle, which is generally updated in the third quarter of each year, and whenever events or changes in circumstances would significantly affect the anticipated lifetime revenues of TECFIDERA, TYSABRI or AVONEX.

For additional information on the impairment charges related to our long-lived assets during 2017 and 2016, please read Note 7, *Intangible Assets and Goodwill,* to our consolidated financial statements included in this report. Impairment charges related to our long-lived assets during 2015 were insignificant.

Goodwill

Goodwill relates largely to amounts that arose in connection with the merger of Biogen, Inc. and IDEC Pharmaceuticals Corporation in 2003 and amounts that are being paid in connection with the acquisition of Fumapharm AG. Our goodwill balances represent the difference between the purchase price and the fair value of the identifiable tangible and intangible net assets when accounted for using the purchase method of accounting.

We assess our goodwill balance within our single reporting unit annually, as of October 31, and whenever events or changes in circumstances indicate the carrying value of goodwill may not be recoverable to determine whether any impairment in this asset may exist and, if so, the extent of such impairment. We compare the fair value of our reporting unit to its carrying value. If the carrying value of the net assets assigned to the reporting unit exceeds the fair value of our reporting unit, we would record an impairment loss equal to the difference.

We completed our required annual impairment test in the fourth quarters of 2017, 2016 and 2015, respectively, and determined in each of those periods that the carrying value of goodwill was not impaired. In each year, the fair value of our reporting unit, which includes goodwill, was significantly in excess of the carrying value of our reporting unit.

Investments, including Fair Value Measures and Impairments

We invest in various types of securities, including short-term and long-term marketable securities, principally corporate notes, government securities including government sponsored enterprise mortgage-backed securities and credit card and auto loan asset-backed securities, in which our excess cash balances are invested.

In accordance with the accounting standard for fair value measurements, we have classified our financial assets as Level 1, 2 or 3 within the fair value hierarchy. Fair values determined by Level 1 inputs utilize quoted prices (unadjusted) in active markets for identical assets that we have the ability to access. Fair values determined by Level 2 inputs utilize data points that are observable such as quoted prices, interest rates, yield curves and foreign currency spot rates. Fair values determined by Level 3 inputs utilize unobservable data points for the asset.

As noted in Note 8, *Fair Value Measurements,* to our consolidated financial statements included in this report, a majority of our financial assets have been classified as Level 2. These assets have been initially valued at the transaction price and subsequently valued utilizing third-party pricing services. The pricing services use many observable market inputs to determine value, including reportable trades, benchmark yields, credit spreads, broker/dealer quotes, bids, offers, current spot rates and other industry and economic events. We validate the prices provided by our third-party pricing services by understanding the models used, obtaining market values from other pricing sources and analyzing pricing data in certain instances.

Impairment

We conduct periodic reviews to identify and evaluate each investment that has an unrealized loss, in accordance with the meaning of other-than-temporary impairment and its application to certain investments. An unrealized loss exists when the current fair value of an individual security is less than its amortized cost basis. Unrealized losses on available-for-sale debt securities that are determined to be temporary, and not related to credit loss, are recorded, net of tax, in accumulated other comprehensive income.

For available-for-sale debt securities with unrealized losses, management performs an analysis to assess whether we intend to sell or whether we would more likely than not be required to sell the security before the expected recovery of the amortized cost basis. Where we intend to sell a security, or may be required to do so, the security's decline in fair value is deemed to be other-than-temporary and the full amount of the unrealized loss is reflected within earnings as an impairment loss.

Regardless of our intent to sell a security, we perform additional analysis on all securities with unrealized losses to evaluate losses associated with the creditworthiness of the security. Credit losses are identified where we do not expect to receive cash flows sufficient to recover the amortized cost basis of a security and are reflected within earnings as an impairment loss.

Share-Based Compensation

We make certain assumptions in order to value and record expense associated with awards made under our share-based compensation arrangements. Changes in these assumptions may lead to variability with respect to the amount of expense we recognize in connection with share-based payments.

Determining the appropriate valuation model and related assumptions requires judgment, and includes estimating the expected market price of our stock on vesting date and stock price volatility as well as the term of the expected awards. 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.

We also estimate forfeitures over the requisite service period when recognizing share-based compensation expense based on historical rates and forward-looking factors. These estimates are adjusted to the extent that actual forfeitures differ, or are expected to materially differ, from our estimates.

Contingent Consideration

For acquisitions completed before January 1, 2009, we record contingent consideration resulting from a business combination when the contingency is resolved. For acquisitions completed after January 1, 2009, we record contingent consideration resulting from a business combination at its fair value on the acquisition date. Each reporting period thereafter, we revalue these obligations and record increases or decreases in their fair value as an adjustment to contingent consideration expense in our consolidated statements of income. Changes in the fair value of the contingent consideration obligations can result from changes to one or multiple inputs including adjustments to the discount rates and achievement and timing of any cumulative sales-based and development milestones, or changes in the probability of certain clinical events and changes in the assumed probability associated with regulatory approval. These fair value measurements represent Level 3 measurements as they are based on significant inputs not observable in the market.

Significant judgment is employed in determining the appropriateness of these assumptions as of the acquisition date and for each subsequent period. Accordingly, changes in assumptions described above, could have a material impact on the amount of contingent consideration expense we record in any given period.

Restructuring Charges

We have made estimates and judgments regarding the amount and timing of our restructuring expense and liability, including current and future period termination benefits, pipeline program termination costs and other exit costs to be incurred when related actions take place. Severance and other related costs are reflected in our consolidated statements of income as a component of total restructuring charges incurred. Actual results may differ from these estimates.

Income Taxes

We prepare and file income tax returns based on our interpretation of each jurisdiction's tax laws and regulations. In preparing our consolidated financial statements, we estimate our income tax liability in each of the jurisdictions in which we operate by estimating our actual current tax expense together with assessing temporary differences resulting from differing treatment of items for tax and financial reporting purposes. These differences result in deferred tax assets and liabilities, which are included in our consolidated balance sheets. Significant management judgment is required in assessing the realizability of our deferred tax assets. In performing this assessment, we consider whether it is more likely than not that some portion or all of the deferred tax assets will not be realized. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences become deductible. In making this determination, under the applicable financial accounting standards, we are allowed to consider the scheduled reversal of deferred tax liabilities, projected future taxable income and the effects of tax planning strategies. Our estimates of future taxable income include, among other items, our estimates of future income tax deductions related to the exercise of stock options. In the event that actual results differ from our estimates, we adjust our estimates in future periods and we may need to establish a valuation allowance, which could materially impact our consolidated financial position and results of operations.

All tax effects associated with intercompany transfers of assets within our consolidated group, both current and deferred, are recorded as a prepaid tax or deferred charge and recognized through our consolidated statements of income when the asset transferred is sold to a third-party or otherwise recovered through amortization of the asset's remaining economic life. If the asset transferred becomes impaired, for example through the obsolescence of inventory or the discontinuation of a research program, we will expense any remaining deferred charge or prepaid tax. As of December 31,

2017, total deferred charges and prepaid taxes were $617.7 million. For additional information on the new accounting standard related to tax effects associated with intercompany transfers of assets within our consolidated group, please read Note 1, *Summary of Significant Accounting Policies: New Accounting Pronouncements,* to our consolidated financial statements included in this report.

We account for uncertain tax positions using a "more-likely-than-not" threshold for recognizing and resolving uncertain tax positions. We evaluate uncertain tax positions on a quarterly basis and consider various factors that include, but are not limited to, changes in tax law, the measurement of tax positions taken or expected to be taken in tax returns, the effective settlement of matters subject to audit, information obtained during in process audit activities and changes in facts or circumstances related to a tax position. We adjust the level of the liability to reflect any subsequent changes in the relevant facts surrounding the uncertain positions. Our liabilities for uncertain tax positions can be relieved only if the contingency becomes legally extinguished, through either payment to the taxing authority or the expiration of the statute of limitations, the recognition of the benefits associated with the position meet the "more-likely-than-not" threshold or the liability becomes effectively settled through the examination process. We consider matters to be effectively settled once the taxing authority has completed all of its required or expected examination procedures, including all appeals and administrative reviews, we have no plans to appeal or litigate any aspect of the tax position, and we believe that it is highly unlikely that the taxing authority would examine or re-examine the related tax position. We also accrue for potential interest and penalties related to unrecognized tax benefits in income tax expense.

We earn a significant amount of our operating income outside the U.S. As a result, a portion of our cash, cash equivalents and marketable securities are held by foreign subsidiaries.

On December 22, 2017, the 2017 Tax Act was signed into law and has resulted in significant changes to the U.S. corporate income tax system.

The 2017 Tax Act eliminates the deferral of U.S. income tax on the historical unrepatriated earnings by imposing the Transition Toll Tax, which is a one-time mandatory deemed repatriation tax on undistributed foreign earnings. The Transition Toll Tax is assessed on the U.S. shareholder's share of the foreign corporation's accumulated foreign earnings that have not previously been taxed. Earnings in the form of cash and cash equivalents will be taxed at a rate of 15.5% and all other earnings will be taxed at a rate of 8.0%. As of December 31, 2017, we have accrued income tax liabilities of $989.6 million under the Transition Toll Tax, of which $78.3 million is expected to be paid within one year. The Transition Toll Tax will be paid over an eight-year period, starting in 2018, and will not accrue interest.

New Accounting Standards

For a discussion of new accounting standards and their expected impact on our consolidated financial statements or disclosures, please read Note 1, *Summary of Significant Accounting Policies,* to our consolidated financial statements included in this report.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

Market Risk

We are subject to certain risks that may affect our results of operations, cash flows and fair values of assets and liabilities, including volatility in foreign currency exchange rates, interest rate movements, pricing pressures worldwide and weak economic conditions in the foreign markets in which we operate. We manage the impact of foreign currency exchange rates and interest rates through various financial instruments, including derivative instruments such as foreign currency forward contracts, interest rate lock contracts and interest rate swap contracts. We do not enter into financial instruments for trading or speculative purposes. The counterparties to these contracts are major financial institutions, and there is no significant concentration of exposure with any one counterparty.

Foreign Currency Exchange Risk

Our results of operations are subject to foreign currency exchange rate fluctuations due to the global nature of our operations. We have operations or maintain distribution relationships in the U.S., Europe, Canada, Asia, and Central and South America. In addition, we recognize our share of pre-tax co-promotion profits on RITUXAN in Canada. As a result, our consolidated financial position, results of operations and cash flows can be affected by market fluctuations in foreign currency exchange rates, primarily with respect to the Euro, British pound sterling, Canadian dollar, Swiss franc, Danish krone and Japanese yen.

While the financial results of our global activities are reported in U.S. dollars, the functional currency for most of our foreign subsidiaries is their respective local currency. Fluctuations in the foreign currency exchange rates of the countries in which we do business will affect our operating results, often in ways that are difficult to predict. In particular, as the U.S. dollar strengthens versus other currencies, the value of the non-U.S. revenues will decline when reported in U.S. dollars. The impact to net income as a result of a strengthening U.S. dollar will be partially mitigated by the value of non-U.S. expenses, which will also decline when reported in U.S. dollars. As the U.S. dollar weakens versus other currencies, the value of the non-U.S. revenues and expenses will increase when reported in U.S. dollars.

We have established revenue and operating expense hedging and balance sheet risk management programs to protect against volatility of future foreign currency cash flows and changes in fair value caused by volatility in foreign currency exchange rates.

In June 2016 the U.K. voted in a referendum to voluntarily depart from the E.U., known as Brexit, and in March 2017, the U.K. formally started the process for the U.K. to leave the E.U. The macroeconomic impact on our results of operations from these developments remains unknown. To date, the foreign currency exchange impact has been insignificant since we hedged the balance sheet foreign currency exchange risk.

Revenue and Operating Expense Hedging Program

Our foreign currency hedging program is designed to mitigate, over time, a portion of the impact resulting from volatility in exchange rate changes on revenues and operating expenses. We use foreign currency forward contracts to manage foreign currency risk, with the majority of our forward contracts used to hedge certain forecasted revenue and operating expense transactions denominated in foreign currencies in the next 21 months. We do not engage in currency speculation. For a more detailed disclosure of our revenue and operating expense hedging program, please read Note 10, *Derivative Instruments,* to our consolidated financial statements included in this report.

Our ability to mitigate the impact of exchange rate changes on revenues and net income diminishes as significant exchange rate fluctuations are sustained over extended periods of time. In particular, devaluation or significant deterioration of foreign currency exchange rates are difficult to mitigate and likely to negatively impact earnings. The cash flows from these contracts are reported as operating activities in our consolidated statements of cash flows.

Balance Sheet Risk Management Hedging Program

We also use forward contracts to mitigate the foreign currency exposure related to certain balance sheet items. The primary objective of our balance sheet risk management program is to mitigate the exposure of foreign currency denominated net monetary assets and liabilities of foreign affiliates. In these instances, we principally utilize currency forward contracts. We have not elected hedge accounting for the balance sheet related items. The cash flows from these contracts are reported as operating activities in our consolidated statements of cash flows.

The following quantitative information includes the impact of currency movements on forward contracts used in our revenue, operating expense and balance sheet hedging programs. As of December 31, 2017 and 2016, a hypothetical adverse 10% movement in foreign currency rates compared to the U.S. dollar across all maturities would result in a hypothetical decrease in the fair value of forward contracts of approximately $286.0 million and $172.0 million, respectively. The estimated fair value change was determined by measuring the impact of the hypothetical exchange rate movement on outstanding forward contracts. Our use of this methodology to quantify the market risk of such instruments is subject to assumptions and actual impact could be significantly different. The quantitative information about market risk is limited because it does not take into account all foreign currency operating transactions.

Interest Rate Risk

Our investment portfolio includes cash equivalents and short-term investments. The fair value of our marketable securities 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 100 basis point adverse movement across all maturities. As of December 31, 2017 and 2016, we estimate that such hypothetical 100 basis point adverse movement would result in a hypothetical loss in fair value of approximately $50.0 million to our interest rate sensitive instruments. The fair values of our investments were determined using third-party pricing services or other market observable data.

To achieve a desired mix of fixed and floating interest rate debt, we entered into interest rate swap contracts during 2015 for certain of our fixed-rate debt. These derivative contracts effectively converted a fixed-rate interest coupon to a floating-rate LIBOR-based coupon over the life of the respective note. As of December 31, 2017 and 2016, a 100 basis-point adverse movement (increase in LIBOR) would increase

annual interest expense by approximately $6.8 million.

Pricing Pressure

Governments in some international markets in which we operate have implemented measures aimed at reducing healthcare costs to limit the overall level of government expenditures. These measures vary by country and may include, among other things, patient access restrictions, suspensions on price increases, prospective and possibly retroactive price reductions and other recoupments and increased mandatory discounts or rebates, recoveries of past price increases and greater importation of drugs from lower-cost countries.

In addition, certain countries set prices by reference to the prices in other countries where our products are marketed. Thus, our inability to secure favorable prices in a particular country may impair our ability to obtain acceptable prices in existing and potential new markets, which may limit market growth. The continued implementation of pricing actions throughout Europe may also lead to higher levels of parallel trade.

In the U.S., federal and state legislatures, health agencies and third-party payors continue to focus on containing the cost of health care. Legislative and regulatory proposals, enactments to reform health care insurance programs and increasing pressure from social sources could significantly influence the manner in which our products are prescribed and purchased. It is possible that additional federal health care reform measures will be adopted in the future, which could result in increased pricing pressure and reduced reimbursement for our products and otherwise have an adverse impact on our consolidated financial position or results of operations.

Our products are also susceptible to increasing competition from generics and biosimilars in many markets. Generic versions of drugs and biosimilars are likely to be sold at substantially lower prices than branded products. Accordingly, the introduction of generic or biosimilar versions of our marketed products, as well as lower-priced competing products, likely would significantly reduce both the price that we receive for such marketed products and the volume of products that we sell, which may have an adverse impact on our consolidated results of operations.

There is also significant economic pressure on state budgets that results in states increasingly seeking to achieve budget savings through mechanisms that limit coverage or payment for our drugs. Managed care organizations are also continuing to seek price discounts and, in some cases, to impose restrictions on the coverage of particular drugs.

Credit Risk

We are subject to credit risk from our accounts receivable related to our product sales. The majority of our accounts receivable arise from product sales in the U.S. and Europe with concentrations of credit risk limited due to the wide variety of customers and markets using our products, as well as their dispersion across many different geographic areas. Our accounts receivable are primarily due from wholesale distributors, public hospitals and other government entities. We monitor the financial performance and creditworthiness of our customers so that we can properly assess and respond to changes in their credit profile. We operate in certain countries where weakness in economic conditions can result in extended collection periods. We continue to monitor these conditions, including the volatility associated with international economies and the relevant financial markets, and assess their possible impact on our business. To date, we have not experienced any significant losses with respect to the collection of our accounts receivable.

Credit and economic conditions in the E.U. continue to remain uncertain, which has, from time to time, led to long collection periods for our accounts receivable and greater collection risk in certain countries.

We believe that our allowance for doubtful accounts was adequate as of December 31, 2017 and 2016. However, if significant changes occur in the availability of government funding or the reimbursement practices of these or other governments, we may not be able to collect on amounts due to us from customers in such countries and our results of operations could be adversely affected.

Item 8. Financial Statements and Supplementary Data

The information required by this Item 8 is contained on pages F-1 through F-78 of this report and is incorporated herein 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 and Internal Control over Financial Reporting

Controls and Procedures

We have carried out an evaluation, under the supervision and with the participation of our management, including our principal executive officer and principal financial officer, of the effectiveness of the design and operation of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended), as of December 31, 2017. Based upon that evaluation, our principal executive officer and principal financial officer concluded that, as of the end of the period covered by this report, our disclosure controls and procedures are effective in ensuring that (a) the information required to be disclosed by us in the reports that we file or submit under the Securities Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms and (b) such information 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. In designing and evaluating our disclosure controls and procedures, our management recognized that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives, and our management necessarily was required to apply its judgment in evaluating the cost-benefit relationship of possible controls and procedures.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting during the quarter ended December 31, 2017, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Management's Annual Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over our financial reporting. Internal control over financial reporting is defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act as a process designed by, or under the supervision of, a company's principal executive and principal financial officers and effected by a company's board of directors, management and other personnel to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with U.S. GAAP. Our internal control over financial reporting includes those policies and procedures that:

- pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect our transactions and dispositions of our assets;
- provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with U.S. GAAP, 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. 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.

Our management assessed the effectiveness of our internal control over financial reporting as of December 31, 2017. 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 our assessment, our management has concluded that, as of December 31, 2017, our internal control over financial reporting is effective based on those criteria.

The effectiveness of our internal control over financial reporting as of December 31, 2017, has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their attestation report, which is included herein.

Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

The information concerning our executive officers is set forth under the heading *"Our Executive Officers"* in Item 1 of this report. The text of our code of business conduct, which includes the code of ethics that applies to our principal executive officer, principal financial officer, principal accounting officer or controller, and persons performing similar functions, is posted on our website, www.biogen.com, under the *"Governance"* subsection of the *"About Us"* section of the site. We intend to make all required disclosures regarding any amendments to, or waivers from, provisions of our code of business conduct at the same location of our website.

The response to the remainder of this item is incorporated by reference from the discussion responsive thereto in the sections entitled *"Proposal 1 - Election of Directors," "Corporate Governance at Biogen," "Stock Ownership - Section 16(a) Beneficial Ownership Reporting Compliance"* and *"Miscellaneous - Stockholder Proposals"* contained in the proxy statement for our 2018 annual meeting of stockholders.

Item 11. Executive Compensation

The response to this item is incorporated by reference from the discussion responsive thereto in the sections entitled *"Executive Compensation Matters"* and *"Corporate Governance at Biogen"* contained in the proxy statement for our 2018 annual meeting of stockholders.

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

The response to this item is incorporated by reference from the discussion responsive thereto in the sections entitled *"Stock Ownership"* and *"Equity Compensation Plan Information"* contained in the proxy statement for our 2018 annual meeting of stockholders.

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

The response to this item is incorporated by reference from the discussion responsive thereto in the sections entitled *"Certain Relationships and Related Person Transactions"* and *"Corporate Governance at Biogen"* contained in the proxy statement for our 2018 annual meeting of stockholders.

Item 14. Principal Accounting Fees and Services

The response to this item is incorporated by reference from the discussion responsive thereto in the section entitled *"Proposal 2 — Ratification of the Selection of our Independent Registered Public Accounting Firm"* contained in the proxy statement for our 2018 annual meeting of stockholders.

PART IV

Item 15. Exhibits and Financial Statement Schedules

a. (1) Consolidated Financial Statements:

The following financial statements are filed as part of this report:

Certain totals may not sum due to rounding.

(2) Exhibits

The exhibits listed on the Exhibit Index beginning on page 94, which is incorporated herein by reference, are filed or furnished as part of this report or are incorporated into this report by reference.

(3) Financial Statement Schedules

Schedules are omitted because they are not applicable, or are not required, or because the information is included in the consolidated financial statements and notes thereto.

Item 16. Form 10-K Summary

Not applicable.

EXHIBIT INDEX

Exhibit No.	Description
2.1†	Asset Purchase Agreement among Biogen Idec International Holding Ltd., Elan Pharma International Limited and Elan Pharmaceuticals, Inc., dated as of February 5, 2013. Filed as Exhibit 2.1 to our Current Report on Form 8-K/A filed on February 12, 2013.
2.2	Separation Agreement between Biogen Inc. and Bioverativ Inc. dated as of January 31, 2017. Filed as Exhibit 2.1 to our Current Report on Form 8-K filed on February 2, 2017.
3.1	Amended and Restated Certificate of Incorporation, as amended. Filed as Exhibit 3.1 to our Quarterly Report on Form 10-Q for the quarter ended June 30, 2012.
3.2	Certificate of Amendment to the Certificate of Incorporation. Filed as Exhibit 3.1 to our Current Report on Form 8-K filed on March 27, 2015.
3.3	Fourth Amended and Restated Bylaws. Filed as Exhibit 3.1 to our Current Report on Form 8-K filed on June 9, 2017.
4.1	Reference is made to Exhibit 3.1 for a description of the rights, preferences and privileges of our Series A Preferred Stock and Series X Junior Participating Preferred Stock.
4.2	Indenture between Biogen Inc. and U.S. Bank National Association, dated as of September 15, 2015. Filed as Exhibit 4.1 to our Current Report on Form 8-K filed on September 16, 2015.
4.3	First Supplemental Indenture between Biogen Inc. and U.S. Bank National Association, dated September 15, 2015. Filed as Exhibit 4.2 to our Current Report on Form 8-K filed on September 16, 2015.
10.1	Credit Agreement between Biogen Inc., Bank of America, N.A., Goldman Sachs Bank USA and other lenders party thereto, dated August 28, 2015. Filed as Exhibit 10.1 to our Current Report on Form 8-K filed on September 1, 2015.
10.2†	Second Amended and Restated Collaboration Agreement between Biogen Idec Inc. and Genentech, Inc., dated as of October 18, 2010. Filed as Exhibit 10.5 to our Annual Report on Form 10-K for the year ended December 31, 2010.
10.3†	Letter Agreement regarding GA101 financial terms between Biogen Idec Inc. and Genentech, Inc., dated October 18, 2010. Filed as Exhibit 10.6 to our Annual Report on Form 10-K for the year ended December 31, 2010.
10.4	Settlement and License Agreement, dated January 17, 2017, between Biogen Swiss Manufacturing GmbH, Biogen International Holdings ltd., Forward Pharma A/S and other parties thereto. Filed as Exhibit 10.1 to our Current Report on Form 8-K filed on February 1, 2017.
10.5*	Biogen Inc. 2017 Omnibus Equity Plan. Filed as Appendix B to our Definitive Proxy Statement on Schedule 14A filed on April 26, 2017.
10.6*	Form of restricted stock unit award agreement under the Biogen Inc. 2017 Omnibus Equity Plan. Filed as Exhibit 10.2 to our Quarterly Report on Form 10-Q for the quarter ended June 30, 2017.
10.7*	Form of market stock unit award agreement under the Biogen Inc. 2017 Omnibus Equity Plan. Filed as Exhibit 10.3 to our Quarterly Report on Form 10-Q for the quarter ended June 30, 2017.
10.8*	Form of performance unit award agreement under the Biogen Inc. 2017 Omnibus Equity Plan. Filed as Exhibit 10.4 to our Quarterly Report on Form 10-Q for the quarter ended June 30, 2017.
10.9*	Form of cash-settled performance unit award agreement under the Biogen Inc. 2017 Omnibus Equity Plan. Filed as Exhibit 10.5 to our Quarterly Report on Form 10-Q for the quarter ended June 30, 2017.
10.10*+	Form of performance stock units award agreement (cash-settled) under the Biogen Inc. 2017 Omnibus Equity Plan.
10.11*+	Form of performance stock units award agreement under the Biogen Inc. 2017 Omnibus Equity Plan.
10.12*	Biogen Idec Inc. 2008 Amended and Restated Omnibus Equity Plan. Filed as Exhibit 10.1 to our Quarterly Report on Form 10-Q for the quarter ended March 31, 2014.
10.13*	Form of performance unit award agreement under the Biogen Idec Inc. 2008 Omnibus Equity Plan. Filed as Exhibit 10.2 to our Quarterly Report on Form 10-Q for the quarter ended March 31, 2014.

Exhibit No.	Description
10.14*	Form of market stock unit award agreement under the Biogen Idec Inc. 2008 Omnibus Equity Plan. Filed as Exhibit 10.3 to our Quarterly Report on Form 10-Q for the quarter ended March 31, 2014.
10.15*	Form of restricted stock unit award agreement under the Biogen Idec Inc. 2008 Omnibus Equity Plan. Filed as Exhibit 10.1 to our Current Report on Form 8-K filed on August 1, 2008.
10.16*	Form of nonqualified stock option award agreement under the Biogen Idec Inc. 2008 Omnibus Equity Plan. Filed as Exhibit 10.2 to our Current Report on Form 8-K filed on August 1, 2008.
10.17*	Form of cash-settled performance shares award agreement under the Biogen Idec Inc. 2008 Omnibus Equity Plan. Filed as Exhibit 10.1 to our Quarterly Report on Form 10-Q for the quarter ended March 31, 2010.
10.18*	Biogen Inc. 2006 Non-Employee Directors Equity Plan, as amended. Filed as Exhibit 10.1 to our Quarterly Report on Form 10-Q for the quarter ended March 31, 2015.
10.19*	Biogen Inc. 2015 Employee Stock Purchase Plan. Filed as Appendix A to our Definitive Proxy Statement on Schedule 14A filed on April 30, 2015.
10.20*	Biogen Idec Inc. 2008 Performance-Based Management Incentive Plan. Filed as Appendix B to our Definitive Proxy Statement on Schedule 14A filed on May 8, 2008.
10.21*	Biogen Idec Inc. Voluntary Executive Supplemental Savings Plan, as amended and restated effective January 1, 2004. Filed as Exhibit 10.13 to our Annual Report on Form 10-K for the year ended December 31, 2003.
10.22*	Biogen Idec Inc. Supplemental Savings Plan, as amended. Filed as Exhibit 10.23 to our Annual Report on Form 10-K for the year ended December 31, 2015.
10.23*	Biogen Idec Inc. Voluntary Board of Directors Savings Plan, as amended. Filed as Exhibit 10.24 to our Annual Report on Form 10-K for the year ended December 31, 2015.
10.24*	Biogen Idec Inc. Executive Severance Policy - U.S. Executive Vice President, as amended effective January 1, 2014. Filed as Exhibit 10.39 to our Annual Report on Form 10-K for the year ended December 31, 2013.
10.25*	Biogen Idec Inc. Executive Severance Policy - International Executive Vice President, as amended effective January 1, 2014. Filed as Exhibit 10.40 to our Annual Report on Form 10-K for the year ended December 31, 2013.
10.26*	Biogen Idec Inc. Executive Severance Policy - U.S. Senior Vice President, as amended effective October 13, 2008. Filed as Exhibit 10.53 to our Annual Report on Form 10-K for the year ended December 31, 2008.
10.27*	Biogen Idec Inc. Executive Severance Policy - International Senior Vice President, as amended effective October 13, 2008. Filed as Exhibit 10.54 to our Annual Report on Form 10-K for the year ended December 31, 2008.
10.28*+	Annual Retainer Summary for Board of Directors.
10.29*	Form of indemnification agreement for directors and executive officers. Filed as Exhibit 10.1 to our Current Report on Form 8-K filed on June 7, 2011.
10.30*	Employment Agreement between Biogen Inc. and Michel Vounatsos dated December 18, 2016. Filed as Exhibit 10.1 to our Current Report on Form 8-K filed on December 19, 2016.
10.31*+	Letter regarding employment arrangement of Jeffrey Capello dated November 14, 2017.
10.32*+	Letter regarding employment arrangement of Gregory Covino dated February 25, 2012.
10.33*+	Letter regarding employment arrangement of Michael Ehlers dated April 16, 2016.
10.34*	Letter regarding employment arrangement of Susan Alexander dated December 31, 2005. Filed as Exhibit 10.58 to our Annual Report on Form 10-K for the year ended December 31, 2009.
10.35*	Employment Agreement between Biogen Idec. Inc. and George A. Scangos amended as of August 23, 2013. Filed as Exhibit 10.1 to our Current Report on Form 8-K filed on August 26, 2013.
10.36*	Letter regarding employment arrangement of Paul J. Clancy dated August 17, 2007. Filed as Exhibit 10.49 to our Annual Report on Form 10-K for the year ended December 31, 2007.
10.37*	Letter regarding employment arrangement of John Cox dated May 19, 2016. Filed as Exhibit 10.1 to our Quarterly Report on Form 10-Q for the quarter ended June 30, 2016.

Exhibit No.	Description
10.38*	Letter regarding employment arrangement of Kenneth DiPietro dated December 12, 2011. Filed as Exhibit 10.49 to our Annual Report on Form 10-K for the year ended December 31, 2012.
21+	Subsidiaries.
23+	Consent of PricewaterhouseCoopers LLP, an Independent Registered Public Accounting Firm.
31.1+	Certification of the Chief Executive Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2+	Certification of the Chief Financial Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1++	Certification of the Chief Executive Officer and the Chief Financial Officer pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101++	The following materials from Biogen Inc.'s Annual Report on Form 10-K for the year ended December 31, 2017, formatted in XBRL (Extensible Business Reporting Language): (i) the Consolidated Statements of Income, (ii) the Consolidated Statements of Comprehensive Income, (iii) the Consolidated Balance Sheets, (iv) the Consolidated Statements of Cash Flows, (v) the Consolidated Statements of Equity and (vi) Notes to Consolidated Financial Statements.

^ References to "our" filings mean filings made by Biogen Inc. and filings made by IDEC Pharmaceuticals Corporation prior to the merger with Biogen, Inc. Unless otherwise indicated exhibits were previously filed with the Securities and Exchange Commission under Commission File Number 0-19311 and are incorporated herein by reference.

* Management contract or compensatory plan or arrangement.

† Confidential treatment has been granted or requested with respect to portions of this exhibit.

\+ Filed herewith.

\+ \+ Furnished herewith.

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.

BIOGEN INC.

By: /S/ MICHEL VOUNATSOS
Michel Vounatsos
Chief Executive Officer

Date: February 1, 2018

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

Name	Capacity	Date
/S/ MICHEL VOUNATSOS Michel Vounatsos	Director and Chief Executive Officer (principal executive officer)	February 1, 2018
/S/ Jeffrey D. Capello Jeffrey D. Capello	Executive Vice President and Chief Financial Officer (principal financial officer)	February 1, 2018
/S/ GREGORY F. COVINO Gregory F. Covino	Vice President, Finance, Chief Accounting Officer (principal accounting officer)	February 1, 2018
/S/ STELIOS PAPADOPOULOS Stelios Papadopoulos	Director and Chairman of the Board of Directors	February 1, 2018
/S/ ALEXANDER J. DENNER Alexander J. Denner	Director	February 1, 2018
/S/ CAROLINE D. DORSA Caroline D. Dorsa	Director	February 1, 2018
/S/ NANCY L. LEAMING Nancy L. Leaming	Director	February 1, 2018
/S/ RICHARD C. MULLIGAN Richard C. Mulligan	Director	February 1, 2018
/S/ ROBERT W. PANGIA Robert W. Pangia	Director	February 1, 2018
/S/ BRIAN S. POSNER Brian S. Posner	Director	February 1, 2018
/S/ ERIC K. ROWINSKY Eric K. Rowinsky	Director	February 1, 2018
/S/ LYNN SCHENK Lynn Schenk	Director	February 1, 2018
/S/ STEPHEN A. SHERWIN Stephen A. Sherwin	Director	February 1, 2018

BIOGEN INC. AND SUBSIDIARIES
CONSOLIDATED FINANCIAL STATEMENTS

BIOGEN INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF INCOME
(In millions, except per share amounts)

	For the Years Ended December 31,		
	2017	2016	2015
Revenues:			
Product, net	$ 10,354.7	$ 9,817.9	$ 9,188.5
Revenues from anti-CD20 therapeutic programs	1,559.2	1,314.5	1,339.2
Other	360.0	316.4	236.1
Total revenues	12,273.9	11,448.8	10,763.8
Cost and expenses:			
Cost of sales, excluding amortization of acquired intangible assets	1,630.0	1,478.7	1,240.4
Research and development	2,253.6	1,973.3	2,012.8
Selling, general and administrative	1,935.5	1,947.9	2,113.1
Amortization of acquired intangible assets	814.7	385.6	382.6
Acquired in-process research and development	120.0	—	—
Collaboration profit (loss) sharing	112.3	10.2	—
Loss (gain) on fair value remeasurement of contingent consideration	62.7	14.8	30.5
Restructuring charges	0.9	33.1	93.4
TECFIDERA litigation settlement charge	—	454.8	—
Total cost and expenses	6,929.7	6,298.4	5,872.8
Income from operations	5,344.2	5,150.4	4,891.0
Other income (expense), net	(215.4)	(217.4)	(123.7)
Income before income tax expense and equity in loss of investee, net of tax	5,128.8	4,933.0	4,767.3
Income tax expense	2,458.7	1,237.3	1,161.6
Equity in loss of investee, net of tax	—	—	12.5
Net income	2,670.1	3,695.7	3,593.2
Net income (loss) attributable to noncontrolling interests, net of tax	131.0	(7.1)	46.2
Net income attributable to Biogen Inc.	$ 2,539.1	$ 3,702.8	$ 3,547.0
Net income per share:			
Basic earnings per share attributable to Biogen Inc.	$ 11.94	$ 16.96	$ 15.38
Diluted earnings per share attributable to Biogen Inc.	$ 11.92	$ 16.93	$ 15.34
Weighted-average shares used in calculating:			
Basic earnings per share attributable to Biogen Inc.	212.6	218.4	230.7
Diluted earnings per share attributable to Biogen Inc.	213.0	218.8	231.2

See accompanying notes to these consolidated financial statements.

BIOGEN INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(In millions)

	For the Years Ended December 31,		
	2017	2016	2015
Net income attributable to Biogen Inc.	$ 2,539.1	$ 3,702.8	$ 3,547.0
Other comprehensive income:			
Unrealized gains (losses) on securities available for sale:			
Unrealized gains (losses) recognized during the period, net of tax	(3.5)	(10.6)	(1.7)
Less: reclassification adjustment for (gains) losses included in net income, net of tax	12.7	0.6	1.3
Unrealized gains (losses) on securities available for sale, net of tax	9.2	(10.0)	(0.4)
Unrealized gains (losses) on cash flow hedges:			
Unrealized gains (losses) recognized during the period, net of tax	(193.8)	51.6	110.8
Less: reclassification adjustment for (gains) losses included in net income, net of tax	31.5	(4.0)	(172.3)
Unrealized gains (losses) on cash flow hedges, net of tax	(162.3)	47.6	(61.5)
Unrealized gains (losses) on pension benefit obligation, net of tax	(4.1)	5.1	(6.2)
Currency translation adjustment	158.7	(138.6)	(96.4)
Total other comprehensive income (loss), net of tax	1.5	(95.9)	(164.5)
Comprehensive income attributable to Biogen Inc.	2,540.6	3,606.9	3,382.5
Comprehensive income (loss) attributable to noncontrolling interests, net of tax	131.0	(7.1)	46.2
Comprehensive income	$ 2,671.6	$ 3,599.8	$ 3,428.7

See accompanying notes to these consolidated financial statements.

BIOGEN INC. AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS
(In millions, except per share amounts)

	As of December 31,	
	2017	2016
ASSETS		
Current assets:		
Cash and cash equivalents	$ 1,573.8	$ 2,326.5
Marketable securities	2,115.2	2,568.6
Accounts receivable, net	1,787.0	1,441.6
Due from anti-CD20 therapeutic programs	532.6	300.6
Inventory	902.7	1,001.6
Other current assets	962.0	1,093.3
Total current assets	7,873.3	8,732.2
Marketable securities	3,057.3	2,829.4
Property, plant and equipment, net	3,182.4	2,501.8
Intangible assets, net	3,879.6	3,808.3
Goodwill	4,632.5	3,669.3
Investments and other assets	1,027.5	1,335.8
Total assets	$ 23,652.6	$ 22,876.8
LIABILITIES AND EQUITY		
Current liabilities:		
Current portion of notes payable and other financing arrangements	$ 3.2	$ 4.7
Taxes payable	68.2	231.9
Accounts payable	395.5	279.8
Accrued expenses and other	2,901.3	2,903.5
Total current liabilities	3,368.2	3,419.9
Notes payable and other financing arrangements	5,935.0	6,512.7
Deferred tax liability	122.6	93.1
Other long-term liabilities	1,628.7	722.5
Total liabilities	11,054.5	10,748.2
Commitments and contingencies		
Equity:		
Biogen Inc. shareholders' equity		
Preferred stock, par value $0.001 per share	—	—
Common stock, par value $0.0005 per share	0.1	0.1
Additional paid-in capital	97.8	—
Accumulated other comprehensive loss	(318.4)	(319.9)
Retained earnings	15,810.4	15,071.6
Treasury stock, at cost; 23.8 million and 22.6 million shares, respectively	(2,977.1)	(2,611.7)
Total Biogen Inc. shareholders' equity	12,612.8	12,140.1
Noncontrolling interests	(14.7)	(11.5)
Total equity	12,598.1	12,128.6
Total liabilities and equity	$ 23,652.6	$ 22,876.8

See accompanying notes to these consolidated financial statements.

BIOGEN INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS
(In millions)

	For the Years Ended December 31,		
	2017	2016	2015
Cash flows from operating activities:			
Net income	$ 2,670.1	$ 3,695.7	$ 3,593.2
Adjustments to reconcile net income to net cash flows from operating activities:			
Depreciation and amortization	1,081.0	682.7	600.4
Acquired in-process research and development	120.0	—	—
Share-based compensation	128.0	154.8	161.4
Deferred income taxes	91.7	(175.0)	(145.6)
Contingent consideration	62.7	14.8	30.5
Other	162.1	89.0	129.9
Changes in operating assets and liabilities, net:			
Accounts receivable	(435.6)	(241.4)	29.0
Due from anti-CD20 therapeutic programs	(232.0)	13.9	(31.1)
Inventory	(94.5)	(165.6)	(174.4)
Other assets	(76.6)	59.1	(127.0)
Accrued expenses and other current liabilities	(227.4)	622.3	199.3
Income tax assets and liabilities	1,303.9	(232.6)	(429.4)
Other liabilities	(2.4)	69.5	83.2
Net cash flows provided by operating activities	4,551.0	4,587.2	3,919.4
Cash flows from investing activities:			
Proceeds from sales and maturities of marketable securities	5,565.9	7,378.9	4,063.0
Purchases of marketable securities	(5,355.2)	(7,913.2)	(6,864.9)
Contingent consideration related to Fumapharm AG acquisition	(1,200.0)	(1,200.0)	(850.0)
Acquired in-process research and development	(120.0)	—	—
Acquisitions of businesses, net of cash acquired	—	—	(198.8)
Purchases of property, plant and equipment	(867.4)	(616.1)	(643.0)
Acquisitions of intangible assets	(975.4)	(111.6)	(15.4)
Other	(11.0)	(22.8)	(44.5)
Net cash flows used in investing activities	(2,963.1)	(2,484.8)	(4,553.6)
Cash flows from financing activities:			
Purchases of treasury stock	(1,365.4)	(1,000.0)	(5,000.0)
Payments related to issuance of stock for share-based compensation arrangements, net	(5.3)	(8.5)	(70.9)
Net distribution to noncontrolling interest	(134.1)	—	(56.1)
Proceeds from borrowings	—	—	5,930.5
Repayments of borrowings	(560.9)	(2.7)	(2.1)
Net cash contribution to Bioverativ, Inc.	(302.7)	—	—
Contingent consideration payments	(3.0)	(38.6)	(13.1)
Other	(8.6)	(2.8)	(5.2)
Net cash flows provided by (used in) financing activities	(2,380.0)	(1,052.6)	783.1
Net increase in cash and cash equivalents	(792.1)	1,049.8	148.9
Effect of exchange rate changes on cash and cash equivalents	39.4	(31.3)	(45.8)
Cash and cash equivalents, beginning of the year	2,326.5	1,308.0	1,204.9
Cash and cash equivalents, end of the year	$ 1,573.8	$ 2,326.5	$ 1,308.0

See accompanying notes to these consolidated financial statements.

BIOGEN INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF EQUITY
(In millions)

	Preferred stock		Common stock		Additional paid-in capital	Accumulated other comprehensive loss	Retained earnings	Treasury stock		Total Biogen Inc. shareholders' equity	Noncontrolling interests	Total equity
	Shares	Amount	Shares	Amount				Shares	Amount			
Balance, December 31, 2016	—	$ —	238.5	$ 0.1	$ —	$ (319.9)	$ 15,071.6	(22.6)	$(2,611.7)	$ 12,140.1	$ (11.5)	$12,128.6
Net income							2,539.1			2,539.1	131.0	2,670.1
Other comprehensive income (loss), net of tax						1.5				1.5	—	1.5
Capital contribution by noncontrolling interest										—	15.8	15.8
Distribution to noncontrolling interest										—	(150.0)	(150.0)
Repurchase of common stock pursuant to the 2016 Share Repurchase Program, at cost								(3.7)	(1,000.0)	(1,000.0)		(1,000.0)
Retirement of common stock pursuant to the 2016 Share Repurchase Program, at cost			(3.7)	—	(36.0)		(964.0)	3.7	1,000.0	—		—
Repurchase of common stock pursuant to the 2011 Share Repurchase Program, at cost								(1.2)	(365.4)	(365.4)		(365.4)
Issuance of common stock under stock option and stock purchase plans			0.2	—	40.5		—			40.5		40.5
Issuance of common stock under stock award plan			0.3	—	(44.8)		(1.0)			(45.8)		(45.8)
Compensation related to share-based payments					138.1					138.1		138.1
Hemophilia spin-off adjustment							(852.8)			(852.8)		(852.8)
Tax benefit							17.5			17.5		17.5
Balance, December 31, 2017	—	$ —	235.3	$ 0.1	$ 97.8	$ (318.4)	$ 15,810.4	(23.8)	$(2,977.1)	$ 12,612.8	$ (14.7)	$12,598.1

See accompanying notes to these consolidated financial statements.

BIOGEN INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF EQUITY - (Continued)
(In millions)

	Preferred stock		Common stock		Additional paid-in capital	Accumulated other comprehensive loss	Retained earnings	Treasury stock		Total Biogen Inc. shareholders' equity	Noncontrolling interests	Total equity
	Shares	Amount	Shares	Amount				Shares	Amount			
Balance, December 31, 2015	—	$ —	241.2	$ 0.1	$ —	$ (224.0)	$12,208.4	(22.6)	$(2,611.7)	$ 9,372.8	$ 2.1	$ 9,374.9
Net income							3,702.8			3,702.8	(7.1)	3,695.7
Other comprehensive income (loss), net of tax						(95.9)				(95.9)	0.1	(95.8)
Acquisition of noncontrolling interest										—	(0.6)	(0.6)
Capital contribution by noncontrolling interest										—	1.5	1.5
Deconsolidation of noncontrolling interest										—	(7.5)	(7.5)
Repurchase of common stock pursuant to the 2016 Share Repurchase Program, at cost								(3.3)	(1,000.0)	(1,000.0)		(1,000.0)
Retirement of common stock pursuant to the 2016 Share Repurchase Program, at cost			(3.3)	—	(164.9)		(835.1)	3.3	1,000.0	—		—
Issuance of common stock under stock option and stock purchase plans			0.2	—	43.7					43.7		43.7
Issuance of common stock under stock award plan			0.4	—	(47.6)		(4.5)			(52.1)		(52.1)
Compensation related to share-based payments					169.4					169.4		169.4
Tax benefit from share-based payments					(0.6)					(0.6)		(0.6)
Balance, December 31, 2016	—	$ —	238.5	$ 0.1	$ —	$ (319.9)	$15,071.6	(22.6)	$(2,611.7)	$ 12,140.1	$ (11.5)	$ 12,128.6

See accompanying notes to these consolidated financial statements.

BIOGEN INC. AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF EQUITY - (Continued)
(In millions)

	Preferred stock		Common stock		Additional paid-in capital	Accumulated other comprehensive loss	Retained earnings	Treasury stock		Total Biogen Inc. shareholders' equity	Noncontrolling interests	Total equity
	Shares	Amount	Shares	Amount				Shares	Amount			
Balance, December 31, 2014	—	$ —	257.1	$ 0.1	$4,196.2	$ (59.5)	$ 9,283.9	(22.6)	$(2,611.7)	$ 10,809.0	$ 5.0	$ 10,814.0
Net income							3,547.0			3,547.0	46.2	3,593.2
Other comprehensive income (loss), net of tax						(164.5)				(164.5)	—	(164.5)
Distribution to noncontrolling interests										—	(60.0)	(60.0)
Acquisition of noncontrolling interests										—	10.9	10.9
Repurchase of common stock pursuant to the 2015 Share Repurchase Program, at cost								(16.8)	(5,000.0)	(5,000.0)		(5,000.0)
Retirement of common stock pursuant to the 2015 Share Repurchase Program, at cost			(16.8)	—	(4,377.5)		(622.5)	16.8	5,000.0	—		—
Issuance of common stock under stock option and stock purchase plans			0.3	—	54.2					54.2		54.2
Issuance of common stock under stock award plan			0.6	—	(125.1)					(125.1)		(125.1)
Compensation related to share-based payments					183.2					183.2		183.2
Tax benefit from share-based payments					69.0					69.0		69.0
Balance, December 31, 2015	—	$ —	241.2	$ 0.1	$ —	$ (224.0)	$12,208.4	(22.6)	$(2,611.7)	$ 9,372.8	$ 2.1	$ 9,374.9

See accompanying notes to these consolidated financial statements.

1. Summary of Significant Accounting Policies

Business Overview

Biogen is a global biopharmaceutical company focused on discovering, developing and delivering worldwide innovative therapies for people living with serious neurological and neurodegenerative diseases, including in our core growth areas of multiple sclerosis (MS) and neuroimmunology, Alzheimer's disease (AD) and dementia, movement disorders and neuromuscular disorders, including spinal muscular atrophy (SMA) and amyotrophic lateral sclerosis (ALS). We also plan to invest in emerging growth areas such as pain, ophthalmology, neuropsychiatry and acute neurology. In addition, we are employing innovative technologies to discover potential treatments for rare and genetic disorders, including new ways of treating diseases through gene therapy in the previously mentioned areas. We also manufacture and commercialize biosimilars of advanced biologics.

Our marketed products include TECFIDERA, AVONEX, PLEGRIDY, TYSABRI, ZINBRYTA and FAMPYRA for the treatment of MS, SPINRAZA for the treatment of SMA and FUMADERM for the treatment of severe plaque psoriasis. We also have certain business and financial rights with respect to RITUXAN for the treatment of non-Hodgkin's lymphoma, chronic lymphocytic leukemia (CLL) and other conditions, GAZYVA for the treatment of CLL and follicular lymphoma, OCREVUS for the treatment of primary progressive MS and relapsing MS and other potential anti-CD20 therapies under a collaboration agreement with Genentech, Inc. (Genentech), a wholly-owned member of the Roche Group.

We support our drug discovery and development efforts through the commitment of significant resources to discovery, research and development programs and business development opportunities, particularly within our core and emerging growth areas. For nearly two decades we have led in the research and development of new therapies to treat MS, resulting in our leading portfolio of MS treatments. Now our research is focused on additional improvements in the treatment of MS, such as the development of next generation therapies for MS, with a goal to reverse or possibly repair damage caused by the disease. We are also applying our scientific expertise to solve some of the most challenging and complex diseases, including AD, progressive supranuclear palsy (PSP), a rare condition that affects movement, speech, vision and cognitive function, Parkinson's disease and ALS.

Our innovative drug development and commercialization activities are complemented by our biosimilar therapies that expand access to medicines and reduce the cost burden for healthcare systems. We are leveraging our manufacturing capabilities and know-how to develop, manufacture and market biosimilars through Samsung Bioepis, our joint venture with Samsung BioLogics Co. Ltd. (Samsung Biologics). Under our commercial agreement, we market and sell BENEPALI, an etanercept biosimilar referencing ENBREL, and FLIXABI, an infliximab biosimilar referencing REMICADE in the European Union (E.U.).

Hemophilia Spin-Off

On February 1, 2017, we completed the spin-off of our hemophilia business, Bioverativ Inc. (Bioverativ), as an independent, publicly traded company. Our consolidated results of operations and financial position included in these audited consolidated financial statements reflect the financial results of our hemophilia business for all periods through January 31, 2017.

For additional information on the spin-off of our hemophilia business, please read Note 3, *Hemophilia Spin-Off,* to these consolidated financial statements.

Consolidation

Our consolidated financial statements reflect our financial statements, those of our wholly-owned subsidiaries and those of certain variable interest entities where we are the primary beneficiary. For consolidated entities where we own or are exposed to less than 100% of the economics, we record net income (loss) attributable to noncontrolling interests in our consolidated statements of income equal to the percentage of the economic or ownership interest retained in such entities by the respective noncontrolling parties. Intercompany balances and transactions are eliminated in consolidation.

In determining whether we are the primary beneficiary of an entity, we apply a qualitative approach that determines whether we have both (1) the power to direct the economically significant activities of the entity and (2)

the obligation to absorb losses of, or the right to receive benefits from, the entity that could potentially be significant to that entity. These considerations impact the way we account for our existing collaborative relationships and other arrangements. We continuously assess whether we are the primary beneficiary of a variable interest entity as changes to existing relationships or future transactions may result in us consolidating or deconsolidating one or more of our collaborators or partners.

Use of Estimates

The preparation of our consolidated financial statements requires us to make estimates, judgments and assumptions that may affect the reported amounts of assets, liabilities, equity, revenues and expenses and related disclosure of contingent assets and liabilities. On an on-going basis we evaluate our estimates, judgments and methodologies. We base our estimates on historical experience and on various other assumptions that we believe are reasonable, the results of which form the basis for making judgments about the carrying values of assets, liabilities and equity and the amount of revenues and expenses. Actual results may differ from these estimates under different assumptions or conditions.

Revenue Recognition

We recognize revenues when all of the following criteria are met: persuasive evidence of an arrangement exists; delivery has occurred or services have been rendered; our price to the customer is fixed or determinable; and collectability is reasonably assured.

Product Revenues

Revenues from product sales are recognized when title and risk of loss have passed to the customer, which is typically upon delivery.

Reserves for Discounts and Allowances

Revenues from product sales are recorded net of reserves established for applicable discounts and allowances, including those associated with the implementation of pricing actions in certain of the international markets in which we operate. These reserves are based on estimates of the amounts earned or to be claimed on the related sales and are classified as reductions of accounts receivable (if the amount is payable to our customer) or a liability (if the amount is payable to a party other than our customer). Our estimates take into consideration our historical experience, current contractual and statutory requirements, specific known market events and trends, industry data and forecasted customer buying and payment patterns. Actual amounts may ultimately differ from our estimates. If actual results vary, we adjust these estimates, which could have an effect on earnings in the period of adjustment.

Product revenue reserves are categorized as follows: discounts, contractual adjustments and returns.

Discounts include trade term discounts and wholesaler incentives. Trade term discounts and wholesaler incentives primarily relate to estimated obligations for credits to be granted to wholesalers for remitting payment on their purchases within established incentive periods and credits to be granted to wholesalers for compliance with various contractually-defined inventory management practices, respectively. We determine these reserves based on our historical experience, including the timing of customer payments.

Contractual adjustments primarily relate to Medicaid and managed care rebates, co-payment (copay) assistance, Veterans Administration (VA) and Public Health Service (PHS) discounts, specialty pharmacy program fees and other governmental rebates or applicable allowances.

- Medicaid rebates relate to our estimated obligations to states under established reimbursement arrangements. Rebate accruals 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 other current liabilities. Our liability for Medicaid rebates consists of estimates for claims that a state will make for the current quarter, claims for prior quarters that have been estimated for which an invoice has not been received, invoices received for claims from the prior quarters that have not been paid, and an estimate of potential claims that will be made for inventory that exists in the distribution channel at period end.
- Governmental rebates or chargebacks, including VA and PHS discounts, represent our estimated obligations resulting from contractual commitments to sell products to qualified healthcare providers at prices lower than the list prices we charge to wholesalers which provide those products. 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. Rebate and chargeback reserves are established in the same period as the related revenue is recognized, resulting in a reduction in 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 the wholesaler notifying us about the resale. Our reserves for VA, PHS and chargebacks consist of amounts that we expect to issue for inventory that exists at the wholesalers that we expect will be sold to qualified healthcare providers and chargebacks that wholesalers have claimed for which we have not issued a credit.

- Managed care rebates represent our estimated obligations to third parties, primarily pharmacy benefit managers. Rebate accruals 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 and other current liabilities. These rebates result from performance-based goals, formulary position and price increase limit allowances (price protection). The calculation of the accrual for these rebates is based on an estimate of the customer's buying patterns and the resulting applicable contractual rebate rate(s) to be earned over a contractual period.

- Copay assistance represents financial assistance to qualified patients, assisting them with prescription drug co-payments required by insurance. The calculation of the accrual for copay is based on an estimate of claims and the cost per claim that we expect to receive associated with inventory that exists in the distribution channel at period end.

- Other governmental rebates, non-US pharmaceutical taxes or applicable allowances primarily relate to mandatory rebates and discounts in international markets where government-sponsored healthcare systems are the primary payors for healthcare.

Product returns are established for returns expected to be made by wholesalers and are recorded in the period the related revenue is recognized, resulting in a reduction to product sales. In accordance with contractual terms, wholesalers are permitted to return product for reasons such as damaged or expired product. The majority of wholesaler returns are due to product expiration. Expired product return reserves are estimated through a comparison of historical return data to their related sales on a production lot basis. Historical rates of return are determined for each product and are adjusted for known or expected changes in the marketplace specific to each product.

In addition to the discounts, rebates and product returns described above and classified as a reduction of revenue, we also maintain certain customer service contracts with distributors and other customers in the distribution channel that provide us with inventory management, data and distribution services, which are generally reflected as a reduction of revenue. To the extent we can demonstrate a separable benefit and fair value for these services, we classify these payments in selling, general and administrative expenses.

Revenues from Anti-CD20 Therapeutic Programs

Revenues from anti-CD20 therapeutic programs consist of:

(i) our share of pre-tax profits and losses in the United States (U.S.) for RITUXAN and GAZYVA;

(ii) reimbursement of our selling and development expenses in the U.S. for RITUXAN; and

(iii) other revenues from anti-CD20 therapeutic programs, which primarily consist of our share of pre-tax co-promotion profits on RITUXAN in Canada and royalty revenues on sales of OCREVUS.

Pre-tax co-promotion profits on RITUXAN and GAZYVA are calculated and paid to us by Genentech in the U.S. Pre-tax co-promotion profits on RITUXAN are calculated and paid to us by the Roche Group in Canada. Pre-tax co-promotion profits consist of U.S. and Canadian net sales to third-party customers less applicable costs to manufacture, third-party royalty expenses, distribution, selling and marketing expenses and joint development expenses incurred by Genentech, the Roche Group and us. Our share of the pre-tax profits on RITUXAN and GAZYVA in the U.S. and pre-tax co-promotion profits on RITUXAN in Canada include estimates made by Genentech and those estimates are subject to change. Actual results may differ from our estimates. For additional information on our collaboration with Genentech, please read Note 20, *Collaborative and Other Relationships,* to these consolidated financial statements.

Royalty Revenues

We receive royalty revenues on sales by our licensees of other products covered under patents that we own. We do not have future performance obligations under these license arrangements. We record these revenues based on estimates of the sales that occurred during the relevant period as a component of other revenues. The relevant period estimates of sales are based on interim data provided by licensees and analysis of historical royalties that have been paid to us, adjusted for any changes in facts and circumstances, as appropriate. Differences between actual and estimated royalty revenues are adjusted for in the period in which they become known, typically the following quarter. Historically, adjustments have not been material when compared to actual amounts paid by licensees.

Multiple-Element Revenue Arrangements

We may enter into transactions that involve the sale of products and related services under multiple element arrangements. In accounting for these transactions, we assess the elements of the contract and whether each element has standalone value and allocate revenues to the various elements based on their estimated selling price as a component of total revenues. The selling price of a revenue generating element can be based on current selling prices offered by us or another party for current products or management's best estimate of a selling price. Revenues allocated to an individual element are recognized when all other revenue recognition criteria are met for that element.

Collaborative and Other Relationships

Our development and commercialization arrangement with AbbVie Inc. (AbbVie) represents a collaborative arrangement as each party is an active participant and exposed to significant risks and rewards of the arrangement. Where we are the principal on sales transactions with third parties, we recognize revenues, cost of sales and operating expenses on a gross basis in their respective lines in our consolidated statements of income. Where we are not the principal on sales transactions with third parties, we record our share of the revenues, cost of sales and operating expenses on a net basis in collaborative and other relationships included in other revenue in our consolidated statements of income.

For additional information on our collaboration with AbbVie, please read Note 20, *Collaborative and Other Relationships*, to these consolidated financial statements.

Fair Value Measurements

We have certain financial assets and liabilities 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* — Fair values are determined utilizing quoted prices (unadjusted) in active markets for identical assets or liabilities that we have the ability to access;
- *Level 2* — Fair values are determined by utilizing quoted prices for identical or similar assets and liabilities in active markets or other market observable inputs such as interest rates, yield curves and foreign currency spot rates; and
- *Level 3* — Prices or valuations that require inputs that are both significant to the fair value measurement and unobservable.

The majority of our financial assets have been classified as Level 2. Our financial assets (which include our cash equivalents, derivative contracts, marketable debt securities and plan assets for deferred compensation) have been initially valued at the transaction price and subsequently valued, at the end of each reporting period, utilizing third-party pricing services or other market observable data. The pricing services utilize industry standard valuation models, including both income and market-based approaches and observable market inputs to determine value. These observable market inputs include reportable trades, benchmark yields, credit spreads, broker/dealer quotes, bids, offers, current spot rates and other industry and economic events.

We validate the prices provided by our third-party pricing services by reviewing their pricing methods and matrices, obtaining market values from other pricing sources and analyzing pricing data in certain instances. After completing our validation procedures, we did not adjust or override any fair value measurements provided by our pricing services as of December 31, 2017 and 2016.

Other Assets and Liabilities

The carrying amounts reflected in our consolidated balance sheets for current accounts receivable, due from anti-CD20 therapeutic programs, other current assets, accounts payable and accrued expenses and other, approximate fair value due to their short-term maturities.

Cash and Cash Equivalents

We consider only those investments which are highly liquid, readily convertible to cash and that mature within three months from date of purchase to be cash equivalents. As of December 31, 2017 and 2016, cash equivalents were comprised of money market funds and commercial paper, overnight reverse repurchase agreements and other debt securities with maturities less than 90 days from the date of purchase.

Accounts Receivable

The majority of our accounts receivable arise from product sales and primarily represent amounts due from our wholesale distributors, public hospitals and other government entities. We monitor the financial performance and creditworthiness of our customers so that we can properly assess and respond to changes in their credit profile. We provide reserves against trade receivables for estimated losses that may result from a customer's inability to pay. Amounts determined to be uncollectible are charged or written-off against the reserve. To date, our historical reserves and write-offs of accounts receivable have not been significant.

In countries where we have experienced a pattern of payments extending beyond our contractual payment term and we expect to collect receivables greater than one year from the time of sale, we have discounted our receivables and reduced related revenues over the period of time that we estimate those amounts will be paid using the country's market-based borrowing rate for such period. The related receivables are classified at the time of sale as non-current assets. We accrete interest income on these receivables, which is recognized as a component of other income (expense), net in our consolidated statements of income.

Concentration of Credit Risk

Financial instruments that potentially subject us to concentrations of credit risk include cash and cash equivalents, investments, derivatives and accounts receivable. We attempt to minimize the risks related to cash and cash equivalents and investments by investing in a broad and diverse range of financial instruments as previously defined by us. We have established guidelines related to credit ratings and maturities intended to safeguard principal balances and maintain liquidity. Our investment portfolio is maintained in accordance with our investment policy, which defines allowable investments, specifies credit quality standards and limits the credit exposure of any single issuer. We minimize credit risk resulting from derivative instruments by choosing only highly rated financial institutions as counterparties.

Concentrations of credit risk with respect to receivables, which are typically unsecured, are somewhat mitigated due to the wide variety of customers and markets using our products, as well as their dispersion across many different geographic areas. The majority of our accounts receivable arise from product sales in the U.S. and Europe and have standard payment terms that generally require payment within 30 to 90 days. We monitor the financial performance and creditworthiness of our customers so that we can properly assess and respond to changes in their credit profile. We continue to monitor these conditions and assess their possible impact on our business.

As of December 31, 2017 and 2016, two wholesale distributors individually accounted for approximately 26.5% and 19.0%, and 37.2% and 19.2%, of accounts receivable, net, respectively.

Marketable Securities and Other Investments

Marketable Debt Securities

Available-for-sale debt securities are recorded at fair market value and unrealized gains and losses are included in accumulated other comprehensive income (loss) in equity, net of related tax effects, unless the security has experienced a credit loss, we have determined that we have the intent to sell the security or we have determined that it is more likely than not that we will have to sell the security before its expected recovery. Realized gains and losses are reported in other income (expense), net, on a specific identification basis.

Marketable Equity Securities

Our marketable equity securities represent investments in publicly traded equity securities and are included in investments and other assets in our consolidated balance sheets. When assessing whether a decline in the fair value of a marketable equity security is other-than-temporary, we consider the fair market value of the security, the duration of the security's decline and prospects for the underlying business, including favorable or adverse clinical trial results, new product initiatives and new collaborative agreements with the companies in which we have invested.

Non-Marketable Equity Securities

We also invest in equity securities of companies whose securities are not publicly traded and where fair value is not readily available. These investments are recorded using either the cost method or the equity method of accounting, depending on our ownership percentage and other factors that suggest we have significant influence. We monitor these investments to evaluate whether any decline in their value has occurred that would be other-than-temporary, based on the implied value of recent company financings, public market prices of comparable companies and general market conditions and are included in investments and other assets in our consolidated balance sheets.

Evaluating Investments for Other-than-Temporary Impairments

We conduct periodic reviews to identify and evaluate each investment that has an unrealized loss, in accordance with the meaning of other-than-temporary impairment and its application to certain investments. An unrealized loss exists when the current fair value of an individual security is less than its amortized cost basis. Unrealized losses on available-for-sale securities that are determined to be temporary, and not related to credit loss, are recorded, net of tax, in accumulated other comprehensive income.

For available-for-sale debt securities with unrealized losses, management performs an analysis to assess whether we intend to sell or whether we would more likely than not be required to sell the security before the expected recovery of the amortized cost basis. Where we intend to sell a security, or may be required to do so, the security's decline in fair value is deemed to be other-than-temporary and the full amount of the unrealized loss is reflected in earnings as an impairment loss.

Regardless of our intent to sell a security, we perform additional analysis on all securities with unrealized losses to evaluate losses associated with the creditworthiness of the security. Credit losses are identified where we do not expect to receive cash flows sufficient to recover the amortized cost basis of a security.

For equity securities, when assessing whether a decline in value is other-than-temporary, we consider the fair market value of the security, the duration of the security's decline and the financial condition of the issuer. We then consider our intent and ability to hold the equity security for a period of time sufficient to recover our carrying value. Where we have determined that we lack the intent and ability to hold an equity security to its expected recovery, the security's decline in fair value is deemed to be other-than-temporary and is reflected in earnings as an impairment loss.

Equity Method of Accounting

In circumstances where we have the ability to exercise significant influence over the operating and financial policies of a company in which we have an investment, we utilize the equity method of accounting for recording investment activity. In assessing whether we exercise significant influence, we consider the nature and magnitude of our investment, the voting and protective rights we hold, any participation in the governance of the other company and other relevant factors such as the presence of a collaborative or other business relationship. Under the equity method of accounting, we record in our results of operations our share of income or loss of the other company. If our share of losses exceeds the carrying value of our investment, we will suspend recognizing additional losses and will continue to do so unless we commit to providing additional funding.

Inventory

Inventories are stated at the lower of cost or market with cost based on the first-in, first-out method. We classify our inventory costs as long-term when we expect to utilize the inventory beyond our normal operating cycle and include these costs in investments and other assets in our consolidated balance sheets. Inventory that can be used in either the production of clinical or commercial products is expensed as research and development costs when identified for use in a clinical manufacturing campaign.

Capitalization of Inventory Costs

We capitalize inventory costs associated with our products prior to regulatory approval, when, based on management's judgment, future commercialization is considered probable and the future economic benefit is expected to be realized. We consider numerous attributes in evaluating whether the costs to manufacture a particular product should be capitalized as an asset. We assess the regulatory approval process and where the particular product stands in relation to that approval process, including any known safety or efficacy concerns, potential labeling restrictions and other impediments to approval. We evaluate our anticipated research and development initiatives and constraints relating to the product and the indication in which it will be used. We consider our manufacturing environment including our supply chain in determining logistical constraints that could hamper approval or commercialization. We consider the shelf life of the product in relation to the expected timeline for approval and we consider patent related or contract issues that may prevent or delay commercialization. We also base our judgment on the viability of commercialization, trends in the marketplace and market acceptance criteria. Finally, we consider the reimbursement strategies that may prevail with respect to the product and assess the economic benefit that we are likely to realize. We expense previously capitalized costs related to pre-approval inventory upon a change in such judgment, due to, among other potential factors, a denial or significant delay of approval by necessary regulatory bodies.

Obsolescence and Unmarketable Inventory

We periodically review our inventories for excess or obsolescence and write-down obsolete or otherwise unmarketable inventory to its estimated net realizable value. If the actual net realizable value is less than that estimated by us, or if it is determined that inventory utilization will further diminish based on estimates of demand, additional inventory write-downs may be required. Additionally, our products are subject to strict quality control and monitoring that we perform throughout the manufacturing process. In the event that certain batches or units of product no longer meet quality specifications, we will record a charge to cost of sales to write-down any unmarketable inventory to its estimated net realizable value. In all cases, product inventory is carried at the lower of cost or its estimated net realizable value. Amounts written-down due to unmarketable inventory are charged to cost of sales.

Property, Plant and Equipment

Property, plant and equipment are carried at cost, subject to review for impairment whenever events or changes in circumstances indicate that the carrying amount of the asset may not be recoverable. The cost of normal, recurring, or periodic repairs and maintenance activities related to property, plant 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 of major capital projects are capitalized until the underlying 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. We also capitalize certain direct and incremental costs associated with the validation effort required for licensing by regulatory agencies of new manufacturing equipment for the production of a commercially approved drug. These costs primarily include direct labor and material and are incurred in preparing the equipment for its intended use. The validation costs are either amortized over the life of the related equipment or expensed as cost of sales when the product produced in the validation process is sold.

In addition, we capitalize certain internal use computer software development costs. If the software is an integral part of production assets, these costs are included in machinery and equipment and are amortized on a straight-line basis over the estimated useful lives of the related software, which generally range from three to five years.

We generally depreciate or amortize the cost of our property, plant 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
Land	Not depreciated
Buildings	15 to 40 years
Leasehold Improvements	Lesser of the useful life or the term of the respective lease
Furniture and Fixtures	5 to 7 years
Machinery and Equipment	5 to 20 years
Computer Software and Hardware	3 to 5 years

When we dispose of property, plant and equipment, we remove the associated cost and accumulated depreciation from the related accounts in our consolidated balance sheets and include any resulting gain or loss in our consolidated statements of income.

Intangible Assets

Our intangible assets consist of acquired and in-licensed rights and patents, developed technology, out-licensed patents, in-process research and development acquired after January 1, 2009, trademarks and trade names. Our intangible assets are recorded at fair value at the time of their acquisition and are stated in our consolidated balance sheets net of accumulated amortization and impairments, if applicable.

Intangible assets related to acquired and in-licensed rights and patents, developed technology and out-licensed patents are amortized over their estimated useful lives using the economic consumption method if anticipated future revenues can be reasonably estimated. The straight-line method is used when revenues cannot be reasonably estimated. Amortization is recorded as amortization of acquired intangible assets in our consolidated statements of income.

Acquired and in-licensed rights and patents primarily relate to obtaining the fair value of the U.S. and rest of world licenses to Forward Pharma A/S' (Forward Pharma) intellectual property, including Forward Pharma's intellectual property related to TECFIDERA, and our acquisition of all remaining rights to TYSABRI from Elan Pharma International, Ltd. (Elan), an affiliate of Elan Corporation, plc. Developed technology primarily relates to our AVONEX product, which was recorded in connection with the merger of Biogen, Inc. and IDEC Pharmaceuticals Corporation in 2003. We amortize the intangible assets related to TECFIDERA, TYSABRI and AVONEX using the economic consumption method based on revenues generated from the products underlying the related intangible assets. An analysis of the anticipated lifetime revenues of TECFIDERA, TYSABRI and AVONEX is performed annually during our long-range planning cycle, which is generally updated in the third quarter of each year, and whenever events or changes in circumstances would significantly affect the anticipated lifetime revenues of TECFIDERA, TYSABRI or AVONEX.

Intangible assets related to trademarks, trade names and in-process research and development prior to commercialization are not amortized because they have indefinite lives; however, they are subject to review for impairment. We review our intangible assets with indefinite lives for impairment annually, as of October 31, and whenever events or changes in circumstances indicate that the carrying value of an asset may not be recoverable.

Acquired In-process Research and Development (IPR&D)

Acquired IPR&D represents the fair value assigned to research and development assets that have not reached technological feasibility. The value assigned to acquired IPR&D is determined by estimating the costs to develop the acquired technology into commercially viable products, estimating the resulting revenues from the projects and discounting the net cash flows to present value. The revenues and costs projections used to value acquired IPR&D are, as applicable, reduced based on the probability of success of developing a new drug. Additionally, the projections consider the relevant market sizes and growth factors, expected trends in technology and the nature and expected timing of new product introductions by us and our competitors. The rates utilized to discount the net cash flows to their present value are commensurate with the stage of development of the projects and uncertainties in the economic estimates used in the projections. Upon the acquisition of IPR&D, we complete an assessment of whether our acquisition constitutes the purchase of a single asset or a group of assets. We consider multiple factors in this assessment, including the nature of the technology acquired, the presence or absence of separate cash flows, the development process and stage of completion, quantitative significance and our rationale for entering into the transaction.

If we acquire a business as defined under applicable accounting standards, then the acquired IPR&D is capitalized as an intangible asset. If we acquire an asset or group of assets that do not meet the definition of a business, then the acquired IPR&D is expensed on its acquisition date. Future costs to develop these assets are recorded to research and development expense as they are incurred.

When performing our impairment assessment, we calculate the fair value using the same methodology as described above. If the carrying value of our acquired IPR&D exceeds its fair value, then the intangible asset is written-down to its fair value. Certain IPR&D programs have a fair value that is not significantly in excess of carrying value, including treatments for forms of neuropathic pain, such as trigeminal neuralgia (TGN). Such programs could become impaired if assumptions used in determining the fair value change. Impairments are recorded as amortization of acquired intangible assets in our consolidated statements of income.

Goodwill

Goodwill represents the difference between the purchase price and the fair value of the identifiable tangible and intangible net assets when accounted for using the purchase method of accounting. Goodwill is not amortized, but reviewed for impairment. Goodwill is reviewed annually, as of October 31, and whenever events or changes in circumstances indicate that the carrying value of the goodwill might not be recoverable.

We compare the fair value of our reporting unit to its carrying value. If the carrying value of the net assets assigned to the reporting unit exceeds the fair value of our reporting unit, we would record an impairment loss equal to the difference. As described in Note 25, *Segment Information,* to these consolidated financial statements, we operate in one operating segment which we consider our only reporting unit.

Impairment of Long-Lived Assets

Long-lived assets to be held and used, including property, plant and equipment and definite-lived intangible assets are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of the assets or asset group may not be recoverable.

Determination of recoverability is based on an estimate of undiscounted future cash flows resulting from the use of the asset and its eventual disposition. In the event that such cash flows are not expected to be sufficient to recover the carrying amount of the assets, the assets are written-down to their fair values. Long-lived assets to be disposed of are carried at fair value less costs to sell.

Contingent Consideration

The consideration for our acquisitions often includes future payments that are contingent upon the occurrence of a particular event or events. For acquisitions completed before January 1, 2009, we record contingent consideration resulting from a business combination when the contingency is resolved. For acquisitions that qualify as business combinations completed after January 1, 2009, we record an obligation for such contingent payments at fair value on the acquisition date. We estimate the fair value of contingent consideration obligations through valuation models that incorporate probability-adjusted assumptions related to the achievement of the milestones and thus likelihood of making related payments. We revalue our contingent consideration obligations each reporting period. Changes in the fair value of our contingent consideration obligations are recognized in our consolidated statements of income. Changes in the fair value of the contingent consideration obligations can result from changes to one or multiple inputs, including adjustments to the discount rates, changes in the amount or timing of expected expenditures associated with product development, changes in the amount or timing of cash flows and reserves associated with products upon commercialization, changes in the assumed achievement or timing of any cumulative sales-based and development milestones, changes in the probability of certain clinical events and changes in the assumed probability associated with regulatory approval.

Discount rates in our valuation models represent a measure of the credit risk associated with settling the liability. The period over which we discount our contingent obligations is based on the current development stage of the product candidates, our specific development plan for that product candidate adjusted for the probability of completing the development step, and when the contingent payments would be triggered. In estimating the probability of success, we utilize data regarding similar milestone events from several sources, including industry studies and our own experience. These fair value measurements are based on significant inputs not observable in the market. Significant judgment is employed in determining the appropriateness of these assumptions as of the acquisition date and for each subsequent period. Accordingly, changes in assumptions could have a material impact on the amount of contingent consideration expense we record in any given period.

Derivative Instruments and Hedging Activities

We recognize all derivative instruments as either assets or liabilities at fair value in our consolidated balance sheets. Changes in the fair value of derivatives are recorded each period in current earnings or accumulated other comprehensive income (loss), depending on whether a derivative is designated as part of a hedge transaction and, if so, the type of hedge transaction. We classify the cash flows from these instruments in the same category as the cash flows from the hedged items. We do not hold or issue derivative instruments for trading or speculative purposes.

We assess, both at inception and on an ongoing basis, whether the derivatives that are used in hedging transactions are highly effective in offsetting the changes in cash flows or fair values of the hedged items. We also assess hedge ineffectiveness on a quarterly basis and record the gain or loss related to the ineffective portion to current earnings. If we determine that a forecasted transaction is no longer probable of occurring, we discontinue hedge accounting for the affected portion of the hedge instrument, and any related unrealized gain or loss on the contract is recognized in current earnings.

Translation of Foreign Currencies

The functional currency for most of our foreign subsidiaries is their local currency. For our non-U.S. subsidiaries that transact in a functional currency other than the U.S. dollar, assets and liabilities are translated at current rates of exchange at the balance sheet date. Income and expense items are translated at the average foreign currency exchange rates for the period. Adjustments resulting from the translation of the financial statements of our foreign operations into U.S. dollars are excluded from the determination of net income and are recorded in accumulated other comprehensive income, a separate component of equity. For subsidiaries where the functional currency of the assets and liabilities differ from the local currency, non-monetary assets and liabilities are translated at the rate of exchange in effect on the date assets were acquired while monetary assets and liabilities are translated at current rates of exchange as of the balance sheet date. Income and expense items are translated at the average foreign currency rates for the period. Translation adjustments of these subsidiaries are included in other income (expense), net in our consolidated statements of income.

Royalty Cost of Sales

We make royalty payments to a number of third parties under license or purchase agreements associated with our acquisition of intellectual property. These royalty payments are typically calculated as a percentage (royalty rate) of the sales of our products in a particular year. That royalty rate may remain constant, increase or decrease within each year based on the total amount of sales during the annual period. Each quarterly period, we estimate our total royalty obligation for the full year and recognize the proportional amount as cost of sales based on actual quarterly sales as a percentage of full year estimated sales. For example, if the level of net sales in any calendar year increases the royalty rate within the year, we will record our cost of sales at an even rate over the year, based on the estimated blended royalty rate.

Accounting for Share-Based Compensation

Our share-based compensation programs grant awards that have included stock options, restricted stock units that vest based on stock performance known as market stock units (MSUs), performance-vested restricted stock units that settle in cash (CSPUs), time-vested restricted stock units (RSUs), performance-vested restricted stock units that can be settled in cash or shares of our common stock (PUs) at the sole discretion of the Compensation and Management Development Committee of the Board of Directors and shares issued under our employee stock purchase plan (ESPP). We charge the estimated fair value of awards against income over the requisite service period, which is generally the vesting period. Where awards are made with non-substantive vesting periods (for instance, where a portion of the award vests upon retirement eligibility), we estimate and recognize expense based on the period from the grant date to the date the employee becomes retirement eligible.

The fair values of our stock option grants are estimated as of the date of grant using a Black-Scholes option valuation model. The estimated fair values of the stock options are then expensed over the options' vesting periods.

The fair values of our MSUs are estimated using a lattice model with a Monte Carlo simulation. We apply an accelerated attribution method to recognize share-based compensation expense over the applicable service period, net of estimated forfeitures when accounting for our MSUs. The probability of actual shares expected to be earned is considered in the grant date valuation, therefore the expense is not adjusted to reflect the actual units earned.

The fair values of our RSUs are based on the market value of our stock on the date of grant. Compensation expense, net of forfeitures, for RSUs is recognized straight-line over the applicable service period.

We apply an accelerated attribution method to recognize share-based compensation expense when accounting for our CSPUs and PUs and the fair value of the liability is remeasured at the end of each reporting period through expected settlement. Compensation expense associated with CSPUs and PUs are based upon the stock price and the number of units expected to be earned after assessing the probability that certain performance criteria will be met and the associated targeted payout level that is forecasted will be achieved, net of estimated forfeitures. Cumulative adjustments are recorded each quarter to reflect changes in the stock price and estimated outcome of the performance-related conditions until the date results are determined and settled.

The purchase price of common stock under our ESPP is equal to 85% of the lesser of (i) the fair market value per share of the common stock on the first business day of an offering period and (ii) the fair market value per share of the common stock on the purchase date. The fair value of the discounted purchases made under our ESPP is calculated using the Black-Scholes model. The fair value of the look-back provision plus the 15% discount is recognized as compensation expense over the 90-day purchase period.

Research and Development Expenses

Research and development expenses consist of upfront fees and milestones paid to collaborators and expenses incurred in performing research and development activities, which include compensation and benefits, facilities and overhead expenses, clinical trial expenses and fees paid to contract research organizations (CROs), clinical supply and manufacturing expenses, write-offs of inventory that was previously capitalized in anticipation of product launch and determined to no longer be realizable and other outside expenses. Research and development expenses are expensed as incurred. Payments we make for research and development services prior to the services being rendered are recorded as prepaid assets in our consolidated balance sheets and are expensed as the services are provided. We also accrue the costs of ongoing clinical trials associated with programs that have been terminated or discontinued for which there is no future economic benefit at the time the decision is made to terminate or discontinue the program.

From time to time, we enter into development agreements in which we share expenses with a collaborative partner. We record payments received from our collaborative partners for their share of the development costs as a reduction of research and development expense, except as discussed in Note 20, *Collaborative and Other Relationships,* to these consolidated financial statements. Because an initial indication has been approved for both RITUXAN and GAZYVA, expenses incurred by Genentech in the ongoing development of RITUXAN and GAZYVA are not recorded as research and development expense, but rather reduce our share of profits recorded as a component of revenues from anti-CD20 therapeutic programs.

For collaborations with commercialized products, if we are the principal, we record revenues and the corresponding operating costs in their respective line items in our consolidated statements of income. If we are not the principal, we record operating costs as a reduction of revenue.

Selling, General and Administrative Expenses

Selling, general and administrative expenses are primarily comprised of compensation and benefits associated with sales and marketing, finance, human resources, legal, information technology and other administrative personnel, outside marketing, advertising and legal expenses and other general and administrative costs.

Advertising costs are expensed as incurred. For the years ended December 31, 2017, 2016 and 2015, advertising costs totaled $75.2 million, $106.3 million and $108.6 million, respectively.

Income Taxes

The provision for income taxes includes federal, state, local and foreign taxes. Income taxes are accounted for under the liability method. Deferred tax assets and liabilities are recognized for the estimated future tax consequences of temporary differences between the financial statement carrying amounts and their respective tax bases. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the year in which the temporary differences are expected to be recovered or settled. We evaluate the realizability of our deferred tax assets and establish a valuation allowance when it is more likely than not that all or a portion of deferred tax assets will not be realized.

All tax effects associated with intercompany transfers of assets within our consolidated group, both current and deferred, are recorded as a prepaid tax or deferred charge and recognized through our consolidated statements of income when the asset transferred is sold to a third party or otherwise recovered through amortization of the asset's remaining economic life. If the asset transferred becomes impaired, for example through the obsolescence of inventory or discontinuation of a research program, we will expense any remaining deferred charge or prepaid tax.

We account for uncertain tax positions using a “more-likely-than-not” threshold for recognizing and resolving uncertain tax positions. We evaluate uncertain tax positions on a quarterly basis and consider various factors including, but not limited to, changes in tax law, the measurement of tax positions taken or expected to be taken in tax returns, the effective settlement of matters subject to audit, information obtained during in process audit activities and changes in facts or circumstances related to a tax position. We also accrue for potential interest and penalties related to unrecognized tax benefits in income tax expense.

Contingencies

We are currently involved in various claims and legal proceedings. Loss contingency provisions are recorded if the potential loss from any claim, asserted or unasserted, or legal proceeding is considered probable and the amount can be reasonably estimated or a range of loss can be determined. These accruals represent management’s best estimate of probable loss. Disclosure also is provided when it is reasonably possible that a loss will be incurred or when it is reasonably possible that the amount of a loss will exceed the recorded provision. On a quarterly basis, we review the status of each significant matter and assess its potential financial exposure. Significant judgment is required in both the determination of probability and the determination as to whether an exposure is reasonably estimable. Because of uncertainties related to these matters, accruals are based only on the best information available at the time. As additional information becomes available, we reassess the potential liability related to pending claims and litigation and may change our estimates. These changes in the estimates of the potential liabilities could have a material impact on our consolidated results of operations and financial position.

Earnings per Share

Basic earnings per share is computed by dividing undistributed net income attributable to Biogen Inc. by the weighted-average number of common shares outstanding during the period.

New Accounting Pronouncements

From time to time, new accounting pronouncements are issued by the Financial Accounting Standards Board (FASB) or other standard setting bodies that we adopt as of the specified effective date. Unless otherwise discussed below, we do not believe that the adoption of recently issued standards have or may have a material impact on our consolidated financial statements or disclosures.

In May 2014 the FASB issued Accounting Standards Update (ASU) No. 2014-09, *Revenue from Contracts with Customers (Topic 606)*, which supersedes all existing revenue recognition requirements, including most industry-specific guidance. This new standard requires a company to recognize revenue when it transfers goods or services to customers in an amount that reflects the consideration that the company expects to receive for those goods or services. The FASB subsequently issued amendments to ASU No. 2014-09 that have the same effective date and transition date. These new standards became effective for us on January 1, 2018, and will be adopted using the modified retrospective method through a cumulative-effect adjustment directly to retained earnings as of that date. We have performed a review of these new standards as compared to our current accounting policies for customer contracts and collaborative relationships. During the fourth quarter of 2017 we finalized our assessments over the impact that these new standards will have on our consolidated results of operations, financial position and disclosures. As of December 31, 2017, we have not identified any accounting changes that would materially impact the amount of reported revenues with respect to our product revenues, revenues from anti-CD20 therapeutic programs or other revenues; however, the adoption of these new standards may result in a change in the timing of revenue recognition related to certain of our contract manufacturing activities. As of December 31, 2017, we expect to recognize an immaterial adjustment to retained earnings reflecting the cumulative impact for the accounting changes related to certain contract manufacturing arrangements made upon adoption of these new standards.

In January 2016 the FASB issued ASU No. 2016-01, *Financial Instruments - Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities*. This new standard amends certain aspects of accounting and disclosure requirements for financial instruments, including the requirement that equity investments with readily determinable fair values are to be measured at fair value with any changes in fair value recognized in a company's results of operations. This new standard does not apply to investments accounted for under the equity method of accounting or those investments that result in consolidation of the investee. Equity investments that do not have readily determinable fair values may be measured at fair value or at cost minus impairment adjusted for changes in observable prices. A financial liability that is measured at fair value in accordance with the fair value option is required to be presented separately in other comprehensive income for the portion of the total change in the fair value resulting from change in the instrument-specific credit risk. In addition, a valuation allowance should be evaluated on deferred tax assets related to available-for-sale debt securities in combination with other deferred tax assets. This new standard became effective for us on January 1, 2018. Based on our current investment holdings, the adoption of this new standard is not expected to have a material impact on our consolidated financial position or results of operations; however, it will result in the reclassification of where we recognize changes in fair value related to certain investments prospectively.

In February 2016 the FASB issued ASU No. 2016-02, *Leases (Topic 842)*. This new standard establishes a right-of-use (ROU) model that requires all lessees recognize right-of-use assets and liabilities on their balance sheet that arise from leases with terms longer than 12 months as well as provide disclosures with respect to certain qualitative and quantitative information related to their leasing arrangements. This new standard will become effective for us on January 1, 2019. A modified retrospective transition approach is required for leases existing at, or entered into after, the beginning of the earliest comparative period presented in the financial statements, with certain practical expedients available. While we are currently evaluating the impact that this new standard may have on our consolidated results of operations, financial position and disclosures, we expect that the adoption of this new standard may materially affect the reported amount of total assets and total liabilities within our consolidated balance sheet with no material impact to our consolidated statement of income. We are unable to quantify the impact at this time as the ultimate impact of adopting this new standard will depend on the total amount of our lease commitments as of the adoption date.

In March 2016 the FASB issued ASU No. 2016-09, *Compensation - Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting*. This new standard requires recognition of the income tax effects of vested or settled awards in the income statement and involves several other aspects of the accounting for share-based payment transactions, including the income tax consequences and classification of awards as either equity or liabilities in the statement of cash flows. This new standard became effective for us on January 1, 2017. The adoption of this new standard did not have a material impact on our consolidated financial position, results of

operations or statement of cash flows; however, it has resulted in the reclassification of certain prior year amounts in our consolidated statements of cash flows to conform to our current year presentation. Specifically, amounts previously disclosed in net cash flows used in financing activities related to our excess tax benefit from share-based compensation have been reclassified to net cash flows provided by operating activities and amounts related to cash paid when withholding shares for tax withholding purposes, previously disclosed in net cash flows provided by operating activities, have been reclassified to net cash flows used in financing activities.

In October 2016 the FASB issued ASU No. 2016-16, *Income Taxes (Topic 740): Intra-Entity Transfer of Assets Other Than Inventory*. This new standard eliminates the deferral of the tax effects of intra-entity asset transfers other than inventory. As a result, the income tax consequences from the intra-entity transfer of an asset other than inventory and associated changes to deferred taxes will be recognized when the transfer occurs. This new standard became effective for us on January 1, 2018. We will adopt this new standard using the modified retrospective method, through a cumulative-effect adjustment directly to retained earnings as of the beginning of that date. Based on currently enacted tax rates, upon adoption, we will record additional deferred tax assets of approximately $0.5 billion and an increase to retained earnings of approximately $0.5 billion. We will recognize incremental deferred income tax expense thereafter as these net deferred tax assets are utilized.

In January 2017 the FASB issued ASU No. 2017-01, *Business Combinations (Topic 805): Clarifying the Definition of a Busines*s. This new standard clarifies the definition of a business and provides a screen to determine when an integrated set of assets and activities is not a business. The screen requires that when substantially all of the fair value of the gross assets acquired (or disposed of) is concentrated in a single identifiable asset or a group of similar identifiable assets, the set is not a business. We elected to early adopt this new standard as of January 1, 2017, with prospective application to any business development transactions, including our recent asset acquisition of BIIB093 from Remedy Pharmaceuticals Inc. (Remedy) in May 2017. For additional information on this transaction, please read Note 2, *Acquisitions,* to these consolidated financial statements.

In January 2017 the FASB issued ASU No. 2017-04, *Intangibles - Goodwill and Other (Topic 350): Simplifying the Test of Goodwill Impairment*. This new standard eliminates Step 2 from the goodwill impairment test. Under the amendments in ASU No. 2017-04, an entity should recognize an impairment charge for the amount by which the carrying amount of a reporting unit exceeds that reporting unit's fair value; however, the loss recognized should not exceed the total amount of goodwill allocated to that reporting unit. We elected to early adopt this new standard as of October 31, 2017, during our annual review of goodwill. The adoption of this new standard resulted in a change to our accounting policy; however, did not have an impact on our consolidated financial position or results of operations.

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. This new standard will become effective for us on January 1, 2019. We are currently evaluating the potential impact that this new standard may have on our consolidated financial position and results of operations.

In August 2017 the FASB issued ASU No. 2017-12, *Derivatives and Hedging (Topic 815): Targeted Improvements to Accounting for Hedging Activities*. This new standard is intended to simplify hedge accounting by better aligning how an entity's risk management activities and hedging relationships are presented in its financial statements and simplifies the application of hedge accounting guidance in certain situations. This new standard expands and refines hedge accounting for both non-financial and financial risk components and aligns the recognition and presentation of the effects of the hedging instrument and the hedged item in the financial statements. This new standard will become effective for us on January 1, 2019; however, early adoption is permitted. For cash flow hedges existing at the adoption date, this new standard requires adoption on a modified retrospective basis with a cumulative-effect adjustment to retained earnings as of the effective date. The amendments to presentation guidance and disclosure requirements are required to be adopted prospectively. We are currently evaluating the date upon which we will adopt this new standard and the impact this new standard may have on our consolidated financial statements.

2. Acquisitions

Remedy Pharmaceuticals Inc.

In May 2017 we completed an asset purchase of the Phase 3-ready candidate, BIIB093 (intravenous glibencamide) (formerly known as CIRARA), from Remedy. The target indication for BIIB093 is large hemispheric infarction (LHI), a severe form of ischemic stroke where brain swelling (cerebral edema) often leads to a disproportionately large share of stroke-related morbidity and mortality. The U.S. Food and Drug Administration (FDA) recently granted BIIB093 Orphan Drug designation for severe cerebral edema in patients with acute ischemic stroke. The FDA has also granted BIIB093 Fast Track designation.

Under this agreement, we are responsible for the future development and commercialization of BIIB093 and Remedy will share in the cost of development for the target indication for BIIB093 in LHI stroke.

We accounted for this transaction as an asset acquisition as we did not acquire any employees from Remedy nor did we acquire any significant processes required in the development of BIIB093. In connection with the closing of this transaction, we made an upfront payment of $120.0 million to Remedy, which was recorded as acquired in-process research and development in our consolidated statements of income as BIIB093 has not yet reached technological feasibility. We also have agreed to pay Remedy certain development and sales based milestone payments that are substantially payable upon or after regulatory approval, as well as royalties on future commercial sales.

Convergence Pharmaceuticals

In February 2015, we completed our acquisition of all of the outstanding stock of Convergence Pharmaceuticals (Convergence), a clinical-stage biopharmaceutical company with a focus on developing product candidates for neuropathic pain. Convergence's lead candidate was a Phase 2 clinical candidate BIIB074 (formerly known as CNV1014802), which had demonstrated clinical activity in proof-of-concept studies for TGN. Additionally, BIIB074 had potential applicability in several other neuropathic pain states, including lumbosacral radiculopathy and erythromelalgia.

The purchase price consisted of a $200.1 million cash payment at closing, plus contingent consideration in the form of development and approval milestones up to a maximum of $450.0 million, of which $350.0 million is associated with the development and approval of BIIB074 for the treatment of TGN. In connection with the closing of this transaction, we recorded a liability of $274.5 million representing the fair value of the contingent consideration resulting in an adjusted purchase price of $474.6 million. The separately identifiable assets and liabilities acquired were primarily comprised of $424.6 million and $128.3 million attributed to in-process research and development and goodwill, respectively. These amounts were partially offset by the establishment of a deferred tax liability for the acquired IPR&D intangible assets which had no tax basis.

We attributed the goodwill recognized to the Convergence workforce's expertise in chronic pain research and clinical development and to establishing a deferred tax liability for the acquired IPR&D intangible assets. The goodwill was not tax deductible.

3. Hemophilia Spin-Off

On February 1, 2017, we completed the spin-off of our hemophilia business, Bioverativ, as an independent, publicly traded company trading under the symbol "BIVV" on the Nasdaq Global Select Market. The spin-off was accomplished through the distribution of all the then outstanding shares of common stock of Bioverativ to Biogen shareholders, who received one share of Bioverativ common stock for every two shares of Biogen common stock they owned. The separation and distribution was structured to be tax-free for shareholders for federal income tax purposes. Bioverativ assumed all of our rights and obligations under our collaboration agreement with Swedish Orphan Biovitrum AB (Sobi) and our collaboration and license agreement with Sangamo Biosciences Inc. (Sangamo).

In connection with the distribution, Biogen and Bioverativ entered into a separation agreement and various other agreements (including a transition services agreement, a tax matters agreement, a manufacturing and supply agreement, an employee matters agreement, an intellectual property matters agreement and certain other commercial agreements). These agreements govern the separation and distribution and the relationship between the two companies going forward. They also provide for the performance of services by each company for the benefit of the other for a period of time. In addition, under the separation agreement, Bioverativ is obligated to indemnify us for

liabilities that may exist relating to its business activities, whether incurred prior to or after the distribution, including any pending or future litigation.

The services under these agreements generally commenced on February 1, 2017 (the distribution date), and terminate within 12 months of the distribution date, with the exception of the manufacturing and supply agreement, which has an initial term of 5 years, with a 5 year extension at Bioverativ's sole discretion and a further 5 year extension with Bioverativ's and our consent.

In connection with the distribution we made a net cash contribution to Bioverativ, during the first quarter of 2017, totaling $302.7 million. The following table summarizes the assets and liabilities that were charged against equity as a result of the spin-off of our hemophilia business:

(In millions)	
Assets	
Cash	$ 302.7
Accounts receivable	144.7
Inventory	116.1
Property, plant and equipment, net	20.2
Intangible assets, net	56.8
Goodwill	314.1
Other, net	53.7
Assets transferred, net	$ 1,008.3
Liabilities	
Accrued expenses and other current liabilities	$ 87.8
Other long-term liabilities	67.7
Liabilities transferred, net	$ 155.5

Pursuant to the terms of our agreements with Bioverativ, upon completion of the spin-off, we distributed ALPROLIX and ELOCTATE on behalf of Bioverativ until Bioverativ obtained appropriate regulatory authorizations in certain countries, including a Biologics License Application transfer in the U.S., which was received in September 2017. Accordingly, commencing October 2017, we ceased distribution of ALPROLIX and ELOCTATE on behalf of Bioverativ under this arrangement.

Under the manufacturing and supply agreement, we manufacture and supply certain products and materials to Bioverativ. For the year ended December 31, 2017, we recognized $64.8 million in revenues in relation to these contract manufacturing services, which is reflected as a component of other royalty and corporate revenues in our consolidated statements of income. We also recorded $15.1 million as cost of sales in relation to these services during the year ended December 31, 2017.

Amounts earned under the non-manufacturing and supply related transaction service agreements are recorded as a reduction of costs and expenses in their respective expense line items. These amounts, which were primarily reflected as a reduction to selling, general and administrative expenses in our consolidated statements of income, were not significant for the year ended December 31, 2017.

Hemophilia related product revenues reflected in our consolidated statements of income for the years ended December 31, 2017, 2016 and 2015 totaled $74.4 million, $846.9 million and $554.2 million, respectively. Results for the year ended December 31, 2017 only reflect hemophilia-related product revenues through January 31, 2017.

Patents

Prior to the spin-off of our hemophilia business, we were awarded various methods of treatment and composition of matter patents related to ELOCTATE and ALPROLIX. Upon completion of the spin-off, these patents were transferred to the patent portfolio of Bioverativ.

4. Restructuring, Business Transformation and Other Cost Saving Initiatives

2017 Corporate Strategy

In July 2017 we announced an updated strategic framework to optimize the value of our MS business while investing for the future across our core growth areas of MS and neuroimmunology, AD and dementia, movement disorders and neuromuscular diseases including SMA and ALS. We also plan to invest in emerging growth areas such as pain, ophthalmology, neuropsychiatry and acute neurology. In addition, we are employing innovative technologies to discover potential treatments for rare and genetic disorders, including new ways of treating diseases through gene therapy in the previously mentioned areas.

In order to deliver positive results in the near term while investing in the next stages of our growth, we will focus on the following strategic priorities:

- maximizing the resilience of our MS core business;
- accelerating efforts in SMA as a significant new growth opportunity;
- developing and expanding our neuroscience portfolio;
- focusing our capital allocation efforts to drive investment for future growth; and
- creating a leaner and simpler operating model to streamline our operations and reallocate resources towards prioritized research and development and commercial value creation opportunities.

In October 2017, in connection with creating a leaner and simpler operating model, we approved a corporate restructuring program intended to streamline our operations and reallocate resources. We expect to make total non-recurring operating and capital expenditures of up to $170.0 million, primarily in 2018, and our goal is to redirect resources of up to $400.0 million annually by 2020 to prioritized research and development and other value creation opportunities.

For the year ended December 31, 2017, we recognized charges in our consolidated statements of income totaling $19.4 million related to this effort, of which $18.5 million is included in selling, general and administrative expense and $0.9 million is reflected as restructuring charges. These restructuring charges, which were substantially incurred and paid in 2017, were primarily related to severance.

2016 Organizational Changes and Cost Saving Initiatives

2016 Restructuring Charges

During the third quarter of 2016 we initiated cost saving measures primarily intended to realign our organizational structure due to the changes in roles and workforce resulting from our decision to spin-off our hemophilia business, and to achieve further targeted cost reductions. For the year ended December 31, 2016, we recognized charges totaling $17.7 million related to this effort, which are in addition to, and separate from, the 2015 restructuring charges described below. These amounts, which were substantially incurred and paid by the end of 2016, were primarily related to severance and are reflected in restructuring charges in our consolidated statements of income.

Cambridge, MA Manufacturing Facility

In June 2016 following an evaluation of our current and future manufacturing capabilities and capacity needs, we determined that we intended to cease manufacturing and vacate our 67,000 square foot small-scale biologics manufacturing facility in Cambridge, MA and close and vacate our 46,000 square foot warehouse space in Somerville, MA.

In December 2016 we subleased our rights to the Cambridge, MA manufacturing facility to Brammer Bio MA, LLC (Brammer). Brammer also purchased from us certain manufacturing equipment, leasehold improvements and other assets in exchange for shares of Brammer common LLC interests and assumed manufacturing operations effective January 1, 2017. In December 2016 we closed and vacated our warehouse space in Somerville, MA.

Our departure from these facilities shortened the expected useful lives of certain leasehold improvements and other assets at these facilities. As a result, we recorded additional depreciation expense to reflect the assets' new

shorter useful lives. For the year ended December 31, 2016, we recognized approximately $45.5 million of this additional depreciation, which was recorded as cost of sales in our consolidated statements of income.

In the fourth quarter of 2016 we also recognized charges totaling $7.4 million for severance costs related to certain employees separated from Biogen in connection with our departure from these facilities. These amounts were substantially incurred and paid by the end of first quarter of 2017 and are reflected in restructuring charges in our consolidated statements of income for the year ended December 31, 2016.

2015 Cost Saving Initiatives

2015 Restructuring Charges

In October 2015, we announced a corporate restructuring, which included the termination of certain pipeline programs and an 11% reduction in workforce. Under this restructuring, cash payments were estimated to total approximately $120.0 million, of which $15.9 million were related to previously accrued 2015 incentive compensation, resulting in net restructuring charges totaling approximately $102.0 million. These amounts were substantially paid by the end of 2016.

During the years ended December 31, 2016 and 2015, we recognized $8.0 million and $93.4 million, respectively, of restructuring charges related to our 2015 restructuring program in our consolidated statements of income. Our restructuring reserve is included in accrued expenses and other in our consolidated balance sheets.

The following table summarizes the charges and spending related to our 2015 restructuring program during 2017:

(In millions)	Workforce Reduction	Pipeline Programs	Total
Restructuring reserve as of December 31, 2015	$ 33.7	$ 3.6	$ 37.3
Expense	4.9	5.4	10.3
Payments	(31.2)	(9.0)	(40.2)
Adjustments to previous estimates, net	(5.2)	2.9	(2.3)
Restructuring reserve as of December 31, 2016	$ 2.2	$ 2.9	$ 5.1
Payments	(1.7)	(2.9)	(4.6)
Restructuring reserve as of December 31, 2017	$ 0.5	$ —	$ 0.5

5. Reserves for Discounts and Allowances

An analysis of the change in reserves for discounts and allowances is summarized as follows:

(In millions)	Discounts	Contractual Adjustments	Returns	Total
2017				
Beginning balance	$ 71.6	$ 482.7	$ 51.2	$ 605.5
Current provisions relating to sales in current year	583.0	2,307.4	26.9	2,917.3
Adjustments relating to prior years	(0.1)	15.0	(8.9)	6.0
Payments/returns relating to sales in current year	(475.8)	(1,756.9)	(0.1)	(2,232.8)
Payments/returns relating to sales in prior years	(69.1)	(442.2)	(23.1)	(534.4)
Ending balance	$ 109.6	$ 606.0	$ 46.0	$ 761.6

(In millions)	Discounts	Contractual Adjustments	Returns	Total
2016				
Beginning balance	$ 56.1	$ 548.7	$ 57.9	$ 662.7
Current provisions relating to sales in current year	592.6	2,044.5	30.9	2,668.0
Adjustments relating to prior years	(1.4)	1.5	(16.8)	(16.7)
Payments/returns relating to sales in current year	(522.5)	(1,576.0)	(1.0)	(2,099.5)
Payments/returns relating to sales in prior years	(53.2)	(536.0)	(19.8)	(609.0)
Ending balance	$ 71.6	$ 482.7	$ 51.2	$ 605.5

(In millions)	Discounts	Contractual Adjustments	Returns	Total
2015				
Beginning balance	$ 47.6	$ 387.1	$ 49.1	$ 483.8
Current provisions relating to sales in current year	459.7	1,732.1	37.6	2,229.4
Adjustments relating to prior years	(1.3)	(16.3)	(14.7)	(32.3)
Payments/returns relating to sales in current year	(405.9)	(1,258.1)	(2.6)	(1,666.6)
Payments/returns relating to sales in prior years	(44.0)	(296.1)	(11.5)	(351.6)
Ending balance	$ 56.1	$ 548.7	$ 57.9	$ 662.7

The total revenue-related reserves above, included in our consolidated balance sheets, are summarized as follows:

	As of December 31,	
(In millions)	2017	2016
Reduction of accounts receivable	$ 189.6	$ 166.9
Component of accrued expenses and other	572.0	438.6
Total revenue-related reserves	$ 761.6	$ 605.5

6. Inventory

The components of inventory are summarized as follows:

	As of December 31,	
(In millions)	2017	2016
Raw materials	$ 162.4	$ 170.4
Work in process	605.7	698.7
Finished goods	157.4	170.3
Total inventory	$ 925.5	$ 1,039.4
Balance Sheet Classification:		
Inventory	$ 902.7	$ 1,001.6
Investments and other assets	22.8	37.8
Total inventory	$ 925.5	$ 1,039.4

Balances in the table above as of December 31, 2017 reflect the elimination of certain amounts transferred to Bioverativ in connection with the completion of the spin-off of our hemophilia business. Balances transferred to Bioverativ related to work in process and finished goods inventory totaled $84.5 million and $31.6 million, respectively. For additional information on the spin-off of our hemophilia business, please read Note 3, *Hemophilia Spin-Off*, to these consolidated financial statements.

Long-term inventory, which primarily consists of work in process, is included in investments and other assets in our consolidated balance sheets.

Inventory amounts written down as a result of excess, obsolescence, unmarketability or other reasons are charged to cost of sales, and totaled $76.9 million, $48.2 million and $41.9 million for the years ended December 31, 2017, 2016 and 2015, respectively.

7. Intangible Assets and Goodwill

Intangible Assets

Intangible assets, net of accumulated amortization, impairment charges and adjustments are summarized as follows:

		As of December 31, 2017			As of December 31, 2016		
(In millions)	Estimated Life	Cost	Accumulated Amortization	Net	Cost	Accumulated Amortization	Net
Out-licensed patents	13-23 years	$ 543.3	$ (535.6)	$ 7.7	$ 543.3	$ (523.6)	$ 19.7
Developed technology	15-23 years	3,005.3	(2,689.0)	316.3	3,005.3	(2,634.3)	371.0
In-process research and development	Indefinite until commercialization	680.6	—	680.6	648.0	—	648.0
Trademarks and trade names	Indefinite	64.0	—	64.0	64.0	—	64.0
Acquired and in-licensed rights and patents	4-18 years	3,971.4	(1,160.4)	2,811.0	3,481.7	(776.1)	2,705.6
Total intangible assets		$ 8,264.6	$ (4,385.0)	$ 3,879.6	$ 7,742.3	$ (3,934.0)	$ 3,808.3

Amortization of acquired intangible assets totaled $814.7 million, $385.6 million and $382.6 million for the years ended December 31, 2017, 2016 and 2015, respectively.

Amortization of acquired intangible assets for the year ended December 31, 2017, includes $444.2 million of amortization and impairment charges related to our U.S. and rest of world licenses to Forward Pharma's intellectual property, including Forward Pharma's intellectual property related to TECFIDERA, as discussed below. Amortization of acquired intangible assets for 2017 also reflects a $31.2 million impairment charge related to the Article 20 Procedure of ZINBRYTA in the E.U. For additional information on the Article 20 Procedure of ZINBRYTA and resulting impairment of ZINBRYTA related assets, please read Note 20, *Collaborative and Other Relationships,* to these consolidated financial statements.

Balances in the table above as of December 31, 2017 also reflect the elimination of certain amounts transferred to Bioverativ in connection with the completion of the spin-off of our hemophilia business. For additional information on the spin-off of our hemophilia business, please read Note 3, *Hemophilia Spin-Off,* to these consolidated financial statements. In-process research and development balances include adjustments related to foreign currency exchange rate fluctuations.

Out-licensed Patents

Out-licensed patents to third-parties primarily relate to patents acquired in connection with the merger of Biogen, Inc. and IDEC Pharmaceuticals Corporation in 2003.

Developed Technology

Developed technology primarily relates to our AVONEX product, which was recorded in connection with the merger of Biogen, Inc. and IDEC Pharmaceuticals Corporation in 2003. The net book value of this asset as of December 31, 2017 was $309.5 million.

IPR&D

IPR&D represents the fair value assigned to research and development assets that we acquired and had not reached technological feasibility at the date of acquisition. Upon commercialization, we will determine the estimated useful life and amortize these amounts based upon an economic consumption method. The carrying value associated with our IPR&D assets as of December 31, 2017 and 2016 relates to the various IPR&D programs we acquired in connection with our acquisitions of Convergence, Stromedix Inc. (Stromedix) and Biogen International Neuroscience GmbH (BIN) in 2015, 2012 and 2010, respectively. These amounts have and will be adjusted for foreign exchange rate fluctuations.

An analysis of anticipated lifetime revenues and anticipated development costs is performed annually during our long-range planning cycle, which was updated in the third quarter of 2017. This analysis is based upon certain assumptions that we evaluate on a periodic basis, including anticipated future product sales, the expected impact of changes in the amount of development costs and the probabilities of our programs succeeding, the introduction of new products by our competitors and changes in our commercial and pipeline product candidates.

Acquired and In-licensed Rights and Patents

Acquired and in-licensed rights and patents primarily relate to our acquisition of all remaining rights to TYSABRI from Elan. The net book value of this asset as of December 31, 2017 was $2,236.2 million.

The net change in acquired and in-licensed rights and patents during 2017 reflects $90.0 million in total milestone payments paid to Ionis Pharmaceuticals, Inc. (Ionis) for the approvals of SPINRAZA in the E.U. and Japan in June 2017 and July 2017, respectively, the $25.0 million milestone payment paid to Samsung Bioepis, for the approval of IMRALDI, an adalimumab biosimilar referencing HUMIRA, in the E.U. in August 2017, and the net carrying value recognized in relation to our acquisition of TECFIDERA license rights, as described below. These net increases were in part offset by amortization and the $31.2 million impairment charge related to the Article 20 Procedure of ZINBRYTA.

For additional information on our relationships with Ionis and Samsung Bioepis and the European Commission (EC) approved restrictions on the use of ZINBRYTA, please read Note 20, *Collaborative and Other Relationships,* to these consolidated financial statements.

TECFIDERA License Rights

In January 2017 we entered into a settlement and license agreement among Biogen Swiss Manufacturing GmbH, Biogen International Holding Ltd., Forward Pharma and certain related parties, which was effective as of February 1, 2017. Pursuant to this agreement, we obtained U.S. and rest of world licenses to Forward Pharma's intellectual property, including Forward Pharma's intellectual property related to TECFIDERA. In exchange, we paid Forward Pharma $1.25 billion in cash. During the fourth quarter of 2016, we recognized a pre-tax charge of $454.8 million related to this agreement and in the first quarter of 2017 we recognized an intangible asset of $795.2 million related to this agreement. The pre-tax charge recognized in the fourth quarter of 2016 represented the fair value of our license to Forward Pharma’s intellectual property for the period April 2014, when we started selling TECFIDERA, through December 31, 2016. The intangible asset represented the fair value of the U.S. and rest of world licenses to Forward Pharma’s intellectual property related to TECFIDERA revenues for the period January 2017, the month in which we entered into this agreement, through December 2020, the last month before royalty payments could first commence pursuant to this agreement.

We have two intellectual property disputes with Forward Pharma, one in the U.S. and one in the E.U., concerning intellectual property related to TECFIDERA. In March 2017 the U.S. intellectual property dispute was decided in our favor. Forward Pharma appealed to the U.S. Court of Appeals for the Federal Circuit and the appeal is pending. We evaluated the recoverability of the U.S. asset acquired from Forward Pharma and recorded an impairment charge in the first quarter of 2017 to adjust the carrying value of the acquired U.S. asset to fair value reflecting the impact of the developments in the U.S. legal dispute. In January 2018 the European Patent Office (EPO) announced its decision revoking Forward Pharma’s European Patent No. 2 801 355. Forward Pharma has stated that it expects to file an appeal to the Technical Board of Appeal of the EPO. Based upon our assessment of these rulings, we continue to amortize the remaining net book value of the U.S. and rest of world intangible assets in our consolidated statements of income utilizing an economic consumption model.

For additional information on these disputes, please read Note 21, *Litigation,* to these consolidated financial statements.

Estimated Future Amortization of Intangible Assets

Our amortization expense is based on the economic consumption and impairment of intangible assets. Our most significant intangible assets are related to our TECFIDERA, AVONEX and TYSABRI products. Annually, during our long-range planning cycle, we perform an analysis of anticipated lifetime revenues of TECFIDERA, AVONEX and TYSABRI. This analysis is also updated whenever events or changes in circumstances would significantly affect the anticipated lifetime revenues of any of these products.

Our most recent long-range planning cycle was completed in the third quarter of 2017. Based upon this analysis, the estimated future amortization of acquired intangible assets for the next five years is expected to be as follows:

(In millions)	As of December 31, 2017
2018	$ 423.5
2019	401.8
2020	381.6
2021	254.3
2022	242.3

Goodwill

The following table provides a roll forward of the changes in our goodwill balance:

	As of December 31,	
(In millions)	2017	2016
Goodwill, beginning of year	$ 3,669.3	$ 2,663.8
Elimination of goodwill allocated to our hemophilia business	(314.1)	—
Increase to goodwill	1,267.3	1,026.9
Other	10.0	(21.4)
Goodwill, end of year	$ 4,632.5	$ 3,669.3

The elimination of goodwill represents an allocation based upon the relative enterprise fair value of the hemophilia business as of the distribution date. For additional information on the spin-off of our hemophilia business, please read Note 3, *Hemophilia Spin-Off,* to these consolidated financial statements.

The increase in goodwill during 2017 and 2016 was related to $1.5 billion and $1.2 billion in contingent milestones achieved (exclusive of $232.7 million and $173.1 million in tax benefits), respectively, and payable to the former shareholders of Fumapharm AG or holders of their rights.

Other includes changes related to foreign currency exchange rate fluctuations. As of December 31, 2017, we had no accumulated impairment losses related to goodwill.

For additional information on future contingent payments to the former shareholders of Fumapharm AG or holders of their rights, please read Note 22, *Commitments and Contingencies,* to these consolidated financial statements.

8. Fair Value Measurements

The tables below present information about our assets and liabilities that are regularly measured and carried at fair value and indicate the level within the fair value hierarchy of the valuation techniques we utilized to determine such fair value:

(In millions)	As of December 31, 2017	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents	$ 1,229.4	$ —	$ 1,229.4	$ —
Marketable debt securities:				
Corporate debt securities	2,609.8	—	2,609.8	—
Government securities	1,919.3	—	1,919.3	—
Mortgage and other asset backed securities	643.4	—	643.4	—
Marketable equity securities	11.8	11.8	—	—
Derivative contracts	2.7	—	2.7	—
Plan assets for deferred compensation	28.5	—	28.5	—
Total	$ 6,444.9	$ 11.8	$ 6,433.1	$ —
Liabilities:				
Derivative contracts	$ 111.3	$ —	$ 111.3	$ —
Contingent consideration obligations	523.6	—	—	523.6
Total	$ 634.9	$ —	$ 111.3	$ 523.6

(In millions)	As of December 31, 2016	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents	$ 2,039.6	$ —	$ 2,039.6	$ —
Marketable debt securities:				
Corporate debt securities	2,663.8	—	2,663.8	—
Government securities	2,172.5	—	2,172.5	—
Mortgage and other asset backed securities	561.7	—	561.7	—
Marketable equity securities	24.9	24.9	—	—
Derivative contracts	61.0	—	61.0	—
Plan assets for deferred compensation	34.5	—	34.5	—
Total	$ 7,558.0	$ 24.9	$ 7,533.1	$ —
Liabilities:				
Derivative contracts	$ 13.6	$ —	$ 13.6	$ —
Contingent consideration obligations	467.6	—	—	467.6
Total	$ 481.2	$ —	$ 13.6	$ 467.6

The fair value of Level 2 instruments classified as cash equivalents and marketable debt securities were determined through third-party pricing services. For a description of our validation procedures related to prices provided by third-party pricing services, please read Note 1, *Summary of Significant Accounting Policies: Fair Value Measurements*, to these consolidated financial statements.

Debt Instruments

The fair values of our debt instruments, which are Level 2 liabilities, are summarized as follows:

	As of December 31,	
(In millions)	2017	2016
Notes payable to Fumedica	$ 3.2	$ 6.1
6.875% Senior Notes due March 1, 2018	—	583.7
2.900% Senior Notes due September 15, 2020	1,517.7	1,521.5
3.625% Senior Notes due September 15, 2022	1,032.9	1,026.6
4.050% Senior Notes due September 15, 2025	1,851.9	1,796.0
5.200% Senior Notes due September 15, 2045	2,077.6	1,874.5
Total	$ 6,483.3	$ 6,808.4

In November 2017 we redeemed our 6.875% Senior Notes due March 1, 2018 with an aggregate principal amount of $550.0 million. For information on this redemption please read Note 12, *Indebtedness,* to these consolidated financial statements.

The fair value of our notes payable to Fumedica was estimated using market observable inputs, including current interest and foreign currency exchange rates. The fair value of each series of our Senior Notes was determined through market, observable and corroborated sources. For additional information on our debt instruments, please read Note 12, *Indebtedness,* to these consolidated financial statements.

Contingent Consideration Obligations

In connection with our acquisitions of Convergence, Stromedix and BIN in 2015, 2012 and 2010, respectively, we agreed to make additional payments based upon the achievement of certain milestone events. The following table provides a roll forward of the fair values of our contingent consideration obligations, which includes Level 3 measurements:

	As of December 31,	
(In millions)	2017	2016
Fair value, beginning of year	$ 467.6	$ 506.0
Changes in fair value	62.7	14.8
Payments and other	(6.7)	(53.2)
Fair value, end of year	$ 523.6	$ 467.6

As of December 31, 2017 and 2016, approximately $279.0 million and $246.8 million, respectively, of the fair value of our total contingent consideration obligations was reflected as a component of other long-term liabilities in our consolidated balance sheets with the remaining balance reflected as a component of accrued expenses and other. Changes in the fair value of our contingent consideration obligations are primarily due to changes in the expected timing and probabilities of success related to the achievement of certain developmental milestones and changes in the discount rate. Payments and other for 2016 includes $7.9 million of a Convergence milestone converted to a short-term obligation under the acquisition agreement.

There were no changes in valuation techniques or transfers between fair value measurement levels during the years ended December 31, 2017 and 2016. The fair values of the intangible assets and contingent consideration liabilities were based on a probability-adjusted discounted cash flow calculation using Level 3 fair value measurements and inputs including estimated revenues and probabilities of success. For additional information on the valuation techniques and inputs utilized in the valuation of our financial assets and liabilities, please read Note 1, *Summary of Significant Accounting Policies,* to these consolidated financial statements.

Convergence

In connection with our acquisition of Convergence in February 2015 we recorded a contingent consideration obligation of $274.5 million. This valuation was based on probability weighted net cash outflow projections of $450.0 million, discounted using a rate of 2.0%, which was the estimated cost of debt financing for market participants. This liability reflected the revised estimate from the date of acquisition for our initial clinical development plans, resulting probabilities of success and the timing of certain milestone payments. For additional information on this transaction, please read Note 2, *Acquisitions,* to these consolidated financial statements.

As of December 31, 2017 and 2016, the fair value of this contingent consideration obligation was $259.0 million and $258.9 million, respectively. Our most recent valuation was determined based upon net cash flow projections of $400.0 million, probability weighted and discounted using a rate of 2.4%, which is a measure of the credit risk associated with settling the liability.

For 2017 compared to 2016, the net increase in the fair value of this obligation was primarily due to changes in the discount rate, partially offset by changes in the expected timing related to the achievement of certain remaining developmental milestones. Approximately $147.9 million is reflected as a component of accrued expenses and other in our consolidated balance sheets as we expect to make the payment within one year.

Stromedix Inc.

In connection with our acquisition of Stromedix in March 2012 we recorded a contingent consideration obligation of $122.2 million. As of December 31, 2017 and 2016, the fair value of this contingent consideration obligation was $162.4 million and $133.2 million, respectively. Our most recent valuation was determined based upon net cash outflow projections of $344.0 million, probability weighted and discounted using a rate of 2.4%, which is a measure of the credit risk associated with settling the liability.

For 2017 compared to 2016, the net increase in the fair value of this obligation was primarily due to an increase in the probability of success related to the achievement of certain remaining developmental milestones, partially offset by changes in the discount rate. Approximately $76.7 million is reflected as a component of accrued expenses and other in our consolidated balance sheets as we expect to make the payment within one year.

Biogen Idec International Neuroscience GmbH

In connection with our acquisition of BIN in December 2010 we recorded a contingent consideration obligation of $81.2 million. As of December 31, 2017 and 2016, the fair value of this contingent consideration obligation was $102.2 million and $75.5 million, respectively. Our most recent valuation was determined based upon net cash outflow projections of $355.0 million, probability weighted and discounted using a rate of 2.8%, which is a measure of the credit risk associated with settling the liability.

For 2017 compared to 2016, the net increase in the fair value of this obligation was primarily due to an increase in the probability of success related to the achievement of certain remaining developmental milestones, partially offset by a $6.7 million developmental milestone payment. Approximately $20.0 million is reflected as a component of accrued expenses and other in our consolidated balance sheets as we achieved the developmental milestone of dosing our first patient in our Phase 2 SPARK study of BIIB054 in Parkinson's disease in January 2018.

Acquired IPR&D

In connection with our acquisition of Convergence, we also allocated $424.6 million of the total purchase price to acquired IPR&D, which was capitalized as an intangible asset. The amount allocated to acquired IPR&D was based on significant inputs not observable in the market and thus represented a Level 3 fair value measurement. These assets will be tested for impairment annually until commercialization, after which time the IPR&D will be amortized over its estimated useful life using the economic consumption method. For additional information on this transaction, please read Note 2, *Acquisitions,* to these consolidated financial statements.

9. Financial Instruments

The following table summarizes our financial assets with maturities of less than 90 days from the date of purchase included in cash and cash equivalents in our consolidated balance sheets:

	As of December 31,	
(In millions)	2017	2016
Commercial paper	$ 30.5	$ 31.0
Overnight reverse repurchase agreements	3.6	—
Money market funds	948.0	741.7
Short-term debt securities	247.3	1,266.9
Total	$ 1,229.4	$ 2,039.6

The carrying values of our commercial paper, including accrued interest, overnight reverse repurchase agreements, money market funds and our short-term debt securities approximate fair value due to their short-term maturities.

The following tables summarize our marketable debt and equity securities, classified as available for sale:

As of December 31, 2017 (In millions)	Fair Value	Gross Unrealized Gains	Gross Unrealized Losses	Amortized Cost
Corporate debt securities				
Current	$ 1,039.3	$ —	$ (0.2)	$ 1,039.5
Non-current	1,570.5	0.9	—	1,569.6
Government securities				
Current	1,075.1	0.1	(0.7)	1,075.7
Non-current	844.2	0.2	(1.1)	845.1
Mortgage and other asset backed securities				
Current	0.8	—	—	0.8
Non-current	642.6	1.1	(0.8)	642.3
Total marketable debt securities	$ 5,172.5	$ 2.3	$ (2.8)	$ 5,173.0
Marketable equity securities, non-current	$ 11.8	$ 1.8	$ (4.4)	$ 14.4

As of December 31, 2016 (In millions)	Fair Value	Gross Unrealized Gains	Gross Unrealized Losses	Amortized Cost
Corporate debt securities				
Current	$ 1,408.6	$ 0.2	$ (0.6)	$ 1,409.0
Non-current	1,255.2	1.2	(4.7)	1,258.7
Government securities				
Current	1,156.0	0.2	(0.3)	1,156.1
Non-current	1,016.5	0.5	(3.4)	1,019.4
Mortgage and other asset backed securities				
Current	4.0	—	—	4.0
Non-current	557.7	0.8	(2.2)	559.1
Total marketable debt securities	$ 5,398.0	$ 2.9	$ (11.2)	$ 5,406.3
Marketable equity securities, non-current	$ 24.9	$ 0.7	$ (9.3)	$ 33.5

Summary of Contractual Maturities: Available-for-Sale Securities

The estimated fair value and amortized cost of our marketable debt securities available-for-sale by contractual maturity are summarized as follows:

	As of December 31, 2017		As of December 31, 2016	
(In millions)	Estimated Fair Value	Amortized Cost	Estimated Fair Value	Amortized Cost
Due in one year or less	$ 2,115.2	$ 2,116.0	$ 2,568.6	$ 2,569.1
Due after one year through five years	2,730.0	2,730.0	2,552.6	2,559.7
Due after five years	327.3	327.0	276.8	277.5
Total available-for-sale securities	$ 5,172.5	$ 5,173.0	$ 5,398.0	$ 5,406.3

The average maturity of our marketable debt securities available-for-sale as of December 31, 2017 and 2016 was 17 months and 12 months, respectively.

Proceeds from Marketable Debt Securities

The proceeds from maturities and sales of marketable debt securities and resulting realized gains and losses are summarized as follows:

	For the Years Ended December 31,		
(In millions)	2017	2016	2015
Proceeds from maturities and sales	$ 5,565.9	$ 7,378.9	$ 4,063.0
Realized gains	$ 3.0	$ 3.3	$ 1.5
Realized losses	$ 22.4	$ 4.3	$ 3.5

Realized losses for the year ended December 31, 2017 primarily relate to impairments recognized on certain of our available-for-sale marketable debt securities as we intend to sell these securities as a result of the Tax Cuts and Jobs Act of 2017 (the 2017 Tax Act), sales of agency mortgage-backed securities, corporate bonds and government securities. Realized losses for the year ended December 31, 2016 primarily relate to sales of corporate bonds, agency mortgage-backed securities and other asset-backed securities. Realized losses for the year ended December 31, 2015 primarily relate to sales of corporate bonds, agency mortgage-backed securities and other asset-backed securities.

Strategic Investments

As of December 31, 2017 and 2016, our strategic investment portfolio was comprised of investments totaling $85.8 million and $99.9 million, respectively, which are included in investments and other assets in our consolidated balance sheets. Our strategic investment portfolio includes investments in equity securities of certain biotechnology companies and investments in venture capital funds where the underlying investments are in equity securities of biotechnology companies.

10. Derivative Instruments

Foreign Currency Forward Contracts - Hedging Instruments

Due to the global nature of our operations, portions of our revenues and operating expenses are recorded in currencies other than the U.S. dollar. The value of revenues and operating expenses measured in U.S. dollars is therefore subject to changes in foreign currency exchange rates. In order to mitigate these changes we use foreign currency forward contracts to lock in exchange rates associated with a portion of our forecasted international revenues and operating expenses.

Foreign currency forward contracts in effect as of December 31, 2017 and 2016 had durations of 1 to 21 months and 1 to 18 months, respectively. These contracts have been designated as cash flow hedges and accordingly, to the extent effective, any unrealized gains or losses on these foreign currency forward contracts are reported in accumulated other comprehensive income (loss) (referred to as AOCI in the tables below). Realized gains and losses for the effective portion of such contracts are recognized in revenues when the sale of product in the currency being hedged is recognized and in operating expenses when the expense in the currency being hedged is recorded. To the extent ineffective, hedge transaction gains and losses are reported in other income (expense), net.

The notional value of foreign currency forward contracts that were entered into to hedge forecasted revenues and operating expenses is summarized as follows:

	Notional Amount As of December 31,	
Foreign Currency: (In millions)	2017	2016
Euro	$ 1,875.6	$ 871.7
British pound sterling	150.9	—
Swiss francs	88.7	—
Canadian dollar	83.5	—
Total foreign currency forward contracts	$ 2,198.7	$ 871.7

The pre-tax portion of the fair value of these foreign currency forward contracts that was included in accumulated other comprehensive income (loss) in total equity reflected net losses of $113.0 million for the year ended December 31, 2017, and net gains of $49.8 million and $1.8 million for the years ended December 31, 2016 and 2015, respectively. We expect the net losses of $113.0 million to be settled over the next 21 months, of which $98.5 million is expected to be settled over the next 12 months, with any amounts in accumulated other comprehensive income (loss) to be reported as an adjustment to revenue or operating expense. We consider the impact of our and our counterparties' credit risk on the fair value of the contracts as well as the ability of each party to execute its contractual obligations. As of December 31, 2017 and 2016, credit risk did not change the fair value of our foreign currency forward contracts.

The following table summarizes the effect of foreign currency forward contracts designated as hedging instruments in our consolidated statements of income:

	For the Years Ended December 31,							
	Net Gains/(Losses) Reclassified from AOCI into Operating Income *(Effective Portion) (in millions)*				Net Gains/(Losses) Recognized into Net Income *(Ineffective Portion) (in millions)*			
Location	2017	2016	2015	Location	2017	2016	2015
Revenues	$ (32.5)	$ 5.3	$ 173.2	Other income (expense)	$ 8.9	$ 2.9	$ 4.9
Operating expenses	$ 0.6	$ (1.5)	$ —	Other income (expense)	$ (0.2)	$ 0.1	$ —

Interest Rate Contracts - Hedging Instruments

We have entered into interest rate lock contracts or interest rate swap contracts on certain borrowing transactions to manage our exposure to interest rate changes and to reduce our overall cost of borrowing.

Interest Rate Lock Contracts

During 2015 we entered into treasury rate locks, with an aggregated notional amount of $1.1 billion, which were designated as cash flow hedges to hedge against changes in the 10-year and 30-year U.S. treasury interest rates that could have impacted our anticipated debt offering. In connection with the issuance of our 4.05% and 5.20% Senior Notes, as described in Note 12, *Indebtedness*, to these consolidated financial statements, we settled the treasury rate locks and realized an $8.5 million gain. As the hedging relationship was effective, the gain was recorded in AOCI and will be recognized in other income (expense), net over the life of the 4.05% and 5.20% Senior Notes.

Interest Rate Swap Contracts

In connection with the issuance of our 2.90% Senior Notes, as described in Note 12, *Indebtedness*, to these consolidated financial statements, we entered into interest rate swaps with an aggregate notional amount of $675.0 million, which expire on September 15, 2020. The interest rate swap contracts are designated as hedges of the fair value changes in the 2.90% Senior Notes attributable to changes in interest rates. Since the specific terms and notional amount of the swaps match the debt being hedged, it is assumed to be a highly effective hedge and all changes in the fair value of the swaps are recorded as a component of the 2.90% Senior Notes with no net impact recorded in income. Any net interest payments made or received on the interest rate swap contracts are recognized as a component of interest expense in our consolidated statements of income.

Foreign Currency Forward Contracts - Other Derivatives

We also enter into other foreign currency forward contracts, usually with durations of one month or less, to mitigate the foreign currency risk related to certain balance sheet positions. We have not elected hedge accounting for these transactions.

The aggregate notional amount of these outstanding foreign currency contracts was $564.9 million and $902.1 million as of December 31, 2017 and 2016, respectively. Net gains of $4.5 million and net losses of $29.2 million and $23.8 million related to these contracts were recognized as a component of other income (expense), net, for the years ended December 31, 2017, 2016 and 2015, respectively.

Summary of Derivatives

While certain of our derivatives are subject to netting arrangements with our counterparties, we do not offset derivative assets and liabilities in our consolidated balance sheets.

The following table summarizes the fair value and presentation in our consolidated balance sheets of our outstanding derivatives including those designated as hedging instruments:

(In millions)	Balance Sheet Location	Fair Value As of December 31, 2017
Hedging Instruments:		
Asset derivatives	Other current assets	$ 0.7
	Investments and other assets	$ 0.2
Liability derivatives	Accrued expenses and other	$ 84.7
	Other long-term liabilities	23.6
Other Derivatives:		
Asset derivatives	Other current assets	$ 1.8
Liability derivatives	Accrued expenses and other	$ 3.0

(In millions)	Balance Sheet Location	Fair Value As of December 31, 2016
Hedging Instruments:		
Asset derivatives	Other current assets	$ 50.4
	Investments and other assets	$ 6.6
Liability derivatives	Other long-term liabilities	$ 4.6
Other Derivatives:		
Asset derivatives	Other current assets	$ 4.0
Liability derivatives	Accrued expenses and other	$ 9.0

11. Property, Plant and Equipment

Property, plant and equipment are recorded at historical cost, net of accumulated depreciation. Components of property, plant and equipment, net are summarized as follows:

	As of December 31,	
(In millions)	2017	2016
Land	$ 141.2	$ 137.8
Buildings	1,213.6	1,107.8
Leasehold improvements	80.6	123.7
Machinery and equipment	1,207.7	1,105.8
Computer software and hardware	767.1	746.8
Furniture and fixtures	55.3	60.6
Construction in progress	1,276.0	658.6
Total cost	4,741.5	3,941.1
Less: accumulated depreciation	(1,559.1)	(1,439.3)
Total property, plant and equipment, net	$ 3,182.4	$ 2,501.8

Depreciation expense totaled $266.3 million, $309.3 million and $217.9 million for 2017, 2016 and 2015, respectively.

For 2017, 2016 and 2015, we capitalized interest costs related to construction in progress totaling approximately $30.7 million, $12.9 million and $10.4 million, respectively. The increase in capitalized interest costs is primarily due to the construction of our Solothurn, Switzerland facility, as discussed below.

Solothurn, Switzerland Facility

During the first quarter of 2016 we purchased land in Solothurn, Switzerland for 64.4 million Swiss Francs (approximately $62.5 million) and are building a large-scale biologics manufacturing facility at this site. We expect this facility to be operational by the end of the decade. Upon completion, the facility will include 393,000 square feet related to a large-scale biologics manufacturing facility, 290,000 square feet of warehouse, utilities and support space and 51,000 square feet of administrative space. As of December 31, 2017 and 2016, we had approximately $1.2 billion and $481.5 million, respectively, capitalized as construction in progress related to this facility.

Research Triangle Park Facility Purchase

In August 2015 we completed the purchase of a drug product manufacturing facility and supporting infrastructure in Research Triangle Park (RTP), NC from Eisai Inc. (Eisai). The $104.8 million purchase price was comprised of $58.6 million for buildings, $25.9 million for machinery and equipment and $20.3 million for land.

In August 2015 we also amended our existing 10-year lease related to Eisai's oral solid dose products manufacturing facility in RTP, NC. The amended lease provided for a three-year term and our agreement to purchase the facility upon expiration of the lease term or at Eisai's option, their completion of certain activities at the facility. Upon signing, we recognized assets along with a corresponding financing obligation in our consolidated balance sheet of $20.3 million, the net present value of the future minimum lease payments. These assets were recorded as a component of buildings and machinery and equipment. In December 2017, upon the earlier than expected completion of Eisai's activities, we completed our purchase of this facility for $17.2 million.

12. Indebtedness

Our indebtedness is summarized as follows:

(In millions)	As of December 31, 2017	2016
Current portion:		
Notes payable to Fumedica	$ 3.2	$ 3.0
Financing arrangement for the purchase of the RTP facility	—	1.7
Current portion of notes payable and other financing arrangements	$ 3.2	$ 4.7
Non-current portion:		
6.875% Senior Notes due March 1, 2018	$ —	$ 558.5
2.900% Senior Notes due September 15, 2020	1,482.4	1,485.3
3.625% Senior Notes due September 15, 2022	994.3	993.2
4.050% Senior Notes due September 15, 2025	1,736.3	1,734.8
5.200% Senior Notes due September 15, 2045	1,722.0	1,721.5
Notes payable to Fumedica	—	3.0
Financing arrangement for the purchase of the RTP facility	—	16.4
Non-current portion of notes payable and other financing arrangements	$ 5,935.0	$ 6,512.7

6.875% Senior Notes due March 1, 2018

On March 4, 2008, we issued $550.0 million aggregate principal amount of 6.875% Senior Notes due March 1, 2018 at 99.184% of par. These notes were senior unsecured obligations. We also entered into interest rate swap contracts where we received a fixed rate and paid a variable rate. These contracts were terminated in December 2008. Upon termination of these contracts, the carrying amount of these notes were increased by $62.8 million with this amount being amortized using the effective interest rate method over the remaining life of the Senior Notes and recognized as a reduction of interest expense.

In November 2017 we redeemed these notes prior to their maturity and recognized a net charge of $5.2 million upon the extinguishment of these notes. This charge, which was recognized in interest expense in other income (expense) net in our consolidated statements of income for the year ended December 31, 2017, reflects the payment of a $7.7 million early call premium and the write off of remaining unamortized original debt issuance costs and discount balances, partially offset by a $2.9 million gain related to the remaining unamortized balance of the interest rate swap liability discussed above.

2015 Senior Notes

The following is a summary of our principal indebtedness as of December 31, 2017:

- $1.5 billion aggregate principal amount of 2.90% Senior Notes due September 15, 2020, valued at 99.792% of par;
- $1.0 billion aggregate principal amount of 3.625% Senior Notes due September 15, 2022, valued at 99.920% of par;
- $1.75 billion aggregate principal amount of 4.05% Senior Notes due September 15, 2025, valued at 99.764% of par; and
- $1.75 billion aggregate principal amount of 5.20% Senior Notes due September 15, 2045, valued at 99.294% of par.

The costs associated with these offerings of approximately $47.5 million have been recorded as a reduction to the carrying amount of the debt in our consolidated balance sheet. These costs along with the discounts will be amortized as additional interest expense using the effective interest rate method over the period from issuance through maturity.

These notes are senior unsecured obligations. These Senior Notes may be redeemed at our option at any time at 100% of the principal amount plus accrued interest and a specified make-whole amount. These Senior Notes

contain a change of control provision that may require us to purchase the notes at a price equal to 101% of the principal amount plus accrued and unpaid interest to the date of purchase under certain circumstances.

In connection with the 2.90% Senior Notes offering due in 2020, we entered into interest rate swap contracts. The carrying value of the 2.90% Senior Notes includes approximately $10.1 million related to changes in the fair value of these contracts. For additional information on our interest rate contracts, please read Note 10, *Derivative Instruments,* to these consolidated financial statements.

Notes Payable to Fumedica

In connection with our 2006 distribution agreement with Fumedica, we issued notes totaling 61.4 million Swiss Francs that are payable to Fumedica in varying amounts from June 2008 through June 2018. Our remaining note payable to Fumedica, payable in June 2018, had a carrying value of 3.1 million Swiss Francs ($3.2 million) and 6.2 million Swiss Francs ($6.0 million) as of December 31, 2017 and 2016, respectively.

Credit Facility

In August 2015 we entered into a $1.0 billion, five-year senior unsecured revolving credit facility under which we are permitted to draw funds for working capital and general corporate purposes. The terms of the revolving credit facility include a financial covenant that requires us not to exceed a maximum consolidated leverage ratio. As of December 31, 2017, we had no outstanding borrowings and were in compliance with all covenants under this facility.

Financing Arrangement

During 2015 we recorded a financing obligation in relation to the amendment of our lease agreement for Eisai's oral solid dose products manufacturing facility in RTP, NC. In December 2017 we completed the purchase of this facility for $17.2 million and derecognized the remaining unamortized portion of the financing obligation from our consolidated balance sheet as of that date. For additional information on this transaction, please read Note 11, *Property, Plant and Equipment,* to these consolidated financial statements.

Debt Maturity

The total gross payments, excluding our financing arrangement, due under our debt arrangements are as follows:

(In millions)	As of December 31, 2017
2018	$ 3.2
2019	—
2020	1,500.0
2021	—
2022	1,000.0
2023 and thereafter	3,500.0
Total	$ 6,003.2

The fair value of our debt is disclosed in Note 8, *Fair Value Measurements,* to these consolidated financial statements.

13. Equity

Preferred Stock

We have 8.0 million shares of Preferred Stock authorized, of which 1.75 million shares are authorized as Series A, 1.0 million shares are authorized as Series X junior participating and 5.25 million shares are undesignated. Shares may be issued without a vote or action of shareholders from time to time in classes or series with the designations, powers, preferences, and the relative, participating, optional or other special rights of the shares of each such class or series and any qualifications, limitations or restrictions thereon as set forth in the instruments governing such shares. Any such Preferred Stock may rank prior to common stock as to dividend rights, liquidation preference or both, and may have full or limited voting rights and may be convertible into shares of common stock. No shares of Preferred Stock were issued and outstanding during 2017, 2016 and 2015.

Common Stock

The following table describes the number of shares authorized, issued and outstanding of our common stock as of December 31, 2017 and 2016:

	As of December 31, 2017			As of December 31, 2016		
(In millions)	Authorized	Issued	Outstanding	Authorized	Issued	Outstanding
Common stock	1,000.0	235.3	211.5	1,000.0	238.5	215.9

Share Repurchases

In July 2016 our Board of Directors authorized a program to repurchase up to $5.0 billion of our common stock (2016 Share Repurchase Program). This authorization does not have an expiration date. All share repurchases under this authorization will be retired. Under this authorization, we repurchased and retired 3.7 million and 3.3 million shares of common stock during the years ended December 31, 2017 and 2016, respectively, at a cost of $1.0 billion for each year. As of December 31, 2017, approximately $3.0 billion remains available for share repurchases under this authorization.

In May 2015 our Board of Directors authorized a program to repurchase up to $5.0 billion of our common stock (2015 Share Repurchase Program). All shares repurchased under this authorization were retired. Our 2015 Share Repurchase Program was completed as of December 31, 2015. Under this authorization, we repurchased and retired approximately 16.8 million shares of common stock at a cost of $5.0 billion during the year ended December 31, 2015.

In February 2011 our Board of Directors authorized a program to repurchase up to 20.0 million shares of our common stock (2011 Share Repurchase Program). Shares repurchased under this authorization were principally used to offset common stock issuances under our share-based compensation programs. Our 2011 Share Repurchase Program was completed as of March 31, 2017. Under this authorization, we repurchased 1.2 million shares of common stock at a cost of $365.4 million during the year ended December 31, 2017. We did not repurchase any shares of common stock under this authorization during the years ended December 31, 2016 and 2015.

14. Accumulated Other Comprehensive Income (Loss)

The following table summarizes the changes in accumulated other comprehensive income (loss), net of tax by component:

(In millions)	Unrealized Gains (Losses) on Securities Available for Sale, net of tax	Unrealized Gains (Losses) on Cash Flow Hedges, net of tax	Unfunded Status of Postretirement Benefit Plans, net of tax	Translation Adjustments	Total
Balance, December 31, 2016	$ (10.8)	$ 57.8	$ (32.7)	$ (334.2)	$ (319.9)
Other comprehensive income (loss) before reclassifications	(3.5)	(193.8)	(4.1)	158.7	(42.7)
Amounts reclassified from accumulated other comprehensive income (loss)	12.7	31.5	—	—	44.2
Net current period other comprehensive income (loss)	9.2	(162.3)	(4.1)	158.7	1.5
Balance, December 31, 2017	$ (1.6)	$ (104.5)	$ (36.8)	$ (175.5)	$ (318.4)

(In millions)	Unrealized Gains (Losses) on Securities Available for Sale, net of tax	Unrealized Gains (Losses) on Cash Flow Hedges, net of tax	Unfunded Status of Postretirement Benefit Plans, net of tax	Translation Adjustments	Total
Balance, December 31, 2015	$ (0.8)	$ 10.2	$ (37.8)	$ (195.6)	$ (224.0)
Other comprehensive income (loss) before reclassifications	(10.6)	51.6	5.1	(138.6)	(92.5)
Amounts reclassified from accumulated other comprehensive income (loss)	0.6	(4.0)	—	—	(3.4)
Net current period other comprehensive income (loss)	(10.0)	47.6	5.1	(138.6)	(95.9)
Balance, December 31, 2016	$ (10.8)	$ 57.8	$ (32.7)	$ (334.2)	$ (319.9)

(In millions)	Unrealized Gains (Losses) on Securities Available for Sale, net of tax	Unrealized Gains (Losses) on Cash Flow Hedges, net of tax	Unfunded Status of Postretirement Benefit Plans, net of tax	Translation Adjustments	Total
Balance, December 31, 2014	$ (0.4)	$ 71.7	$ (31.6)	$ (99.2)	$ (59.5)
Other comprehensive income (loss) before reclassifications	(1.7)	110.8	(6.2)	(96.4)	6.5
Amounts reclassified from accumulated other comprehensive income (loss)	1.3	(172.3)	—	—	(171.0)
Net current period other comprehensive income (loss)	(0.4)	(61.5)	(6.2)	(96.4)	(164.5)
Balance, December 31, 2015	$ (0.8)	$ 10.2	$ (37.8)	$ (195.6)	$ (224.0)

The following table summarizes the amounts reclassified from accumulated other comprehensive income:

		Amounts Reclassified from Accumulated Other Comprehensive Income		
		For the Years Ended December 31,		
(In millions)	Income Statement Location	2017	2016	2015
Gains (losses) on securities available for sale	Other income (expense)	$ (19.5)	$ (0.9)	$ (2.0)
	Income tax benefit (expense)	6.8	0.3	0.7
Gains (losses) on cash flow hedges	Revenues	(32.5)	5.3	173.2
	Operating expenses	0.6	(1.5)	—
	Other income (expense)	0.3	0.2	(0.1)
	Income tax benefit (expense)	0.1	—	(0.8)
Total reclassifications, net of tax		$ (44.2)	$ 3.4	$ 171.0

15. Earnings per Share

Basic and diluted earnings per share are calculated as follows:

	For the Years Ended December 31,		
(In millions)	2017	2016	2015
Numerator:			
Net income attributable to Biogen Inc.	$ 2,539.1	$ 3,702.8	$ 3,547.0
Denominator:			
Weighted average number of common shares outstanding	212.6	218.4	230.7
Effect of dilutive securities:			
Stock options and employee stock purchase plan	0.1	0.1	0.1
Time-vested restricted stock units	0.2	0.2	0.3
Market stock units	0.1	0.1	0.1
Dilutive potential common shares	0.4	0.4	0.5
Shares used in calculating diluted earnings per share	213.0	218.8	231.2

Amounts excluded from the calculation of net income per diluted share because their effects were anti-dilutive were insignificant.

Earnings per share for the years ended December 31, 2017, 2016 and 2015 reflects, on a weighted average basis, the repurchase of 3.7 million shares, 0.7 million shares and 4.6 million shares, respectively, of our common stock under our share repurchase authorizations.

The adjustments related to the spin-off of our hemophilia business did not have a material impact on the potentially dilutive securities to be considered in the calculation of diluted earnings per share of common stock.

16. Share-based Payments

Share-based Compensation Expense

The following table summarizes share-based compensation expense included in our consolidated statements of income:

	For the Years Ended December 31,		
(In millions)	2017	2016	2015
Research and development	$ 74.0	$ 84.5	$ 88.6
Selling, general and administrative	95.7	121.7	127.3
Restructuring charges	—	(1.8)	(8.6)
Subtotal	169.7	204.4	207.3
Capitalized share-based compensation costs	(9.6)	(14.6)	(11.0)
Share-based compensation expense included in total cost and expenses	160.1	189.8	196.3
Income tax effect	(42.8)	(54.0)	(55.8)
Share-based compensation expense included in net income attributable to Biogen Inc.	$ 117.3	$ 135.8	$ 140.5

The following table summarizes share-based compensation expense associated with each of our share-based compensation programs:

	For the Years Ended December 31,		
(In millions)	2017	2016	2015
Market stock units	$ 22.4	$ 38.4	$ 38.1
Time-vested restricted stock units	107.3	120.0	119.0
Cash settled performance units	18.4	16.3	22.4
Performance units	12.3	18.6	13.9
Employee stock purchase plan	9.3	11.1	13.9
Subtotal	169.7	204.4	207.3
Capitalized share-based compensation costs	(9.6)	(14.6)	(11.0)
Share-based compensation expense included in total cost and expenses	$ 160.1	$ 189.8	$ 196.3

As of December 31, 2017, unrecognized compensation cost related to unvested share-based compensation was approximately $168.0 million, net of estimated forfeitures. We expect to recognize the cost of these unvested awards over a weighted-average period of 1.9 years.

Spin-off Related Equity Adjustments

Pursuant to an employee matters agreement entered into in connection with the spin-off of our hemophilia business and the provisions of our existing share-based compensation arrangements, we made certain adjustments to the number and terms of our outstanding stock options, RSUs, CSPUs and other share-based awards to preserve the intrinsic value of the awards immediately before and after the spin-off. For purposes of the vesting of these equity awards, continued employment or service with Biogen or with Bioverativ was treated as continued employment for purposes of both Biogen's and Bioverativ's equity awards with the outstanding awards continuing to vest over their respective original vesting periods. Outstanding unvested awards for employees transferring to Bioverativ were converted to unvested Bioverativ awards.

Adjustments to the number of our share-based compensation awards were made using an adjustment ratio based upon the weighted-average closing price of our common stock for the 10 calendar days prior to the effective date of the spin-off and the volume-weighted average prices for the 10 calendar days of our common stock following the effective date of the spin-off. For stock options, the exercise prices of the awards were modified to maintain the pre-spin intrinsic value of the awards in relation to the post-spin stock price of Biogen. The difference between the fair value of the awards based upon the adjustment ratio and the opening price on the distribution date was not material.

Share-Based Compensation Plans

We have three share-based compensation plans pursuant to which awards are currently being made: (i) the Biogen Inc. 2006 Non-Employee Directors Equity Plan (2006 Directors Plan); (ii) the Biogen Inc. 2017 Omnibus Equity Plan (2017 Omnibus Equity Plan); and (iii) the Biogen Inc. 2015 Employee Stock Purchase Plan (2015 ESPP).

Directors Plan

In May 2006 our shareholders approved the 2006 Directors Plan for share-based awards to our directors. Awards granted from the 2006 Directors Plan may include stock options, shares of restricted stock, RSUs, stock appreciation rights and other awards in such amounts and with such terms and conditions as may be determined by a committee of our Board of Directors, subject to the provisions of the plan. We have reserved a total of 1.6 million shares of common stock for issuance under the 2006 Directors Plan. The 2006 Directors Plan provides that awards other than stock options and stock appreciation rights will be counted against the total number of shares reserved under the plan in a 1.5-to-1 ratio. In June 2015 our shareholders approved an amendment to extend the term of the 2006 Directors Plan until June 2025.

Omnibus Plan

In June 2017 our shareholders approved the 2017 Omnibus Equity Plan for share-based awards to our employees. Awards granted from the 2017 Omnibus Equity Plan may include stock options, shares of restricted stock, RSUs, performance shares, stock appreciation rights and other awards in such amounts and with such terms and conditions as may be determined by a committee of our Board of Directors, subject to the provisions of the plan. Shares of common stock available for grant under the 2017 Omnibus Equity Plan consist of 8.0 million shares reserved for this purpose, plus shares of common stock that remained available for grant under our 2008 Omnibus Equity Plan as of June 7, 2017 or that could again become available for grant if outstanding awards under the 2008 Omnibus Equity Plan as of June 7, 2017 are cancelled, surrendered or terminated in whole or in part. The 2017 Omnibus Equity Plan provides that awards other than stock options and stock appreciation rights will be counted against the total number of shares available under the plan in a 1.5-to-1 ratio.

We have not made any awards pursuant to the 2008 Omnibus Equity Plan since our shareholders approved the 2017 Omnibus Equity Plan, and do not intend to make any awards pursuant to the 2008 Omnibus Equity Plan in the future, except that unused shares under the 2008 Omnibus Equity Plan have been carried over for use under the 2017 Omnibus Equity Plan.

Stock Options

We currently do not grant stock options to our employees or directors. Outstanding stock options previously granted to our employees and directors generally have a ten-year term and vest over a period of between one and four years, provided the individual continues to serve at Biogen through the vesting dates. Options granted under all plans are exercisable at a price per share not less than the fair market value of the underlying common stock on the date of grant. The estimated fair value of options, including the effect of estimated forfeitures, is recognized over the options' vesting periods. The fair value of the stock options granted in 2010 was estimated as of the date of grant using a Black-Scholes option valuation model. There were no grants of stock options made in 2017, 2016 and 2015. As of December 31, 2017, all outstanding options were exercisable.

The expected life of options granted is derived using assumed exercise rates based on historical exercise patterns and represents the period of time that options granted are expected to be outstanding. Expected stock price volatility is based upon implied volatility for our exchange-traded options and other factors, including historical volatility. After assessing all available information on either historical volatility, implied volatility or both, we have concluded that a combination of both historical and implied volatility provides the best estimate of expected volatility. The risk-free interest rate used is determined by the market yield curve based upon risk-free interest rates established by the Federal Reserve, or non-coupon bonds that have maturities equal to the expected term. The dividend yield of zero is based upon the fact that we have not historically granted cash dividends, and do not expect to issue dividends in the foreseeable future. Stock options granted prior to January 1, 2006 were valued based on the grant date fair value of those awards, using the Black-Scholes option pricing model, as previously calculated for pro-forma disclosures.

The following table summarizes our stock option activity:

	Shares	Weighted Average Exercise Price
Outstanding at December 31, 2016	66,000	$ 54.06
Hemophilia spin-off adjustment	—	$ —
Granted	—	$ —
Exercised	(14,000)	$ 50.89
Cancelled	(10,000)	$ 55.11
Outstanding at December 31, 2017	42,000	$ 53.83

The total intrinsic values of options exercised in 2017, 2016 and 2015 totaled $3.4 million, $10.4 million and $38.0 million, respectively. The aggregate intrinsic values of options outstanding as of December 31, 2017 totaled $11.1 million. The weighted average remaining contractual term for options outstanding as of December 31, 2017 was 1.3 years.

The following table summarizes the amount of tax benefit realized for stock options and cash received from the exercise of stock options:

	For the Years Ended December 31,		
(In millions)	2017	2016	2015
Tax benefit realized for stock options	$ 3.4	$ 4.0	$ 11.9
Cash received from the exercise of stock options	$ 0.7	$ 2.2	$ 6.3

Market Stock Units (MSUs)

MSUs awarded to employees prior to 2014 vested in four equal annual increments beginning on the first anniversary of the grant date. Participants may ultimately earn between 0% and 150% of the target number of units granted based on actual stock performance.

MSUs awarded to employees in 2014 and thereafter vest in three equal annual increments beginning on the first anniversary of the grant date, and participants may ultimately earn between 0% and 200% of the target number of units granted based on actual stock performance.

The vesting of these awards is subject to the respective employee's continued employment. The number of MSUs granted represents the target number of units that are eligible to be earned based on the attainment of certain market-based criteria involving our stock price. The number of MSUs earned is calculated at each annual anniversary from the date of grant over the respective vesting periods, resulting in multiple performance periods. Accordingly, additional MSUs may be issued or currently outstanding MSUs may be cancelled upon final determination of the number of awards earned. Compensation expense, including the effect of forfeitures, is recognized over the applicable service period.

The following table summarizes our MSU activity:

	Shares	Weighted Average Grant Date Fair Value
Unvested at December 31, 2016	230,000	$ 355.60
Hemophilia spin-off adjustment	4,000	$ —
Granted (a)	94,000	$ 382.59
Vested	(112,000)	$ 311.17
Forfeited	(45,000)	$ 372.35
Unvested at December 31, 2017	171,000	$ 370.83

(a) MSUs granted in 2017 include approximately 9,000 MSUs issued in 2017 based upon the attainment of performance criteria set for 2013, in relation to awards granted in that year. MSUs granted during 2017 also include awards granted in conjunction with our annual awards made in February 2017 and MSUs granted in conjunction with the hiring of employees. These grants reflect the target number of shares eligible to be earned at the time of grant. MSUs granted in 2017 reflect an adjustment based upon the final performance multiplier in relation to shares granted in 2016, 2015 and 2014.

We value grants of MSUs using a lattice model with a Monte Carlo simulation. This valuation methodology utilizes several key assumptions, including the 60 calendar day average closing stock price on grant date for MSUs awarded prior to 2014, the 30 calendar day average closing stock price on the date of grant for MSUs awarded in 2014 and thereafter, expected volatility of our stock price, risk-free rates of return and expected dividend yield.

The assumptions used in our valuation are summarized as follows:

	For the Years Ended December 31,		
	2017	2016	2015
Expected dividend yield	—%	—%	—%
Range of expected stock price volatility	33.0% - 35.6%	38.2% - 40.7%	31.0% - 33.2%
Range of risk-free interest rates	0.9% - 1.6%	0.6% - 0.9%	0.2% - 1.0%
30 calendar day average stock price on grant date	$263.18 - $267.88	$260.67 - $304.86	$277.35 - $426.27
Weighted-average per share grant date fair value	$382.59	$328.03	$493.43

The fair values of MSUs vested in 2017, 2016 and 2015 totaled $31.4 million, $39.3 million and $109.0 million, respectively.

Cash Settled Performance Units (CSPUs)

CSPUs awarded to employees vest in three equal annual increments beginning on the first anniversary of the grant date. The vesting of these awards is subject to the respective employee's continued employment with such awards settled in cash. The number of CSPUs granted represents the target number of units that are eligible to be earned based on the attainment of certain performance measures established at the beginning of the performance period, which ends on December 31 of each year. Participants may ultimately earn between 0% and 200% of the target number of units granted based on the degree of actual performance metric achievement. Accordingly, additional CSPUs may be issued or currently outstanding CSPUs may be cancelled upon final determination of the number of units earned. CSPUs awarded prior to 2014 are settled in cash based on the 60 calendar day average closing stock price through each vesting date once the actual vested and earned number of units is known. CSPUs awarded in 2014 and thereafter will be settled in cash based on the 30 calendar day average closing stock price through each vesting date, once the actual vested and earned number of units is known. Since no shares are issued, these awards do not dilute equity. Compensation expense, including the effect of forfeitures, is recognized over the applicable service period.

The following table summarizes our CSPU activity:

	Shares
Unvested at December 31, 2016	122,000
Hemophilia spin-off adjustment	3,000
Granted (a)	83,000
Vested	(69,000)
Forfeited	(34,000)
Unvested at December 31, 2017	105,000

(a) CSPUs granted in 2017 include awards granted in conjunction with our annual awards made in February 2017 and CSPUs granted in conjunction with the hiring of employees. These grants reflect the target number of shares eligible to be earned at the time of grant. CSPUs granted in 2017 also include CSPUs issued in 2017 based upon the attainment of performance criteria set for 2016 in relation to shares granted in 2016.

The cash paid in settlement of CSPUs vested in 2017, 2016 and 2015 totaled $16.6 million, $31.9 million and $79.8 million, respectively.

Performance-vested Restricted Stock Units (PUs)

PUs are granted to certain employees in the form of RSUs that may be settled in cash or shares of our common stock at the sole discretion of the Compensation and Management Development Committee of our Board of Directors. These awards are structured and accounted for the same way as the CSPUs, and vest in three equal annual increments beginning on the first anniversary of the grant date. The number of PUs granted represents the target number of units that are eligible to be earned based on the attainment of certain performance measures established at the beginning of the performance period, which ends on December 31 of each year. Participants may ultimately earn between 0% and 200% of the target number of units granted based on the degree of actual performance metric achievement. Accordingly, additional PUs may be issued or currently outstanding PUs may be cancelled upon final determination of the number of units earned. PUs settling in cash are based on the 30 calendar day average closing stock price through each vesting date once the actual vested and earned number of units is known. Compensation expense, including the effect of forfeitures, is recognized over the applicable service period.

The following table summarizes our PU activity:

	Shares
Unvested at December 31, 2016	110,000
Hemophilia spin-off adjustment	3,000
Granted (a)	40,000
Vested	(43,000)
Forfeited	(19,000)
Unvested at December 31, 2017	91,000

(a) PUs granted in 2017 include awards granted in conjunction with our annual awards made in February 2017 and PUs granted in conjunction with the hiring of employees. These grants reflect the target number of shares eligible to be earned at the time of grant.

During 2015 32,000 PUs were converted to share settlements, of which approximately 11,000 shares were vested and issued. All other PUs that vested in 2015 were settled in cash totaling $12.4 million.

All PUs that vested in 2017 and 2016 were settled in cash totaling $11.5 million and $8.1 million, respectively.

Time-Vested Restricted Stock Units (RSUs)

RSUs awarded to employees generally vest no sooner than one-third per year over three years on the anniversary of the date of grant, or upon the third anniversary of the date of the grant, provided the employee remains continuously employed with us, except as otherwise provided in the plan. Shares of our common stock will be delivered to the employee upon vesting, subject to payment of applicable withholding taxes. RSUs awarded to directors for service on our Board of Directors vest on the first anniversary of the date of grant, provided in each case that the director continues to serve on our Board of Directors through the vesting date. Shares of our common stock will be delivered to the director upon vesting and are not subject to any withholding taxes. The fair value of all RSUs is based on the market value of our stock on the date of grant. Compensation expense, including the effect of forfeitures, is recognized over the applicable service period.

The following table summarizes our RSU activity:

	Shares	Weighted Average Grant Date Fair Value
Unvested at December 31, 2016	888,000	$ 303.49
Hemophilia spin-off adjustment	12,000	$ —
Granted (a)	464,000	$ 293.41
Vested	(350,000)	$ 308.04
Forfeited	(182,000)	$ 292.57
Unvested at December 31, 2017	832,000	$ 291.85

(a) RSUs granted in 2017 primarily represent RSUs granted in conjunction with our annual awards made in February 2017 and awards made in conjunction with the hiring of new employees. RSUs granted in 2017 also include approximately 11,000 RSUs granted to our Board of Directors.

RSUs granted in 2016 and 2015 had weighted average grant date fair values of $268.52 and $388.88, respectively.

The fair values of RSUs vested in 2017, 2016 and 2015 totaled $100.0 million, $104.6 million and $239.7 million, respectively.

Employee Stock Purchase Plan (ESPP)

In June 2015 our shareholders approved the 2015 ESPP. The 2015 ESPP, which became effective on July 1, 2015, replaced the Biogen Idec Inc. 1995 ESPP (1995 ESPP), which expired on June 30, 2015. The maximum aggregate number of shares of our common stock that may be purchased under the 2015 ESPP is 6.2 million.

The following table summarizes our ESPP activity:

	For the Years Ended December 31,		
(In millions, except share amounts)	**2017**	**2016**	**2015**
Shares issued under the 2015 ESPP	167,000	190,000	78,000
Shares issued under the 1995 ESPP	—	—	98,000
Cash received under the 2015 ESPP	$ 39.8	$ 41.5	$ 19.3
Cash received under the 1995 ESPP	$ —	$ —	$ 30.0

17. Income Taxes

Income Tax Expense

Income before income tax provision and the income tax expense consist of the following:

	For the Years Ended December 31,		
(In millions)	**2017**	**2016**	**2015**
Income before income taxes (benefit):			
Domestic	$ 3,540.4	$ 3,655.4	$ 3,386.7
Foreign	1,588.4	1,277.6	1,380.6
Total	$ 5,128.8	$ 4,933.0	$ 4,767.3
Income tax expense (benefit):			
Current:			
Federal	$ 2,201.4	$ 1,304.3	$ 1,214.1
State	57.0	55.1	38.6
Foreign	108.6	52.9	54.5
Total	2,367.0	1,412.3	1,307.2
Deferred:			
Federal	$ 241.0	$ (125.6)	$ (129.6)
State	9.9	(3.8)	(1.9)
Foreign	(159.2)	(45.6)	(14.1)
Total	91.7	(175.0)	(145.6)
Total income tax expense	$ 2,458.7	$ 1,237.3	$ 1,161.6

Tax Reform

The 2017 Tax Act, which was signed into law on December 22, 2017, has resulted in significant changes to the U.S. corporate income tax system. These changes include a federal statutory rate reduction from 35% to 21%, the elimination or reduction of certain domestic deductions and credits and limitations on the deductibility of interest expense and executive compensation. The 2017 Tax Act also transitions international taxation from a worldwide system to a modified territorial system and includes base erosion prevention measures on non-U.S. earnings, which has the effect of subjecting certain earnings of our foreign subsidiaries to U.S. taxation as global intangible low-taxed income (GILTI). These changes are effective beginning in 2018.

The 2017 Tax Act also includes a one-time mandatory deemed repatriation tax on accumulated foreign subsidiaries' previously untaxed foreign earnings (the Transition Toll Tax).

Changes in tax rates and tax laws are accounted for in the period of enactment. Therefore, during the year ended December 31, 2017, we recorded a charge totaling $1,173.6 million related to our current estimate of the provisions of the 2017 Tax Act.

Transition Toll Tax

The 2017 Tax Act eliminates the deferral of U.S. income tax on the historical unrepatriated earnings by imposing the Transition Toll Tax, which is a one-time mandatory deemed repatriation tax on undistributed foreign earnings. The Transition Toll Tax is assessed on the U.S. shareholder's share of the foreign corporation's accumulated foreign earnings that have not previously been taxed. Earnings in the form of cash and cash equivalents will be taxed at a rate of 15.5% and all other earnings will be taxed at a rate of 8.0%.

As of December 31, 2017, we have accrued income tax liabilities of $989.6 million under the Transition Toll Tax, of which $78.3 million is expected to be paid within one year. The Transition Toll Tax will be paid over an eight-year period, starting in 2018, and will not accrue interest.

At December 31, 2017, we considered none of our earnings to be permanently reinvested outside the U.S. and have therefore recorded tax liabilities associated with an estimate of the total withholding taxes that may be a result of our repatriation of earnings.

Effect on Deferred Tax Assets and Liabilities and other Adjustments

Our deferred tax assets and liabilities are measured at the enacted tax rate expected to apply when these temporary differences are expected to be realized or settled.

As our deferred tax assets exceed the balance of our deferred tax liabilities at the date of enactment, we have recorded a tax expense of $184.0 million, reflecting the decrease in the U.S. corporate income tax rate and other changes to U.S. tax law. It is our current policy to not recognize deferred taxes for basis differences expected to reverse as GILTI is incurred and instead to account for any taxes assessed as period costs.

Status of our Assessment

Our preliminary estimate of the Transition Toll Tax and the remeasurement of our deferred tax assets and liabilities is subject to the finalization of management's analysis related to certain matters, such as developing interpretations of the provisions of the 2017 Tax Act, changes to certain estimates and amounts related to the earnings and profits of certain subsidiaries and the filing of our tax returns. U.S. Treasury regulations, administrative interpretations or court decisions interpreting the 2017 Tax Act may require further adjustments and changes in our estimates.

The final determination of the Transition Toll Tax and the remeasurement of our deferred assets and liabilities will be completed as additional information becomes available, but no later than one year from the enactment of the 2017 Tax Act.

Article 20 Procedure of ZINBRYTA

As a result of the Article 20 Procedure of ZINBRYTA, we have recognized a net impairment charge on certain tax assets reflected within income tax expense of $48.8 million. This charge reflects the write off of $142.6 million related to prepaid taxes, which was partially offset by the recognition of an unrecorded deferred tax benefit of $93.8 million. For additional information on the Article 20 Procedure of ZINBRYTA and resulting impairment of ZINBRYTA related assets, please read Note 20, *Collaborative and Other Relationships,* to these consolidated financial statements.

Deferred Tax Assets and Liabilities

Significant components of our deferred tax assets and liabilities are summarized as follows:

	As of December 31,	
(In millions)	2017	2016
Deferred tax assets:		
Tax credits	$ 60.0	$ 201.1
Inventory, other reserves and accruals	147.8	250.6
Intangibles, net	378.8	459.8
Net operating loss	209.8	65.9
Share-based compensation	26.9	61.5
Other	25.1	49.0
Valuation allowance	(16.6)	(16.1)
Total deferred tax assets	$ 831.8	$ 1,071.8
Deferred tax liabilities:		
Purchased intangible assets	$ (250.7)	$ (376.6)
Depreciation, amortization and other	(107.9)	(113.5)
Total deferred tax liabilities	$ (358.6)	$ (490.1)

In addition to deferred tax assets and liabilities, we have recorded prepaid tax and deferred charges related to intercompany transactions. As of December 31, 2017 and 2016, the total deferred charges and prepaid taxes were $617.7 million and $989.8 million, respectively.

In October 2016 the FASB issued ASU No. 2016-16, *Income Taxes (Topic 740): Intra-Entity Transfer of Assets Other Than Inventory*. This new standard eliminates the deferral of the tax effects of intra-entity asset transfers other than inventory. As a result, the income tax consequences from the intra-entity transfer of an asset other than inventory and associated changes to deferred taxes will be recognized when the transfer occurs.

This new standard becomes effective for us on January 1, 2018. We will adopt this standard using the modified retrospective method, through a cumulative-effect adjustment directly to retained earnings as of that date. Based on currently enacted tax rates, upon adoption in 2018, we will record additional deferred tax assets of approximately $0.5 billion and an increase to retained earnings of approximately $0.5 billion. We will recognize incremental deferred income tax expense thereafter as these net deferred tax assets are utilized.

Tax Rate

A reconciliation between the U.S. federal statutory tax rate and our effective tax rate is summarized as follows:

	For the Years Ended December 31,		
	2017	2016	2015
Statutory rate	35.0 %	35.0 %	35.0 %
State taxes	0.8	0.9	0.5
Taxes on foreign earnings	(11.1)	(9.6)	(10.0)
Credits and net operating loss utilization	(0.8)	(1.4)	(1.3)
Purchased intangible assets	1.4	1.2	1.0
Manufacturing deduction	(1.9)	(1.9)	(1.8)
2017 Tax Act	22.9	—	—
Impairment of ZINBRYTA related tax assets	0.9	—	—
Other permanent items	0.7	0.5	0.7
Other	—	0.4	0.3
Effective tax rate	47.9 %	25.1 %	24.4 %

Changes in Tax Rate

The most significant factors contributing to the increase in our effective tax rate for the year ended December 31, 2017, as compared to 2016 is the effect of the enactment of the 2017 Tax Act and the impairment of certain ZINBRYTA related tax assets, both of which are discussed above. Excluding the effect of these items, our income tax rate would have decreased due to a lower percentage of our earnings being recognized in the U.S., a higher tax jurisdiction. The geographic split of our earnings was affected by milestone and upfront payments in the current year and the spin-off of our hemophilia business, partially offset by growth from the U.S. launch of SPINRAZA and increases in our revenues from anti-CD20 therapeutic programs in the U.S. In addition, in 2017 we earned a lower benefit from the orphan drug credit due to the FDA's approval of SPINRAZA.

Our effective tax rate for 2016 compared to 2015 increased primarily due to a net state tax benefit in 2015 resulting from the remeasurement of one of our uncertain tax positions, described below, and a higher relative percentage of our earnings being attributed to the U.S., a higher tax jurisdiction.

Tax Attributes

As of December 31, 2017, we had net operating losses and general business credit carry forwards for federal income tax purposes of approximately $1.4 million and $1.3 million, respectively, which begin to expire in 2020. Additionally, for state income tax purposes, we had net operating loss carry forwards of approximately $19.3 million that begin to expire in 2018. For state income tax purposes, we also had research and investment credit carry forwards of approximately $129.7 million that begin to expire in 2018. For foreign income tax purposes, we had $2.1 billion of net operating loss carryforwards that begin to expire in 2021.

In assessing the realizability of our deferred tax assets, we have considered whether it is more likely than not that some portion or all of the deferred tax assets will not be realized. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences become deductible. In making this determination, under the applicable financial reporting standards, we are allowed to consider the scheduled reversal of deferred tax liabilities, projected future taxable income and tax planning strategies. Our estimates of future taxable income take into consideration, among other items, our estimates of future income tax deductions related to the exercise of stock options. Based upon the level of historical taxable income and income tax liability and projections for future taxable income over the periods in which the deferred tax assets are utilizable, we believe it is more likely than not that we will realize the net benefits of the deferred tax assets of our wholly owned subsidiaries. In the event that actual results differ from our estimates or we adjust our estimates in future periods, we may need to establish a valuation allowance, which could materially impact our consolidated financial position and results of operations.

Accounting for Uncertainty in Income Taxes

A reconciliation of the beginning and ending amount of our unrecognized tax benefits is summarized as follows:

(In millions)	2017	2016	2015
Balance at January 1,	$ 32.4	$ 67.9	$ 131.5
Additions based on tax positions related to the current period	5.7	7.2	10.5
Additions for tax positions of prior periods	7.3	36.3	19.5
Reductions for tax positions of prior periods	(21.8)	(13.3)	(49.9)
Statute expirations	(1.4)	(1.4)	(1.2)
Settlement refund (payment)	44.6	(64.3)	(42.5)
Balance at December 31,	$ 66.8	$ 32.4	$ 67.9

Our 2017 activity above reflects a refund received from a state, related to the settlement of an uncertain tax position.

We and our subsidiaries are routinely examined by various taxing authorities. We file income tax returns in various U.S. states and in U.S. federal and other foreign jurisdictions. With few exceptions, we are no longer subject to U.S. federal tax examination for years before 2013 or state, local or non-U.S. income tax examinations for years before 2010.

Included in the balance of unrecognized tax benefits as of December 31, 2017, 2016 and 2015 are $64.3 million, $26.9 million and $15.7 million (net of the federal benefit on state issues), respectively, of unrecognized tax benefits that, if recognized, would affect the effective income tax rate in future periods.

We recognize potential interest and penalties accrued related to unrecognized tax benefits in income tax expense. In 2017 we recognized a net interest expense of $4.8 million. In 2016 we recognized net interest expense of $9.1 million. In 2015 we recognized a net interest expense of approximately $3.1 million. We have accrued approximately $16.1 million and $25.2 million for the payment of interest and penalties as of December 31, 2017 and 2016, respectively.

International Uncertain Tax Positions

We have made payments totaling approximately $60.0 million to the Danish Tax Authority (SKAT) for assessments received for fiscal 2009, 2011 and 2013 regarding withholding taxes and the treatment of certain intercompany transactions involving a Danish affiliate and another of our affiliates. We continue to dispute the assessments for all of these periods and believe that the positions taken in our historical filings are valid.

It is reasonably possible that we will adjust the value of our uncertain tax positions related to Danish withholding taxes based on potential European court decisions expected in 2018 on similar matters.

Federal and State Uncertain Tax Positions

It is reasonably possible that we will adjust the value of our uncertain tax positions related to our revenues from anti-CD20 therapeutic programs and certain transfer pricing issues as we receive additional information from various taxing authorities, including reaching settlements with the authorities. In addition, the Internal Revenue Service and other national tax authorities routinely examine our intercompany transfer pricing with respect to intellectual property related transactions and it is possible that they may disagree with one or more positions we have taken with respect to such valuations.

18. Other Consolidated Financial Statement Detail

Supplemental Cash Flow Information

Supplemental disclosure of cash flow information for the years ended December 31, 2017, 2016 and 2015, is as follows:

	For the Years Ended December 31,		
(In millions)	**2017**	**2016**	**2015**
Cash paid during the year for:			
Interest	$ 281.7	$ 281.2	$ 39.1
Income taxes	$ 1,066.4	$ 1,642.2	$ 1,674.8

Non-cash Operating, Investing and Financing Activity

In the fourth quarter of 2017 we accrued $600.0 million upon reaching $15.0 billion and $16.0 billion in total cumulative sales of FUMADERM and TECFIDERA (together, the Fumapharm Products). The amount, net of tax benefit, was accounted for as an increase to goodwill in accordance with the accounting standard applicable to business combinations when we acquired Fumapharm, and is expected to be paid in the first quarter of 2018. For additional information on this transaction, please read Note 22, *Commitments and Contingencies,* to these consolidated financial statements.

In connection with the construction of our large-scale biologics manufacturing facility in Solothurn, Switzerland, we accrued charges related to processing equipment and engineering services of approximately $150.0 million and $100.0 million in our consolidated balance sheets as of December 31, 2017 and 2016, respectively. For additional information on this matter, please read Note 11, *Property, Plant and Equipment,* to these consolidated financial statements.

In December 2016 we accrued $454.8 million related to the settlement and license agreement with Forward Pharma. For additional information on this transaction, please read Note 7, *Intangible Assets and Goodwill,* to these consolidated financial statements.

In February 2015 upon completion of our acquisition of Convergence, we recorded a contingent consideration obligation of $274.5 million as part of the purchase price. For additional information on this transaction, please read Note 2, *Acquisitions,* to these consolidated financial statements.

Other Income (Expense), Net

Components of other income (expense), net, are summarized as follows:

	For the Years Ended December 31,		
(In millions)	2017	2016	2015
Interest income	$ 78.5	$ 63.4	$ 22.1
Interest expense	(250.8)	(260.0)	(95.5)
Gain (loss) on investments, net	(36.3)	6.0	(3.8)
Foreign exchange gains (losses), net	6.3	(9.8)	(32.7)
Other, net	(13.1)	(17.0)	(13.8)
Total other income (expense), net	$ (215.4)	$ (217.4)	$ (123.7)

Interest expense for the year ended December 31, 2017, includes a $5.2 million charge recognized in November 2017 upon the redemption of our 6.875% Senior Notes due March 1, 2018. For additional information on the redemption of these notes, please read Note 12, *Indebtedness,* to these consolidated financial statements.

Gain (loss) on investments, net for the year ended December 31, 2017, includes other than temporary impairments recorded on strategic investments and marketable debt securities during the year.

Other Current Assets

Other current assets include prepaid taxes totaling approximately $657.6 million and $817.0 million as of December 31, 2017 and 2016, respectively.

As a result of the Article 20 Procedure of ZINBRYTA, we impaired prepaid tax balances totaling $142.6 million. For additional information on the Article 20 Procedure of ZINBRYTA and resulting impairment of ZINBRYTA related assets, please read Note 20, *Collaborative and Other Relationships,* to these consolidated financial statements.

Accrued Expenses and Other

Accrued expenses and other consists of the following:

	As of December 31,	
(In millions)	2017	2016
Current portion of contingent consideration obligations	$ 844.6	$ 580.8
Revenue-related reserves for discounts and allowances	572.0	438.6
Employee compensation and benefits	297.7	282.9
Royalties and licensing fees	206.7	195.8
Collaboration expenses	183.7	130.9
Construction in progress	159.7	134.0
Accrued TECFIDERA litigation settlement charge	—	454.8
Other	636.9	685.7
Total accrued expenses and other	$ 2,901.3	$ 2,903.5

Pricing of TYSABRI in Italy - AIFA

In the fourth quarter of 2011 Biogen Italia SRL, our Italian subsidiary, received a notice from the Italian National Medicines Agency (Agenzia Italiana del Farmaco or AIFA) that sales of TYSABRI after mid-February 2009 through mid-February 2011 exceeded by EUR30.7 million a reimbursement limit established pursuant to a Price Determination Resolution granted by AIFA in December 2006. In January 2012 we filed an appeal against AIFA in administrative court in Rome, Italy seeking a ruling that the reimbursement limit in the Price Determination Resolution should apply as written to only “the first 24 months” of TYSABRI sales, which ended in mid-February 2009. Since being notified in the fourth quarter of 2011 that AIFA believed a reimbursement limit was still in effect, we deferred revenue on sales of TYSABRI as if the reimbursement limit were in effect for each biannual period

beginning in mid-February 2009.

In July 2013 we negotiated an agreement in principle with AIFA's Price and Reimbursement Committee that would have resolved all of AIFA's claims relating to sales of TYSABRI in excess of the reimbursement limit for the periods from February 2009 through January 2013 for an aggregate repayment of EUR33.3 million. As a result of this agreement in principle, we recorded a liability and reduction to revenue of EUR15.4 million at June 30, 2013, which approximated 50% of the claim related to the period from mid-February 2009 through mid-February 2011.

In June 2014 AIFA approved a resolution affirming that there is no reimbursement limit from and after February 2013. As a result, we recognized $53.5 million of TYSABRI revenues related to the periods February 2013 through June 2014 that were previously deferred.

In the first quarter of 2017 we reached an agreement with AIFA's Price and Reimbursement Committee resolving all of AIFA's claims relating to sales of TYSABRI in excess of the reimbursement limit for prior periods. As a result, in the first quarter of 2017, we recognized EUR41.8 million (approximately $45.0 million) in revenues for sales that were previously deferred. These amounts were previously accrued for and included in the table above in Other as of December 31, 2016.

19. Investments in Variable Interest Entities

Consolidated Variable Interest Entities

Our consolidated financial statements include the financial results of variable interest entities in which we are the primary beneficiary. The following are our significant variable interest entities.

Neurimmune

In November 2007 we entered into a collaboration and license agreement with Neurimmune Subone AG (Neurimmune) for the development and commercialization of antibodies for the treatment of AD. We are responsible for the development, manufacturing and commercialization of all collaboration products. This agreement is effective for the longer of the duration of certain patents relating to a licensed product, or 12 years from the first commercial sale of any product using such a licensed compound. Our anti-amyloid beta antibody, aducanumab, for the treatment of AD resulted from this collaboration.

We consolidate the results of Neurimmune as we determined that we are the primary beneficiary of Neurimmune because we have the power through the collaboration to direct the activities that most significantly impact the entity's economic performance and we are required to fund 100% of the research and development costs incurred in support of the collaboration. Under this agreement, we are also required to pay royalties on sales of any resulting commercial products and make payments upon the achievement of certain milestone events.

In October 2017 we amended the terms of our collaboration and license agreement with Neurimmune. Under the amended agreement, we made a $150.0 million payment to Neurimmune in exchange for a 15% reduction in royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab. Our royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab, will now range from the high single digits to low teens. As we consolidate the results of Neurimmune, we recognized this payment as a charge to noncontrolling interest in the fourth quarter of 2017 and treated it as a distribution. Under the amended agreement, we also have an option that will expire in April 2018 to further reduce our royalty rates payable on products developed under the agreement, including on potential commercial sales of aducanumab, by an additional 5% in exchange for a $50.0 million payment to Neurimmune.

Research and development costs for which we reimburse Neurimmune are reflected in research and development expense in our consolidated statements of income. During the years ending December 31, 2017, 2016 and 2015 amounts reimbursed were immaterial.

In September 2015 we recognized a $60.0 million milestone payable to Neurimmune upon enrollment of the first patient in a Phase 3 trial for aducanumab. We recognized this payment as a charge to noncontrolling interest. Based upon our current development plans for aducanumab, we may pay Neurimmune up to $275.0 million in remaining milestone payments. Future milestone payments and royalties, if any, will be reflected in our consolidated statements of income as a charge to noncontrolling interest, net of tax when such milestones are achieved.

The assets and liabilities of Neurimmune are not significant to our consolidated financial position or results of operations as it is a research and development organization. We have provided no financing to Neurimmune other than previously contractually required amounts.

Under the terms of our October 2017 collaboration agreement with Eisai for the joint development and commercialization of aducanumab, Eisai may elect to share in the benefit and cost associated with the royalty reductions discussed above. Eisai has elected to not share in the benefit and cost of the October 2017 royalty reduction. For additional information on our collaboration arrangement with Eisai, please read Note 20, *Collaborative and Other Relationships*, to these consolidated financial statements.

Unconsolidated Variable Interest Entities

We have relationships with other variable interest entities that we do not consolidate as we lack the power to direct the activities that significantly impact the economic success of these entities. These relationships include investments in certain biotechnology companies and research collaboration agreements.

As of December 31, 2017 and 2016, the carrying value of our investments in biotechnology companies totaled $48.3 million and $47.4 million, respectively. Our maximum exposure to loss related to these variable interest entities is limited to the carrying value of our investments.

We have also entered into research collaboration agreements with certain variable interest entities where we are required to fund certain development activities. These development activities are included in research and development expense in our consolidated statements of income, as they are incurred. We have provided no financing to these variable interest entities other than previously contractually required amounts.

20. Collaborative and Other Relationships

In connection with our business strategy, we have entered into various collaboration agreements that provide us with rights to develop, produce and market products using certain know-how, technology and patent rights maintained by our collaborative partners. Terms of the various collaboration agreements may require us to make milestone payments upon the achievement of certain product research and development objectives and pay royalties on future sales, if any, of commercial products resulting from the collaboration.

Depending on the collaborative arrangement, we may record funding receivable or payable balances with our partners, based on the nature of the cost-sharing mechanism and activity within the collaboration. Our significant collaboration arrangements are discussed below.

Genentech (Roche Group)

We have certain business and financial rights with respect to RITUXAN for the treatment of non-Hodgkin's lymphoma, CLL and other conditions, GAZYVA for the treatment of CLL and follicular lymphoma, OCREVUS for the treatment of primary progressive MS (PPMS) and relapsing MS (RMS) and other potential anti-CD20 therapies under a collaboration agreement with Genentech, a wholly-owned member of the Roche Group. The Roche Group and its sub-licensees maintain sole responsibility for the development, manufacturing and commercialization of GAZYVA in the U.S.

Our collaboration agreement will continue in effect until we mutually agree to terminate the collaboration, except that if we undergo a change in control, as defined in our collaboration agreement, Genentech has the right to present an offer to buy the rights to RITUXAN and we must either accept Genentech's offer or purchase Genentech's rights on the same terms as its offer. Genentech will also be deemed concurrently to have purchased our rights to any other anti-CD20 products in development in exchange for a royalty and our rights to GAZYVA in exchange for the compensation described in the table below. Our collaboration with Genentech was created through a contractual arrangement and not through a joint venture or other legal entity.

RITUXAN

Genentech is responsible for the worldwide manufacturing of RITUXAN. Development and commercialization rights and responsibilities under this collaboration are divided as follows:

U.S.

We share with Genentech co-exclusive rights to develop, commercialize and market RITUXAN in the U.S.

Canada

We and Genentech have assigned our rights under our collaboration agreement with respect to Canada to the Roche Group.

GAZYVA

We recognize our share of the development and commercialization expenses of GAZYVA as a reduction of our share of pre-tax profits in revenues from anti-CD20 therapeutic programs.

Commercialization of GAZYVA impacts our percentage of the co-promotion profits for RITUXAN, as summarized in the table below.

OCREVUS

In March 2017 the FDA approved OCREVUS, a humanized anti-CD20 monoclonal antibody, for the treatment of RMS and PPMS. Under our agreement with Genentech, we will receive a tiered royalty on U.S. net sales from 13.5% and increasing up to 24% if annual net sales exceed $900.0 million. There will be a 50% reduction to these royalties if a biosimilar to OCREVUS is approved in the U.S.

In addition, we will receive a 3% royalty on net sales of OCREVUS outside the U.S., with the royalty period lasting 11 years from the first commercial sale of OCREVUS on a country-by-country basis. OCREVUS was approved for the treatment of RMS and PPMS in Australia, Switzerland and the E.U. in July 2017, September 2017 and January 2018, respectively.

The commercialization of OCREVUS does not impact the percentage of the co-promotion profits we receive for RITUXAN or GAZYVA. Genentech is solely responsible for development and commercialization of OCREVUS and funding future costs. Genentech cannot develop OCREVUS in CLL, non-Hodgkin's lymphoma or rheumatoid arthritis. OCREVUS royalty revenues were based on our estimates from third party and market research data of OCREVUS sales occurring during the corresponding period. Differences between actual and estimated royalty revenues will be adjusted for in the period in which they become known, which is expected to be the following quarter.

Profit-sharing Formulas

RITUXAN Profit Share

Our current pretax co-promotion profit-sharing formula for RITUXAN provides for a 30% share on the first $50.0 million of co-promotion operating profits earned each calendar year. Our share of annual co-promotion profits in excess of $50.0 million varies, as summarized in the table below, upon the following events:

Until GAZYVA First Non-CLL FDA Approval	40.0%
After GAZYVA First Non-CLL FDA Approval until First GAZYVA Threshold Date	39.0%
After First GAZYVA Threshold Date until Second GAZYVA Threshold Date	37.5%
After Second GAZYVA Threshold Date	35.0%

First Non-CLL GAZYVA FDA Approval means the FDA's first approval of GAZYVA in an indication other than CLL.

First GAZYVA Threshold Date means the earlier of (i) the date of the First Non-CLL GAZYVA FDA approval if U.S. gross sales of GAZYVA for the preceding consecutive 12-month period were at least $150.0 million or (ii) the first day of the calendar quarter after the date of the First Non-CLL GAZYVA FDA Approval that U.S. gross sales of GAZYVA within any consecutive 12-month period have reached $150.0 million.

Second GAZYVA Threshold Date means the first day of the calendar quarter after U.S. gross sales of GAZYVA within any consecutive 12-month period have reached $500.0 million. The Second GAZYVA Threshold Date can be achieved regardless of whether GAZYVA has been approved in a non-CLL indication.

Our share of RITUXAN pre-tax profits in the U.S. decreased to 39% from 40% in February 2016 when GAZYVA was approved by the FDA as a new treatment for follicular lymphoma and was further decreased to 37.5% in the third quarter of 2017 as gross sales of GAZYVA in the U.S. for the preceding 12 month period exceeded $150.0 million.

In addition, should the FDA approve an anti-CD20 product other than OCREVUS or GAZYVA that is acquired or developed by Genentech and subject to the collaboration agreement, our share of the co-promotion operating profits would be between 30% and 37.5% based on certain events.

In June 2017 the FDA approved RITUXAN HYCELA for subcutaneous injection for the treatment of adults with previously untreated and relapsed or refractory follicular lymphoma, previously untreated diffuse large B-cell lymphoma and CLL. This new treatment includes the same monoclonal antibody as intravenous RITUXAN in combination with hyaluronidase human, an enzyme that helps to deliver rituximab under the skin.

GAZYVA Profit Share

Our current pretax profit-sharing formula for GAZYVA provides for a 35% share on the first $50.0 million of operating profits earned each calendar year. Our share of annual profits in excess of $50.0 million varies, as summarized in the table below, upon the following events:

Until First GAZYVA Threshold Date	39.0%
After First GAZYVA Threshold Date until Second GAZYVA Threshold Date	37.5%
After Second GAZYVA Threshold Date	35.0%

In 2017, 2016 and 2015 our share of operating profits on GAZYVA was 35%.

In November 2017 the FDA approved GAZYVA in combination with chemotherapy, followed by GAZYVA alone, for people with previously untreated advanced follicular lymphoma.

Revenues from Anti-CD20 Therapeutic Programs

Revenues from anti-CD20 therapeutic programs are summarized as follows:

	For the Years Ended December 31,		
(In millions)	2017	2016	2015
Biogen's share of pre-tax profits in the U.S. for RITUXAN and GAZYVA, including the reimbursement of selling and development expenses	$ 1,316.4	$ 1,249.5	$ 1,269.8
Other revenues from anti-CD20 therapeutic programs	242.8	65.0	69.4
Total revenues from anti-CD20 therapeutic programs	$ 1,559.2	$ 1,314.5	$ 1,339.2

In 2017 the 37.5% profit-sharing threshold was met during the third quarter and the 39% profit-sharing threshold was met during the first quarter. In 2016 the 39% profit-sharing threshold was met during the first quarter. In 2015, the 40% profit-sharing threshold was met during the first quarter.

Biogen's share of pre-tax profits in the U.S. for RITUXAN and GAZYVA, including the reimbursement of selling and development expenses for 2017, as depicted in the table above, excludes certain expenses charged to the collaboration by Genentech that we believe remain the responsibility of Genentech and that we are not obligated to pay under the terms of the collaboration agreement. Accordingly, we did not recognize the effect of those expenses in the determination of our share of pre-tax collaboration profits and Genentech has withheld approximately $120 million from amounts due to us in relation to collaboration activity for 2017, representing Genentech's estimate of our share of these expenses. We remain in discussions with Genentech about a resolution relating to these amounts.

Prior to regulatory approval, we record our share of the expenses incurred by the collaboration for the development of anti-CD20 products in research and development expense in our consolidated statements of income. After an anti-CD20 product is approved, we record our share of the development expenses related to that product as a reduction of our share of pre-tax profits in revenues from anti-CD20 therapeutic programs.

AbbVie

We have a collaboration agreement with AbbVie for the development and commercialization of ZINBRYTA, which was approved for the treatment of relapsing forms of MS in the U.S. in May 2016 and in the E.U. in July 2016. Under this agreement, we and AbbVie conduct ZINBRYTA co-promotion activities in the U.S., E.U. and Canadian territories (Collaboration Territory) where development and commercialization costs and profits are shared equally. Outside of the Collaboration Territory, we are solely responsible for development and commercialization of ZINBRYTA and will pay a tiered royalty to AbbVie as a percentage of net sales in the low to high teens.

We are responsible for manufacturing and research and development activities in both the Collaboration Territory and outside the Collaboration Territory and record these activities within their respective lines in our consolidated statements of income, net of any reimbursement of research and development expenditures received from AbbVie. For the years ended December 31, 2017, 2016 and 2015, the collaboration incurred $39.9 million, $48.6 million and $113.8 million for research and development activities, respectively, for which we recognized $19.9 million, $24.3 million and $60.8 million, respectively, in our consolidated statements of income.

Prior to regulatory approval, we also recognized $22.0 million of pre-commercialization expenses within our selling, general and administrative expense, which represented 50% of the collaboration's pre-commercialization costs for 2016. After ZINBRYTA was approved by the FDA and European Medicines Agency (EMA) in 2016, we began to recognize our share of the collaboration activities within the U.S., E.U. and Canadian territories as described below under *"Co-promotion Profits and Losses."*

Article 20 Procedure of ZINBRYTA

In July 2017 the EMA announced that it had provisionally restricted the use of ZINBRYTA to adult patients with highly active relapsing disease despite a full and adequate course of treatment with at least one disease modifying therapy (DMT) or with rapidly evolving severe relapsing MS who are unsuitable for treatment with other DMTs. These restrictions followed the initiation of an EMA review (referred to as an Article 20 Procedure) of ZINBRYTA following the report of a case of fatal fulminant liver failure, as well as four cases of serious liver injury.

In October 2017, as part of this Article 20 Procedure of ZINBRYTA, the EMA Pharmacovigilance Risk Assessment Committee (PRAC) completed its assessment and recommended a further set of restrictions on the use of ZINBRYTA by MS patients.

In November 2017 the Committee for Medicinal Products for Human Use (CHMP) adopted an opinion, confirming the PRAC's recommendations, for further restrictions to minimize the risk of serious liver injury with ZINBRYTA, including restriction of its use to adult patients with relapsing forms of MS who have had an inadequate response to at least two DMTs and for whom treatment with any other DMT is contraindicated or otherwise unsuitable. In January 2018 the EC adopted a final and legally-binding decision, which concluded the Article 20 Procedure, confirming the CHMP opinion.

The recommendation of these restrictions by the CHMP resulted in the impairment of substantially all of our assets related to ZINBRYTA as we have determined that these amounts may not be recoverable. As a result, we recorded net impairment charges related to intangible assets, inventory, property, plant and equipment and prepaid tax assets, totaling approximately $190.8 million. Inventory related losses are subject to our profit share with AbbVie and are included above net of expected reimbursement. Offsetting these amounts was an unrecorded tax benefit related to certain ZINBRYTA related assets totaling approximately $93.8 million.

Co-promotion Profits and Losses

In the U.S., AbbVie recognizes revenues on sales to third parties and we recognize our 50% share of the co-promotion profits or losses as a component of total revenues in our consolidated statements of income. The collaboration began selling ZINBRYTA in the U.S. in the third quarter of 2016. For the years ended December 31, 2017 and 2016, we recognized a net reduction in revenue of $16.9 million and $21.9 million, respectively, to reflect our share of an overall net loss within the collaboration.

The following table provides a summary of the U.S. collaboration and our share of the co-promotion losses on ZINBRYTA in the U.S.:

	For the Year Ended December 31,	
(In millions)	2017	2016
Product revenues, net	$ 53.1	$ 6.1
Costs and expenses	92.6	50.0
Co-promotion losses in the U.S.	$ 39.5	$ 43.9
Biogen's share of co-promotion losses in the U.S.	$ 16.9	$ 21.9

In the E.U. and Canada, we recognize revenues on sales to third parties in product revenues, net in our consolidated statements of income. We also record the related cost of revenues and sales and marketing expenses to their respective line items in our consolidated statements of income as these costs are incurred. We reimburse AbbVie for their 50% share of the co-promotion profits or losses in the E.U. and Canada. This reimbursement is recognized in collaboration profit (loss) sharing in our consolidated statements of income. We began to recognize product revenues on sales of ZINBRYTA in the E.U. in the third quarter of 2016. For the year ended December 31, 2017, we recognized net expense of $1.3 million to reflect AbbVie's 50% sharing of the net collaboration profits in the E.U. and Canada, as compared to net income recognized of $4.9 million to reflect AbbVie's 50% sharing of the net collaboration losses in the E.U. and Canada in the prior year.

Acorda

In June 2009 we entered into a collaboration and license agreement with Acorda Therapeutics, Inc. (Acorda) to develop and commercialize products containing fampridine, such as FAMPYRA, in markets outside the U.S. We are responsible for all regulatory activities and the future clinical development of related products in those markets.

Under this agreement, we pay tiered royalties based on the level of ex-U.S. net sales and potential milestone payments based on the successful achievement of certain regulatory and commercial milestones, which would be capitalized as intangible assets upon achievement of the milestones and amortized utilizing an economic consumption model. The next expected milestone would be $15.0 million, due if ex-U.S. net sales reach $100.0 million over a period of four consecutive quarters. Royalty payments are recognized in cost of sales within our consolidated statements of income.

In connection with the collaboration and license agreement, we also entered into a supply agreement with Acorda for the commercial supply of FAMPYRA. This agreement is a sublicense arrangement of an existing agreement between Acorda and Alkermes, who acquired Elan Drug Technologies, the original party to the license with Acorda.

For the years ending December 31, 2017, 2016 and 2015, total cost of sales related to royalties and commercial supply of FAMPYRA reflected in our consolidated statements of income were $34.0 million, $31.5 million and $30.6 million, respectively.

Ionis Pharmaceuticals, Inc.

Product Collaborations

SPINRAZA

In January 2012 we entered into an exclusive worldwide option and collaboration agreement with Ionis to develop and commercialize SPINRAZA for the treatment of SMA. During 2014 we amended this agreement to adjust the amount of potential additional payments and terms of the exercise of our opt-in right to license SPINRAZA, which included providing for additional opt-in scenarios, based on the filing or acceptance of a New Drug Application (NDA) with the FDA or marketing authorization application with the EMA. Consistent with the initial agreement, Ionis remained responsible for conducting the pivotal/Phase 3 trials and we provided input on the clinical trial design and regulatory strategy for the development of SPINRAZA.

SPINRAZA was approved for the treatment of SMA in the U.S., E.U. and Japan in December 2016, June 2017 and July 2017, respectively.

For the years ended December 31, 2017 and 2016, we recognized product revenues totaling $883.7 million and $4.6 million, respectively, on our sales of SPINRAZA. Under our agreement with Ionis, we make royalty payments to Ionis on annual worldwide net sales of SPINRAZA using a tiered royalty rate between 11% and 15%, which are recognized in cost of sales within our consolidated statements of income. Royalty cost of sales related to sales of SPINRAZA for the years ended December 31, 2017 and 2016 totaled $112.4 million and $0.5 million, respectively.

Upon entering into this agreement, we made an upfront payment of $29.0 million to Ionis. In addition, during 2017 we made milestone payments to Ionis totaling $150.0 million related to the marketing approvals discussed above, which were capitalized in intangible assets, net in our consolidated balance sheets. During the third quarter of 2016, upon the exercise of our option to develop and commercialize SPINRAZA, we also paid a $75.0 million license fee to Ionis, which was recognized as research and development expense in our consolidated statements of income.

During 2017 no clinical trial payments were made to Ionis due to the completion of study activities. During 2016 and 2015, we made clinical trial payments of $35.3 million and $42.8 million, respectively, related to the advancement of the program, which were recorded in investments and other assets in our consolidated balance sheets as they represented prepaid research and development expenditures. As of December 31, 2017, these prepaid research and development amounts were fully expensed as the services were provided.

For the years ending December 31, 2017, 2016 and 2015, $234.5 million, $257.8 million and $74.9 million, respectively, were reflected in total costs and expenses in our consolidated statements of income related to the advancement and commercialization of the program.

Antisense Therapeutics

In December 2012 we entered into an agreement with Ionis for the development and commercialization of up to three therapeutic targets.

Under this agreement, Ionis is responsible for global development of any product candidate through the completion of a Phase 2 trial and we will provide advice on the clinical trial design and regulatory strategy. We have an option to license the product candidate until completion of the Phase 2 trial. If we exercise our option, we will pay a license fee of up to $70.0 million to Ionis and assume global development, regulatory and commercialization responsibilities. Ionis is eligible to receive up to another $130.0 million in milestone payments upon the achievement of certain regulatory milestones as well as royalties on future sales if we successfully develop the product candidate after option exercise.

Upon entering into this agreement, we made an upfront payment of $30.0 million to Ionis and agreed to make potential additional payments, prior to licensing, of up to $10.0 million based on the development of the selected product candidate as well as a mark-up of the cost estimate of the Phase 1 and Phase 2 trials. During 2015 we recognized this $10.0 million developmental milestone upon the selection of BIIB080 (also known as IONIS-MAPT$_{Rx}$), which is currently in Phase 1 development.

Research Collaborations

2013 Long-term Strategic Research Agreement

In September 2013 we entered into a six-year research collaboration agreement with Ionis under which both companies collaborate to perform discovery level research and subsequent development and commercialization activities of antisense or other therapeutics for the treatment of neurological disorders. Under the collaboration, Ionis will perform research on a set of neurological targets identified within this agreement. Once the research has reached a specific stage of development, we will make a determination whether antisense therapy is the preferred approach to developing a therapeutic candidate or whether another modality is preferred. If an antisense approach is selected, Ionis will continue development and identify a potential product candidate. If another modality is selected, we will assume responsibility for identifying a potential product candidate and assume development responsibility for development in that modality.

Under this agreement, we made an upfront payment of $100.0 million to Ionis, of which $75.0 million was recorded as research and development expense representing the value of intellectual property purchased that had not reached technological feasibility. We recognized the remaining $25.0 million as prepaid research and discovery services, representing the value of the Ionis full time equivalent employee resources required by the collaboration to provide research and discovery services over the term of the collaboration.

Ionis is also eligible to receive milestone payments, license fees and royalty payments for all product candidates developed through this collaboration, with the specific amount dependent upon the modality of the product candidate advanced by us. During the years ending December 31, 2017, 2016 and 2015, we triggered milestones of $12.0 million, $5.5 million and $20.0 million, respectively, related to the advancement of IONIS-SOD1$_{Rx}$ for the treatment of ALS and other neurological targets identified.

For non-ALS antisense product candidates, Ionis will be responsible for global development through the completion of a Phase 2 trial and we will provide advice on the clinical trial design and regulatory strategy. For ALS antisense product candidates, we are responsible for global development, clinical trial design and regulatory strategy. We have an option to license a product candidate until completion of the Phase 2 trial. If we exercise our option, we will pay Ionis up to a $70.0 million license fee and assume global development, regulatory and commercialization responsibilities. Ionis could receive additional milestone payments upon the achievement of certain regulatory milestones of up to $130.0 million, plus additional amounts related to the cost of clinical trials conducted by Ionis under the collaboration, and royalties on future sales if we successfully develop the product candidate after option exercise.

For product candidates using a different modality, we will be responsible for global development through all stages and will pay Ionis up to $90.0 million upon the achievement of certain regulatory milestones and royalties on future sales if we successfully develop the product candidate.

2017 SMA Collaboration Agreement

In December 2017 we entered into a new collaboration agreement with Ionis to identify new antisense oligonucleotide drug candidates for the treatment of SMA. Under this agreement, we will have the option to license therapies arising out of this collaboration and will be responsible for their development and commercialization of these therapies.

Upon entering into this agreement, we made a $25.0 million upfront payment to Ionis and we may pay Ionis up to $260.0 million in additional development and regulatory milestone payments if new drugs advance to marketing approval. Upon commercialization, we may also pay Ionis up to $800.0 million in additional performance-based milestone payments and tiered royalties on potential net sales of such therapies.

Eisai Co., Ltd.

BAN2401 and E2609 Collaboration

In March 2014 we entered into a collaboration agreement with Eisai (Eisai Collaboration Agreement) to jointly develop and commercialize two Eisai product candidates for the treatment of AD, BAN2401, a monoclonal antibody that targets amyloid-beta aggregates, and E2609, a BACE inhibitor. Under the Eisai Collaboration Agreement, Eisai serves as the global operational and regulatory lead for both compounds with all costs, including research, development, sales and marketing expenses shared equally by us and Eisai; and following marketing approval in major markets, such as the U.S., the E.U. and Japan, we and Eisai would co-promote BAN2401 and E2609 and share profits equally. In smaller markets, Eisai will distribute these products and pay us a royalty. In addition, the Eisai Collaboration Agreement provides both parties with certain rights and obligations in the event of a change in control of either party.

The Eisai Collaboration Agreement also provided Eisai with an option to jointly develop and commercialize aducanumab (Aducanumab Option) and an option to jointly develop and commercialize one of our anti-tau monoclonal antibodies (Anti-Tau Option). Upon exercise of each of the Aducanumab Option and the Anti-Tau Option, a separate collaboration agreement would be entered into with Eisai on terms and conditions that mirror the Eisai Collaboration Agreement.

In October 2017 Eisai exercised its Aducanumab Option and we entered into a new collaboration agreement for the joint development and commercialization of aducanumab (Aducanumab Collaboration Agreement). Eisai has not yet exercised its Anti-Tau Option.

Under the Aducanumab Collaboration Agreement, both companies will continue to jointly develop BAN2401 and E2609 in accordance with the Eisai Collaboration Agreement; however, we are no longer required to pay Eisai any milestone payments for products containing BAN2401 and we are no longer entitled to any potential development and commercial milestone payments from Eisai in relation to aducanumab.

A summary of activity related to the Eisai Collaboration Agreement is as follows:

	For the Years Ended December 31,		
(In millions)	2017	2016	2015
Total development expense incurred by the collaboration in development of BAN2401 and E2609	$ 146.2	$ 95.1	$ 84.1
Biogen's share of BAN2401 and E2609 development expense reflected in our consolidated statements of income, excluding upfront and milestone payments	$ 74.3	$ 50.5	$ 40.4

During the fourth quarter of 2016 we recognized a $50.0 million milestone payment related to the initiation of a Phase 3 trial for E2609, which is included in research and development expense in our consolidated statements of income. We could pay Eisai up to an additional $625.0 million under the Eisai Collaboration Agreement based on the future achievement of certain development, regulatory and commercial milestones.

Aducanumab Collaboration Agreement

Under the Aducanumab Collaboration Agreement, we will continue to lead the ongoing Phase 3 development of aducanumab and will remain responsible for 100% of development costs for aducanumab incurred in support of this agreement until April 2018. Eisai will then reimburse us for 15% of aducanumab development expenses for the period April 2018 through December 2018, and 45% thereafter. Upon commercialization, both companies will co-promote aducanumab with a region-based profit split. We will receive a 55% share of the potential profits (losses) in the U.S., a 68.5% share of the potential profits (losses) in the E.U. and a 20% share of the potential profits (losses) in Japan and Asia, excluding China and South Korea. The companies will continue to share equally in the potential profits (losses) in rest of world markets.

We and Eisai also agreed to co-promote AVONEX, TYSABRI and TECFIDERA in Japan in certain settings and Eisai will distribute AVONEX, TYSABRI, TECFIDERA and PLEGRIDY in India and other Asia-Pacific markets, excluding China.

During the year ended December 31, 2017, $263.4 million was reflected in research and development expense in our consolidated statements of income related to the advancement of our aducanumab program.

Anti-Tau Option

Eisai may exercise the Anti-Tau Option after completion of the Phase 1 clinical trial of such anti-tau monoclonal antibody. If Eisai exercises its Anti-Tau Option, we will receive an upfront payment from Eisai and will be entitled to additional development and commercial milestone payments.

Bristol-Myers Squibb Company

In June 2017 we completed an exclusive license agreement with Bristol-Myers Squibb Company (BMS) for BIIB092 (formerly known as BMS-986168), a Phase 2-ready experimental medicine with potential in AD and PSP. BIIB092 is an antibody targeting tau, the protein that forms the deposits, or tangles, in the brain associated with AD and other neurodegenerative tauopathies such as PSP.

Under this agreement, we received worldwide rights to BIIB092 and are responsible for the full development and global commercialization of BIIB092 in AD and PSP.

Upon entering into this agreement, we made an upfront payment of $300.0 million to BMS and we may pay BMS up to $410.0 million in additional milestone payments, and potential royalties. We also assumed all remaining obligations to the former shareholders of iPierian, Inc. (iPierian) related to BMS's acquisition of iPierian in 2014. In June 2017 we recognized a $60.0 million developmental milestone payable to the former shareholders of iPierian upon dosing of the first patient in the Phase 2 PSP study for BIIB092 and we may pay the former shareholders of iPierian up to $490.0 million in remaining milestone payments, and potential royalties.

Both the $300.0 million upfront payment and the $60.0 million developmental milestone payment were recognized as research and development expense in our consolidated statements of income for the year ended December 31, 2017.

Alkermes

In November 2017 we entered into an exclusive license and collaboration agreement with Alkermes Pharma Ireland Limited, a subsidiary of Alkermes plc (Alkermes), for BIIB098 (formerly known as ALKS 8700), an oral monomethyl fumarate prodrug in Phase 3 development for the treatment of relapsing forms of MS.

Under this agreement, we received an exclusive, worldwide license to develop and commercialize BIIB098 and will pay Alkermes a mid-teens percentage royalty on potential worldwide net sales of BIIB098. Royalties payable on net sales of BIIB098 are subject to tiered minimum payment requirements for a period of five years following FDA approval. Alkermes is eligible to receive royalties in the mid-single digits to low-teen percentages of annual net sales upon successful development and commercialization of new product candidates other than BIIB098. Alkermes will maintain responsibility for regulatory interactions with the FDA through the potential approval of the NDA for BIIB098 for the treatment of MS.

Upon entering into this agreement, we made a $28.0 million upfront payment to Alkermes representing our share of BIIB098 development costs already incurred in 2017. Beginning in 2018 we are responsible for all development expenses related to BIIB098. In December 2017 we also recognized a $50.0 million expense, which is expected to be paid to Alkermes in early 2018, enabling the continuation of the agreement to develop BIIB098. Both the $28.0 million upfront payment and $50.0 million continuation payment were recognized as research and development expense in our consolidated financial statements for the year ended December 31, 2017.

We may also pay Alkermes up to approximately $150.0 million in additional future milestone payments upon certain regulatory achievements related to BIIB098 under this collaboration. For the year ended December 31, 2017, we recorded $80.3 million in research and development expense in our consolidated statements of income related to this collaboration.

In connection with the license and collaboration agreement, we may also enter into a supply agreement with Alkermes for the commercial supply of BIIB098 and other products developed under the license and collaboration agreement.

Applied Genetic Technologies Corporation

In July 2015 we entered into a collaboration and license agreement to develop gene-based therapies for multiple ophthalmic diseases with Applied Genetic Technologies Corporation (AGTC). This collaboration is focused on the development of a portfolio of AGTC's therapeutic programs, including both a clinical-stage candidate for X-linked Retinoschisis (XLRS) and a pre-clinical candidate for the treatment of X-Linked Retinitis Pigmentosa (XLRP). This agreement also provides us with options for early stage discovery programs in two ophthalmic diseases and one non-ophthalmic condition, as well as an equity investment in AGTC.

Under this agreement we received worldwide commercialization rights for the XLRS and XLRP programs. AGTC will lead the clinical development programs of XLRS through product approval and of XLRP through the completion of first-in-human trials and we will support the related clinical development costs, subject to certain conditions, following the first-in-human study for XLRS and IND-enabling studies for XLRP. AGTC has an option to share development costs and profits after the initial clinical trial data becomes available, and an option to co-promote the second of these products approved in the U.S.

Upon entering into this agreement we made an upfront payment of $124.0 million to AGTC. AGTC is also eligible to receive development, regulatory and commercial milestone payments aggregating in excess of $1.1 billion, which includes up to $467.5 million collectively for the two lead programs and up to $592.5 million across the discovery programs. AGTC is also eligible to receive royalties in the mid-single digit to mid-teen percentages of annual net sales upon successful development and commercialization of new product candidates.

The $124.0 million upfront payment reflected a $30.0 million equity investment in AGTC, prepaid research and development expenditures of $58.4 million and total licensing and other fees of $35.6 million. The $35.6 million in total licensing and other fees were recognized as a charge to research and development expense in our consolidated statements of income for the year ended December 31, 2015. The $30.0 million equity investment and the $58.4 million of prepaid research and development expenditures were recorded in investments and other assets in our consolidated balance sheets. These prepaid research and development amounts are being expensed as the services are provided, of which $11.1 million remains as a prepaid asset as of December 31, 2017.

For the years ended December 31, 2017, 2016 and 2015 we recorded $27.5 million, $26.5 million and $54.5 million, respectively, which were reflected in research and development expense in our consolidated statements of income related to this collaboration.

In connection with the collaboration and license agreement, we also received a manufacturing license under which we received an exclusive license to use AGTC's proprietary technology platform to make AAV vectors for up to six genes, three of which are in AGTC's discretion, in exchange for payment of milestones and royalties.

University of Pennsylvania

In May 2016 we entered into a collaboration and alliance with the University of Pennsylvania (UPenn) to advance gene therapy and gene editing technologies. The collaboration is primarily focused on the development of therapeutic approaches that target the eye, skeletal muscle and the central nervous system. The alliance is also focused on the research and validation of next-generation gene transfer technology using adeno-associated virus gene delivery vectors and exploring the expanded use of genome editing technology as a potential therapeutic platform.

Upon entering into this agreement we made an upfront payment of $20.0 million to UPenn, which was recorded as research and development expense in our consolidated statements of income, and made prepaid research and development expenditures of $15.0 million, which was recorded in investments and other assets in our consolidated balance sheets. During 2017, we made additional prepaid research and development expenditures to UPenn of $29.1 million related to the advancement of these programs. These prepaid research and development amounts are being expensed as the services are provided, of which $12.7 million remains as a prepaid asset as of December 31, 2017. We also expect to fund an additional $18.4 million in additional research and development costs in seven preclinical research and development programs, as well as the exploration of genome-editing technology.

If all of the collaborations programs are successful and we exercise all of our options under the UPenn collaboration and alliance, we may be required to make future payments of over $2.0 billion in research funding, options and milestone payments. UPenn is also eligible to receive royalties in the mid-single digit to mid-teens percentages of annual net sales upon successful development and commercialization of new product candidates.

For the years ended December 31, 2017 and 2016, we recorded $33.0 million and $27.8 million, respectively, in research and development expense in our consolidated statements of income related to this collaboration.

Other Research and Discovery Arrangements

For the years ended December 31, 2017, 2016 and 2015, we entered into several research, discovery and other related arrangements that resulted in $10.0 million, $10.3 million and $9.7 million, respectively, recorded as research and development expense in our consolidated statements of income.

These arrangements may include the potential for future milestone payments based on the achievement of certain clinical and commercial development payable over a period of several years.

Samsung Bioepis

Joint Venture Agreement

In February 2012 we entered into a joint venture agreement with Samsung Biologics, establishing an entity, Samsung Bioepis, to develop, manufacture and market biosimilar pharmaceuticals. Samsung Biologics contributed 280.5 billion South Korean won (approximately $250.0 million) for an 85% stake in Samsung Bioepis and we contributed approximately 49.5 billion South Korean won (approximately $45.0 million) for the remaining 15% ownership interest. Under the joint venture agreement, we have no obligation to provide any additional funding and our ownership interest may be diluted due to financings in which we do not participate. As of December 31, 2017, our ownership interest is approximately 5%, which reflects the effect of additional equity financings in which we did not participate. We maintain an option to purchase additional stock in Samsung Bioepis that would allow us to increase our ownership percentage up to 49.9%. The exercise of this option is within our control and is based on paying for 49.9% of the total investment made by Samsung Biologics into Samsung Bioepis in excess of what we have already contributed under the joint venture agreement plus a rate that will represent their return on capital. If we do not exercise this option by mid-2018, this option will expire and Samsung Biologics will have the right to purchase all of Samsung Bioepis' shares then held by us.

We account for this investment under the equity method of accounting as we maintain the ability to exercise significant influence over Samsung Bioepis through a presence on the entity's Board of Directors and our contractual relationship. Under the equity method, we recorded our original investment at cost and subsequently adjust the carrying value of our investment for our share of equity in the entity's income or losses according to our percentage of ownership. We recognize our share of the results of operations related to our investment in Samsung Bioepis one quarter in arrears when the results of the entity become available, which is reflected as equity in loss of investee, net of tax in our consolidated statements of income. During the year ended December 31, 2015, we recognized a loss on our investment of $12.5 million. During 2015, as our share of losses exceeded the carrying value of our investment, we suspended recognizing additional losses and will continue to do so unless we commit to providing additional funding.

Commercial Agreement

In December 2013 pursuant to our rights under the joint venture agreement with Samsung Biologics, we entered into an agreement with Samsung Bioepis to commercialize, over a 10-year term, three anti-tumor necrosis factor (TNF) biosimilar product candidates in Europe and in the case of one anti-TNF biosimilar, Japan. Under this agreement, we have made total upfront and clinical development milestone payments of $46.0 million, all of which have been recorded as research and development expense in our consolidated statements of income as the programs they relate to had not achieved regulatory approval. We also agreed to make additional milestone payments of $25.0 million upon regulatory approval in the E.U. for each of the three anti-TNF biosimilar product candidates. During the years ended December 31, 2017 and 2016, we paid $25.0 million and $50.0 million, respectively, in milestone payments, which have been capitalized in intangible assets, net in our consolidated balance sheets as IMRALDI received regulatory approval in the E.U. in August 2017, BENEPALI received regulatory approval in the E.U. in January 2016 and FLIXABI received regulatory approval in the E.U. in May 2016.

We began to recognize revenues on sales of BENEPALI in the E.U. in the first quarter of 2016 and FLIXABI in the E.U. in the third quarter of 2016. We reflect revenues on sales of BENEPALI and FLIXABI to third parties in product revenues, net in our consolidated statements of income and record the related cost of revenues and sales and marketing expenses in our consolidated statements of income to their respective line items when these costs are incurred. We share 50% of the profit or loss related to our commercial agreement with Samsung Bioepis. This profit sharing with Samsung Bioepis is recognized in collaboration profit (loss) sharing in our consolidated statements of income. For the years ended December 31, 2017 and 2016, we recognized a net expense of $111.0 million and $15.1 million, respectively, to reflect Samsung Bioepis's 50% sharing of the net collaboration profits.

Other Services

Simultaneous with the formation of Samsung Bioepis, we also entered into a license agreement, a technical development services agreement and a manufacturing agreement with Samsung Bioepis. Under the license agreement, we granted Samsung Bioepis an exclusive license to use, develop, manufacture and commercialize biosimilar products created by Samsung Bioepis using Biogen product-specific technology. In exchange, we will receive single digit royalties on all biosimilar products developed and commercialized by Samsung Bioepis. Under the technical development services agreement, we provide Samsung Bioepis technical development and technology transfer services, which include, but are not limited to, cell culture development, purification process development, formulation development and analytical development. Under our manufacturing agreement, we manufacture clinical and commercial quantities of bulk drug substance of biosimilar products for Samsung Bioepis pursuant to contractual terms. Under limited circumstances, we may also supply Samsung Bioepis with quantities of drug product of biosimilar products for use in clinical trials through arrangements with third-party contract manufacturers.

For the years ended December 31, 2017, 2016 and 2015, we recognized $42.7 million, $20.2 million and $62.9 million, respectively, in revenues in relation to these services, which is reflected as a component of other revenues in our consolidated statements of income.

21. Litigation

We are currently involved in various claims and legal proceedings, including the matters described below. For information as to our accounting policies relating to claims and legal proceedings, including use of estimates and contingencies, please read Note 1, *Summary of Significant Accounting Policies,* to these consolidated financial statements.

With respect to some loss contingencies, an estimate of the possible loss or range of loss cannot be made until management has further information, including, for example, (i) which claims, if any, will survive dispositive motion practice; (ii) information to be obtained through discovery; (iii) information as to the parties' damages claims and supporting evidence; (iv) the parties' legal theories; and (v) the parties' settlement positions.

The claims and legal proceedings in which we are involved also include challenges to the scope, validity or enforceability of the patents relating to our products, pipeline or processes, and challenges to the scope, validity or enforceability of the patents held by others. These include claims by third parties that we infringe their patents. An adverse outcome in any of these proceedings could result in one or more of the following and have a material impact on our business or consolidated results of operations and financial position: (i) loss of patent protection; (ii) inability to continue to engage in certain activities; and (iii) payment of significant damages, royalties, penalties and/or license fees to third parties.

Loss Contingencies

Qui Tam Litigation

On July 6, 2015, a qui tam action filed on behalf of the United States and certain states was unsealed by the U.S. District Court for the District of Massachusetts. The action alleges sales and promotional activities in violation of the federal False Claims Act and state law counterparts, and seeks single and treble damages, civil penalties, interest, attorneys' fees and costs. Our motion to dismiss is pending. The United States has not made an intervention decision. An estimate of the possible loss or range of loss cannot be made at this time.

Securities Litigation

We and certain current and former officers are defendants in an action filed by a shareholder on October 20, 2016 in the U.S. District Court for the District of Massachusetts alleging violations of federal securities laws under 15 U.S.C §78j(b) and §78t(a) and 17 C.F.R. §240.10b-5 and seeking a declaration of the action as a class action and an award of damages, interest and attorneys' fees. An estimate of the possible loss or range of loss cannot be made at this time.

Other Matters

Abbreviated New Drug Application (ANDA) Litigation relating to TECFIDERA

In June, July, and September 2017 and January 2018, we initiated patent infringement proceedings pursuant to the Hatch-Waxman act in the U.S. District Court for the District of Delaware against Amneal Pharmaceuticals LLC, Aurobindo Pharma U.S.A., Inc., Caribe Holdings (Cayman) Co. Ltd. DBA Puracap Caribe, Puracap International LLC, Graviti Pharmaceuticals Pvt. Ltd., Hetero USA, Inc., Impax Laboratories, Inc., Prinston Pharmaceutical Inc., Slayback Pharma LLC, Teva Pharmaceuticals USA, Inc., Alkem Laboratories Ltd., Cipla Limited, Glenmark Pharmaceuticals Ltd., Lupin Atlantis Holdings SA, Macleods Pharmaceuticals, Ltd., MSN Laboratories Pvt. Ltd., Pharmathen S.A., Shipla Medicare Limited, Sun Pharma Global FZE, Torrent Pharmaceuticals Ltd., TWi Pharmaceuticals, Inc., Windlas Healthcare Pvt. Ltd., Accord Healthcare Inc., Par Pharmaceutical Inc., Sandoz Inc., Sawai USA, Inc. and Zydus Pharmaceuticals (USA) Inc. In addition, we initiated patent infringement proceedings pursuant to the Hatch-Waxman act against Stason Pharmaceuticals, Inc. in the U.S. District Court for the Central District of California, Zydus Pharmaceuticals (USA) Inc. in the U.S. District Court for the District of New Jersey, Accord Healthcare Inc. in the U.S. District Court for the Middle District of North Carolina, Par Pharmaceutical Inc. in the U.S. District Court for the Southern District of New York, Sandoz Inc. in the U.S. District Court for the District of Colorado and Mylan Pharmaceuticals Inc. in the U.S. District Court for the Northern District of West Virginia.

The cases against Accord Healthcare Inc., Zydus Pharmaceuticals (USA) Inc. and Sandoz Inc. have been dismissed in the North Carolina, New Jersey and Colorado courts but will continue against those parties in Delaware. The cases against Par Pharmaceutical Inc. in both New York and Delaware have been dismissed because Par Pharmaceutical Inc.'s ANDA application has been withdrawn. The case against Stason Pharmaceuticals, Inc. in California has been dismissed, but the case against its partner Sawai USA, Inc. will proceed in Delaware.

We expect a trial in the Delaware actions in December 2019, and a trial has been set in the West Virginia action in February 2020.

Interference Proceeding with Forward Pharma

In April 2015 the U.S. Patent and Trademark Office (USPTO) declared an interference between Forward Pharma's pending U.S. Patent Application No. 11/576,871 and our U.S. Patent No. 8,399,514 (the '514 patent). The '514 patent includes claims covering the treatment of MS with 480 mg of dimethyl fumarate as provided for in our TECFIDERA label. In March 2017 the USPTO ruled against Forward Pharma. Forward Pharma has appealed to the U.S. Court of Appeals for the Federal Circuit and the appeal is pending. For additional information regarding this matter, please read Note 7, *Intangibles Assets and Goodwill,* to these consolidated financial statements.

European Patent Office Oppositions

In 2016 the EPO decided to revoke our European patent number 2 137 537 (the '537 patent), which we have appealed. The '537 patent includes claims covering the treatment of MS with 480 mg of dimethyl fumarate as provided for in our TECFIDERA label.

In January 2018 the EPO announced its decision revoking Forward Pharma's European Patent No. 2 801 355, which was issued in May 2015 and expires in October 2025. Forward Pharma has stated that it expects to file an appeal to the Technical Board of Appeal of the EPO. The settlement and license agreement that we entered with Forward Pharma in January 2017 did not resolve the issues pending in this proceeding and we and Forward Pharma intend to permit the Technical Board of Appeal and the Enlarged Board of Appeal, as applicable, to make a final determination. For additional information regarding this matter, please read Note 7, *Intangibles Assets and Goodwill,* to these consolidated financial statements.

Patent Revocation Matter

Swiss Pharma International AG filed actions in the District Court of The Hague (on January 11, 2016), the German Patents Court (on March 3, 2016) and the Commercial Court of Rome (November 2017) to invalidate the Dutch, German and Italian counterparts of our European Patent Number 1 485 127 ("Administration of agents to treat inflammation") ('127 patent), which was issued in June 2011 and concerns administration of natalizumab (TYSABRI) to treat MS. The patent expires in February 2023. The Dutch counterpart was ruled invalid and we have appealed. In November 2018 Bioeq gmbh (an entity associated with Swiss Pharma and Polpharma) brought an action in the Polish Patent Office seeking to revoke the Polish counterpart of the '127 patent. In January 2018 the German court announced that the German counterpart was invalid. No date for a hearing on the merits has yet been set in the Italian action.

'755 Patent Litigation

On May 28, 2010, Biogen MA Inc. (formerly Biogen Idec MA Inc.) filed a complaint in the U.S. District Court for the District of New Jersey alleging infringement by Bayer Healthcare Pharmaceuticals Inc. (Bayer) (manufacturer, marketer and seller of BETASERON and manufacturer of EXTAVIA), EMD Serono, Inc. (EMD Serono) (manufacturer, marketer and seller of REBIF), Pfizer Inc. (Pfizer) (co-marketer of REBIF) and Novartis Pharmaceuticals Corp. (Novartis) (marketer and seller of EXTAVIA) of our U.S. Patent No. 7,588,755 ('755 Patent), which claims the use of interferon beta for immunomodulation or treating a viral condition, viral disease, cancers or tumors. The complaint seeks monetary damages, including lost profits and royalties. Bayer had previously filed a complaint against us in the same court, on May 27, 2010, seeking a declaratory judgment that it does not infringe the '755 Patent and that the patent is invalid, and seeking monetary relief in the form of attorneys' fees, costs and expenses.

Bayer, Pfizer, Novartis and EMD Serono have all filed counterclaims seeking declaratory judgments of patent invalidity and non-infringement, and seeking monetary relief in the form of costs and attorneys' fees. The trial against EMD Serono and Pfizer commenced in mid-January 2018 and is ongoing. A trial date against Bayer and Novartis has not yet been set.

Government Matters

We have learned that state and federal governmental authorities are investigating our sales and promotional practices and have received related subpoenas. We are cooperating with the government.

We have received subpoenas and other requests from the federal government for documents and information relating to our relationship with non-profit organizations that provide assistance to patients taking drugs sold by Biogen and Biogen's co-pay assistance programs. We are cooperating with the government.

On July 1, 2016, we received civil investigative demands from the federal government for documents and information relating to our treatment of certain service agreements with wholesalers when calculating and reporting Average Manufacturer Prices in connection with the Medicaid Drug Rebate Program. We are cooperating with the government.

In July 2017 we learned that the Prosecution Office of Milan is investigating our interactions with certain healthcare providers in Italy. We are cooperating with the government.

Product Liability and Other Legal Proceedings

We are also involved in product liability claims and other legal proceedings generally incidental to our normal business activities. While the outcome of any of these proceedings cannot be accurately predicted, we do not believe the ultimate resolution of any of these existing matters would have a material adverse effect on our business or financial condition.

22. Commitments and Contingencies

TYSABRI Contingent Payments

In 2013 we acquired from Elan full ownership of all remaining rights to TYSABRI that we did not already own or control. Under the acquisition agreement, we are obligated to make contingent payments to Elan of 18% on annual worldwide net sales up to $2.0 billion and 25% on annual worldwide net sales that exceed $2.0 billion. Royalty payments to Elan and other third parties are recognized as cost of sales in our consolidated statements of income. Elan was acquired by Perrigo Company plc (Perrigo) in December 2013, and Perrigo subsequently sold its rights to these payments to a third party effective January 2017.

Contingent Consideration related to Business Combinations

In connection with our acquisitions of Convergence, Stromedix and BIN, we agreed to make additional payments based upon the achievement of certain milestone events.

As the acquisitions of Convergence, Stromedix and BIN, occurred after January 1, 2009, we recorded the contingent consideration liabilities associated with these transactions at their fair value on the acquisition date and revalue these obligations each reporting period. We may pay up to approximately $1.1 billion in remaining milestones related to these acquisitions. For additional information on our acquisition of Convergence please read Note 2, *Acquisitions,* to these consolidated financial statements.

Fumapharm AG

In 2006 we acquired Fumapharm AG. As part of this acquisition we acquired FUMADERM and TECFIDERA (together, Fumapharm Products). We paid $220.0 million upon closing of the transaction and agreed to pay an additional $15.0 million if a Fumapharm Product was approved for MS in the U.S. or E.U. In the second quarter of 2013 we paid this $15.0 million contingent payment as TECFIDERA was approved in the U.S. for MS by the FDA. We are also required to make additional contingent payments to former shareholders of Fumapharm AG or holders of their rights based on the attainment of certain cumulative sales levels of Fumapharm Products and the level of total net sales of Fumapharm Products in the prior 12-month period, as defined in the acquisition agreement.

During 2017 we paid $1.2 billion in contingent payments as we reached the $11.0 billion, $12.0 billion, $13.0 billion and $14.0 billion cumulative sales levels related to the Fumapharm Products in the fourth quarter of 2016 and the first, second and third quarters of 2017, respectively, and accrued $600.0 million upon reaching $15.0 billion and $16.0 billion in total cumulative sales of Fumapharm Products in the fourth quarter of 2017.

We will owe an additional $300.0 million contingent payment for every additional $1.0 billion in cumulative sales level of Fumapharm Products reached if the prior 12 months sales of the Fumapharm Products exceed $3.0 billion, until such time as the cumulative sales level reaches $20.0 billion, at which time no further contingent payments shall be due. If the prior 12 months sales of Fumapharm Products are less than $3.0 billion, contingent payments remain payable on a decreasing tiered basis. These payments will be accounted for as an increase to goodwill as incurred, in accordance with the accounting standard applicable to business combinations when we acquired Fumapharm. Any portion of the payment which is tax deductible will be recorded as a reduction to goodwill. Payments are due within 60 days following the end of the quarter in which the applicable cumulative sales level has been reached.

Contingent Development, Regulatory and Commercial Milestone Payments

Based on our development plans as of December 31, 2017, we could make potential future milestone payments to third parties of up to approximately $4.2 billion, including approximately $0.7 billion in development milestones, approximately $1.5 billion in regulatory milestones and approximately $2.0 billion in commercial milestones as part of our various collaborations, including licensing and development programs. Payments under these agreements generally become due and payable upon achievement of certain development, regulatory or commercial milestones. Because the achievement of these milestones was not considered probable as of December 31, 2017, such contingencies have not been recorded in our financial statements. Amounts related to contingent milestone payments are not considered contractual obligations as they are contingent on the successful achievement of certain development, regulatory approval and commercial milestones.

Other Funding Commitments

As of December 31, 2017, we have several on-going clinical studies in various clinical trial stages. Our most significant clinical trial expenditures are to CROs. The contracts with CROs are generally cancellable, with notice, at our option. We have recorded accrued expenses of approximately $40.0 million in our consolidated balance sheet for expenditures incurred by CROs as of December 31, 2017. We have approximately $460.0 million in cancellable future commitments based on existing CRO contracts as of December 31, 2017.

Tax Related Obligations

We exclude liabilities pertaining to uncertain tax positions from our summary of contractual obligations as we cannot make a reliable estimate of the period of cash settlement with the respective taxing authorities. As of December 31, 2017, we have approximately $77.3 million of net liabilities associated with uncertain tax positions.

As of December 31, 2017, we have accrued income tax liabilities of $989.6 million under the Transition Toll Tax, of which $78.3 million is expected to be paid within one year. The Transition Toll Tax will be paid over an eight-year period, starting in 2018, and will not accrue interest.

Solothurn, Switzerland Facility

In December 2015, we purchased land in Solothurn, Switzerland and are building a large-scale biologics manufacturing facility at this site. We expect this facility to be operational by the end of the decade. As of December 31, 2017, we had contractual commitments of $270.0 million for the construction of this facility.

Leases

We rent laboratory and office space and certain equipment under non-cancelable operating leases. These lease agreements contain various clauses for renewal at our option and, in certain cases, escalation clauses typically linked to rates of inflation. Rental expense, net of sublease income under these leases, which terminate at various dates through 2028, amounted to $65.3 million, $68.7 million and $68.6 million in 2017, 2016 and 2015, respectively. In addition to rent, the leases may require us to pay additional amounts for taxes, insurance, maintenance and other operating expenses.

As of December 31, 2017, minimum rental commitments under non-cancelable leases, net of income from subleases, for each of the next five years and total thereafter were as follows:

(In millions)	2018	2019	2020	2021	2022	Thereafter	Total
Minimum lease payments	$ 72.6	$ 72.3	$ 68.4	$ 66.9	$ 65.7	$ 271.1	$ 617.0
Less: income from subleases (1)	(24.3)	(24.7)	(23.9)	(22.3)	(22.0)	(71.3)	(188.5)
Net minimum lease payments	$ 48.3	$ 47.6	$ 44.5	$ 44.6	$ 43.7	$ 199.8	$ 428.5

(1) Represents sublease income expected to be received for the vacated manufacturing facility in Cambridge, MA, the vacated portion of our Weston, MA facility and other facilities throughout the world.

Under certain of our lease agreements, we are contractually obligated to return leased space to its original condition upon termination of the lease agreement. At the inception of a lease with such conditions, we record an asset retirement obligation liability and a corresponding capital asset in an amount equal to the estimated fair value of the obligation. In subsequent periods, for each such lease, we record interest expense to accrete the asset retirement obligation liability to full value and depreciate each capitalized asset retirement obligation asset, both over the term of the associated lease agreement. Our asset retirement obligations were not significant as of December 31, 2017 or 2016.

23. Guarantees

As of December 31, 2017 and 2016, we did not have significant liabilities recorded for guarantees.

We enter into indemnification provisions under our agreements with other companies in the ordinary course of business, typically with business partners, contractors, clinical sites and customers. Under these provisions, we generally indemnify and hold harmless the indemnified party for losses suffered or incurred by the indemnified party as a result of our activities. These indemnification provisions generally survive termination of the underlying agreement. The maximum potential amount of future payments we could be required to make under these indemnification provisions is unlimited. However, to date we have not incurred material costs to defend lawsuits or settle claims related to these indemnification provisions. As a result, the estimated fair value of these agreements is minimal. Accordingly, we have no liabilities recorded for these agreements as of December 31, 2017 and 2016.

24. Employee Benefit Plans

We sponsor various retirement and pension plans. Our estimates of liabilities and expenses for these plans incorporate a number of assumptions, including expected rates of return on plan assets and interest rates used to discount future benefits.

401(k) Savings Plan

We maintain a 401(k) Savings Plan, which is available to substantially all regular employees in the U.S. over the age of 21. Participants may make voluntary contributions. We make matching contributions according to the 401(k) Savings Plan's matching formula. All matching contributions and participant contributions vest immediately. The 401(k) Savings Plan also holds certain transition contributions on behalf of participants who previously participated in the Biogen, Inc. Retirement Plan. The expense related to our 401(k) Savings Plan primarily consists of our matching contributions.

Expense related to our 401(k) Savings Plan totaled $42.6 million, $45.2 million and $51.8 million for the years ended December 31, 2017, 2016 and 2015, respectively.

Deferred Compensation Plan

We maintain a non-qualified deferred compensation plan, known as the Supplemental Savings Plan (SSP), which allows a select group of management employees in the U.S. to defer a portion of their compensation. The SSP also provides certain credits to highly compensated U.S. employees that are paid by the company. These credits are known as the Restoration Match. The deferred compensation amounts are accrued when earned. Such deferred compensation is distributable in cash in accordance with the rules of the SSP. Deferred compensation amounts under such plan as of December 31, 2017 and 2016 totaled approximately $109.8 million and $128.5 million, respectively, and are included in other long-term liabilities in our consolidated balance sheets. The SSP also holds certain transition contributions on behalf of participants who previously participated in the Biogen, Inc. Retirement Plan. The Restoration Match and participant contributions vest immediately. Distributions to participants can be either in one lump sum payment or annual installments as elected by the participants.

Pension Plans

Our retiree benefit plans include defined benefit plans for employees in our affiliates in Switzerland and Germany as well as other insignificant defined benefit plans in certain other countries where we maintain an operating presence.

Our Swiss plan is a government-mandated retirement fund that provides employees with a minimum investment return. The minimum investment return is determined annually by the Swiss government and was 1.00% in 2017 and 1.25% in 2016 and 1.75% in 2015, respectively. Under the Swiss plan, both we and certain of our employees with annual earnings in excess of government determined amounts are required to make contributions into a fund managed by an independent investment fiduciary. Employer contributions must be in an amount at least equal to the employee's contribution. Minimum employee contributions are based on the respective employee's age, salary and gender.

As of December 31, 2017 and 2016, the Swiss plan had an unfunded net pension obligation of approximately $48.3 million and $39.1 million, respectively, and plan assets that totaled approximately $83.7 million and $68.6 million, respectively. In 2017, 2016 and 2015, we recognized expense totaling $12.3 million, $15.3 million and $12.9 million, respectively, related to our Swiss plan.

The obligations under the German plans are unfunded and totaled $43.5 million and $35.4 million as of December 31, 2017 and 2016, respectively. Net periodic pension cost related to the German plans totaled $5.2 million, $4.2 million and $4.0 million for the years ended December 31, 2017, 2016 and 2015, respectively.

25. Segment Information

We operate as one operating segment, focused on discovering, developing and delivering worldwide innovative therapies for people living with serious neurological and neurodegenerative diseases. Our Chief Executive Officer (CEO), as the chief operating decision-maker, manages and allocates resources to the operations of our company on a total company basis. Our 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. Our pharmaceutical, operations and technology organization manages the development of the manufacturing processes, clinical trial supply, commercial product supply, distribution, buildings and facilities. Our commercial organization is responsible for U.S. and international development of our commercial products. The company is also supported by corporate staff functions. Managing and allocating resources on a total company basis enables our CEO to assess the overall level of resources available and how to best deploy these resources across functions, therapeutic areas and research and development projects that are in line with our long-term company-wide strategic goals. Consistent with this decision-making process, our CEO uses consolidated, single-segment financial information for purposes of evaluating performance, forecasting future period financial results, allocating resources and setting incentive targets.

Enterprise-wide disclosures about product revenues, other revenues and long-lived assets by geographic area and information relating to major customers are presented below. Revenues are primarily attributed to individual countries based on location of the customer or licensee.

Revenues by product are summarized as follows:

	For the Years Ended December 31,								
	2017			2016			2015		
(In millions)	United States	Rest of World	Total	United States	Rest of World	Total	United States	Rest of World	Total
Multiple Sclerosis (MS):									
TECFIDERA	$ 3,294.0	$ 920.0	$ 4,214.0	$ 3,169.4	$ 798.7	$ 3,968.1	$ 2,908.2	$ 730.2	$ 3,638.4
AVONEX	1,593.6	557.9	2,151.5	1,675.3	638.2	2,313.5	1,790.2	840.0	2,630.2
PLEGRIDY	295.5	198.8	494.3	305.0	176.7	481.7	227.1	111.4	338.5
TYSABRI	1,113.8	859.3	1,973.1	1,182.9	780.9	1,963.8	1,103.1	783.0	1,886.1
FAMPYRA	—	91.6	91.6	—	84.9	84.9	—	89.7	89.7
ZINBRYTA	—	52.7	52.7	—	7.8	7.8	—	—	—
Spinal Muscular Atrophy:									
SPINRAZA	657.0	226.7	883.7	4.6	—	4.6	—	—	—
Hemophilia:									
ELOCTATE	42.2	6.2	48.4	445.2	68.0	513.2	308.3	11.4	319.7
ALPROLIX	21.0	5.0	26.0	268.0	65.7	333.7	208.9	25.6	234.5
Other product revenues:									
FUMADERM	—	39.6	39.6	—	45.9	45.9	—	51.4	51.4
BENEPALI	—	370.8	370.8	—	100.6	100.6	—	—	—
FLIXABI	—	9.0	9.0	—	0.1	0.1	—	—	—
Total product revenues	$ 7,017.1	$ 3,337.6	$ 10,354.7	$ 7,050.4	$ 2,767.5	$ 9,817.9	$ 6,545.8	$ 2,642.7	$ 9,188.5

Geographic Information

The following tables contain certain financial information by geographic area:

December 31, 2017 (In millions)	U.S.	Europe	Asia	Other	Total
Product revenues from external customers	$ 7,017.1	$ 2,844.8	$ 160.1	$ 332.7	$ 10,354.7
Revenues from anti-CD20 therapeutic programs	$ 1,475.6	$ 0.6	$ —	$ 83.0	$ 1,559.2
Other revenues from external customers	$ 249.5	$ 67.8	$ 42.7	$ —	$ 360.0
Long-lived assets	$ 1,226.9	$ 1,948.2	$ 5.2	$ 2.1	$ 3,182.4

December 31, 2016 (In millions)	U.S.	Europe	Asia	Other	Total
Product revenues from external customers	$ 7,050.4	$ 2,237.2	$ 217.3	$ 313.0	$ 9,817.9
Revenues from anti-CD20 therapeutic programs	$ 1,249.5	$ 1.9	$ —	$ 63.1	$ 1,314.5
Other revenues from external customers	$ 224.7	$ 71.5	$ 20.2	$ —	$ 316.4
Long-lived assets	$ 1,272.3	$ 1,221.1	$ 7.0	$ 1.4	$ 2,501.8

December 31, 2015 (In millions)	U.S.	Europe	Asia	Other	Total
Product revenues from external customers	$ 6,545.8	$ 2,165.7	$ 143.7	$ 333.3	$ 9,188.5
Revenues from anti-CD20 therapeutic programs	$ 1,269.8	$ 3.5	$ —	$ 65.9	$ 1,339.2
Other revenues from external customers	$ 142.0	$ 31.2	$ 62.9	$ —	$ 236.1
Long-lived assets	$ 1,296.5	$ 881.7	$ 7.7	$ 1.7	$ 2,187.6

Revenues from Anti-CD20 Therapeutic Programs

Approximately 13%, 11% and 12% of our total revenues in 2017, 2016 and 2015, respectively, are derived from our collaboration agreement with Genentech. For additional information on our collaboration with Genentech, please read Note 20, *Collaborative and Other Relationships,* to these consolidated financial statements.

Significant Customers

We recorded revenues from two wholesalers accounting for 34% and 21% of gross product revenues in 2017, 35% and 22% of gross product revenues in 2016, and 34% and 26% of gross product revenues in 2015, respectively.

Other

As of December 31, 2017, 2016 and 2015, approximately $1,215.7 million, $545.5 million and $161.5 million, respectively, of our long-lived assets were related to the construction of our large-scale biologics manufacturing facility in Solothurn, Switzerland.

As of December 31, 2017, 2016 and 2015, approximately $707.1 million, $643.6 million and $684.9 million, respectively, of our long-lived assets were related to our manufacturing facilities in Denmark.

For additional information on our large-scale biologics manufacturing facility in Solothurn, Switzerland, please read Note 11, *Property, Plant and Equipment,* to these consolidated financial statements.

26. Quarterly Financial Data (Unaudited)

(In millions, except per share amounts)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total Year
2017	(a)	(a) (b) (c) (d)	(a)	(a) (e) (f) (g) (h)	
Product revenues, net	$ 2,380.1	$ 2,639.7	$ 2,622.5	$ 2,712.4	$ 10,354.7
Revenues from anti-CD20 therapeutic programs	$ 340.6	$ 397.1	$ 406.5	$ 415.0	$ 1,559.2
Other revenues	$ 90.0	$ 41.6	$ 48.8	$ 179.6	$ 360.0
Total revenues	$ 2,810.7	$ 3,078.4	$ 3,077.8	$ 3,307.0	$ 12,273.9
Gross profit (1)	$ 2,426.1	$ 2,712.2	$ 2,707.8	$ 2,797.8	$ 10,643.9
Net income	$ 747.5	$ 862.8	$ 1,226.1	$ (166.3)	$ 2,670.1
Net income attributable to Biogen Inc.	$ 747.6	$ 862.8	$ 1,226.1	$ (297.4)	$ 2,539.1
Net income per share:					
Basic earnings per share attributable to Biogen Inc.	$ 3.47	$ 4.07	$ 5.80	$ (1.41)	$ 11.94
Diluted earnings per share attributable to Biogen Inc.	$ 3.46	$ 4.07	$ 5.79	$ (1.40)	$ 11.92
Weighted-average shares used in calculating:					
Basic earnings per share attributable to Biogen Inc.	215.6	211.9	211.4	211.5	212.6
Diluted earnings per share attributable to Biogen Inc.	215.9	212.2	211.8	212.0	213.0

BIOGEN INC. AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS — (Continued)

(In millions, except per share amounts)	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total Year
2016		(i)	(i) (j)	(i) (k) (l)	
Product revenues, net	$ 2,309.4	$ 2,466.0	$ 2,539.6	$ 2,502.9	$ 9,817.9
Revenues from anti-CD20 therapeutic programs	$ 329.5	$ 349.2	$ 317.6	$ 318.2	$ 1,314.5
Other revenues	$ 87.9	$ 79.0	$ 98.6	$ 50.9	$ 316.4
Total revenues	$ 2,726.8	$ 2,894.2	$ 2,955.8	$ 2,872.0	$ 11,448.8
Gross profit (1)	$ 2,413.8	$ 2,523.9	$ 2,538.9	$ 2,493.5	$ 9,970.1
Net income	$ 969.2	$ 1,048.4	$ 1,030.2	$ 647.9	$ 3,695.7
Net income attributable to Biogen Inc.	$ 970.9	$ 1,049.8	$ 1,032.9	$ 649.2	$ 3,702.8
Net income per share:					
Basic earnings per share attributable to Biogen Inc.	$ 4.44	$ 4.79	$ 4.72	$ 3.00	$ 16.96
Diluted earnings per share attributable to Biogen Inc.	$ 4.43	$ 4.79	$ 4.71	$ 2.99	$ 16.93
Weighted-average shares used in calculating:					
Basic earnings per share attributable to Biogen Inc.	218.9	219.1	218.9	216.6	218.4
Diluted earnings per share attributable to Biogen Inc.	219.3	219.4	219.4	217.0	218.8

(1) Gross profit is calculated as total revenues less cost of sales, excluding amortization of acquired intangible assets.

(a) Net income and net income attributable to Biogen Inc. for the first, second, third and fourth quarters of 2017 include a pre-tax charge of $353.6 million, $29.4 million, $30.4 million and $30.8 million, respectively, related to our U.S. and rest of world licenses to Forward Pharma's intellectual property, including Forward Pharma's intellectual property related to TECFIDERA.

(b) Net income and net income attributable to Biogen Inc. for the second quarter of 2017 includes a pre-tax charge to research and development expense of $300.0 million for an upfront payment to BMS upon the closing of our agreement to exclusively license BIIB092.

(c) Net income and net income attributable to Biogen Inc. for the second quarter of 2017 includes a pre-tax charge to acquired in-process research and development of $120.0 million for an upfront payment to Remedy upon closing of the asset purchase transaction.

(d) Net income and net income attributable to Biogen Inc. for the second quarter of 2017 includes a pre-tax charge to research and development expense of $60.0 million for a developmental milestone that became payable to the former shareholders of iPierian upon dosing of the first patient in the Phase 2 PSP study for BIIB092.

(e) Net income attributable to Biogen Inc., for the fourth quarter of 2017, includes a pre-tax charge to noncontrolling interest of $150.0 million for a payment to Neurimmune in exchange for a 15% reduction in royalty rates payable on potential commercial sales of aducanumab.

(f) Net income and net income attributable to Biogen Inc. for the fourth quarter of 2017 includes pre-tax charges to research and development expense of $28.0 million and $50.0 million for an upfront payment and a continuation payment, respectively, to Alkermes.

(g) Net income and net income attributable to Biogen Inc. for the fourth quarter of 2017 includes a pre-tax charge to research and development expense of $25.0 million for an upfront payment to Ionis upon entering into a new collaboration agreement to identify new antisense-oligonucleotide drug candidates for the treatment of SMA.

(h) Net income and net income attributable to Biogen Inc. for the fourth quarter of 2017 includes $1,173.6 million related to the provisions of the 2017 Tax Act, including a $989.6 million expense under the Transition Toll Tax.

(i) Net income and net income attributable to Biogen Inc. for the second, third and fourth quarters of 2016 includes additional pre-tax depreciation expense totaling $15.8 million, $15.7 million and $14.0 million, respectively, as part of our decision to cease manufacturing and vacate our small-scale biologics manufacturing facility in Cambridge, MA as well as close and vacate our warehouse space in Somerville, MA.

(j) Net income and net income attributable to Biogen Inc. for the third quarter of 2016 includes a pre-tax charge to research and development expense of $75.0 million for a license fee paid to Ionis as we exercised our option to develop and commercialize SPINRAZA.

(k) Net income and net income attributable to Biogen Inc. for the fourth quarter of 2016 includes a pre-tax charge to research and development expense of $50.0 million for a milestone payment due to Eisai related to the initiation of a Phase 3 trial for E2609.

(l) Net income and net income attributable to Biogen Inc. for the fourth quarter of 2016 includes a pre-tax charge of $454.8 million related to our January 2017 settlement and license agreement with Forward Pharma.

27. Subsequent Events

Karyopharm Therapeutics Inc.

In January 2018 we acquired the exclusive worldwide rights to develop and commercialize Karyopharm Therapeutics Inc.'s (Karyopharm) investigational oral compound BIIB100 (formerly known as KPT-350) for the treatment of certain neurological and neurodegenerative conditions, primarily in ALS. We will pay Karyopharm an upfront payment of $10.0 million and we may pay Karyopharm up to $207.0 million in additional milestone payments, and potential royalties.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Shareholders of Biogen Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of Biogen Inc. and its subsidiaries (the "Company") as of December 31, 2017 and 2016, and the related consolidated statements of income, comprehensive income, equity and cash flows for each of the three years in the period ended December 31, 2017, including the related notes (collectively referred to as the “consolidated financial statements”). We also have audited the Company's internal control over financial reporting as of December 31, 2017, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2017 and 2016, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2017 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2017, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management’s Annual Report on Internal Control over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company’s consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements 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. 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 audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

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 (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) 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 (iii) provide reasonable

assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

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

/s/PricewaterhouseCoopers LLP
Boston, Massachusetts
February 1, 2018

We have served as the Company's auditor since 2003.

Exhibit 10.10

Performance Stock Units AWARD AGREEMENT (Cash settled)

Granted Under

Biogen Inc. 2017 Omnibus Equity Plan

1. **Grant of Performance Stock Units (Cash Settled)**

Pursuant to the Biogen Inc. 2017 Omnibus Equity Plan (as it may be amended from time to time, the "Plan"), Biogen Inc. (the "Company") hereby grants to you, an employee of the Company or one of its Affiliates (the "Participant"), on each of the grant dates specified on your Fidelity stock plan account (the "Grant Date"), the number of cash-settled performance stock units (the "Granted PSUs" or the "Award") specified on your Fidelity stock plan account, subject to the terms and conditions of this award agreement ("Agreement") and the Plan. No Granted PSUs shall be paid unless vested in accordance with this Agreement. The Participant's rights to the Granted PSUs are subject to the restrictions described in this Agreement and the Plan, in addition to such other restrictions, if any, as may be imposed by law. All initially capitalized terms used herein will have the meaning specified in the Plan, unless another meaning is specified in this Agreement.

2. **Vesting**

A. The Participant shall have a non-forfeitable right to a portion of the Award only upon the vesting dates specified on your Fidelity stock plan account, except as otherwise provided herein or determined by the Committee in its sole discretion. No portion of any Award shall become vested on the vesting date unless the Participant is then, and since the Grant Date has continuously been, employed by the Company or any Affiliate. If the Participant ceases to be employed by the Company and its Affiliates for any reason, any then outstanding and unvested portion of the Award shall be automatically and immediately forfeited and terminated, except as otherwise provided in this Agreement and the Plan.

B. The Award will become eligible to vest upon achievement of each of three annual performance goals (the "Annual Performance Goals"), as adopted by the Committee in the first calendar quarter of each of the three years beginning on the first year in which the Award is granted and communicated. The calculation of the number of Granted PSUs that will vest is specified in the Long-Term Incentive Program Overview for Executives for the year in which the Award is granted ("LTI Overview"), which is also found on your Fidelity stock plan account. Granted PSUs that become eligible to vest upon the achievement of each of the Annual Performance Goals are referred to as the "Eligible PSUs." In the event and to the extent that the any of the Annual Performance Goals are not satisfied, such Granted PSUs connected to such unachieved Annual Performance Goals shall not become eligible to vest and shall be immediately forfeited. As specified in each of the Annual Performance Goals, in the event and to the extent that the Annual Performance Goals are exceeded, an additional number of Granted PSUs will become eligible to vest. In no event shall the number of Eligible PSUs exceed 200% of the number of Granted PSUs. All Eligible PSUs will vest on the later of the third anniversary of the Grant Date or the date of the Committee's determination of the degree to which the Annual Performance Goals have been satisfied (the "Vesting Date").

C. Except as otherwise provided in the Plan, upon termination of the Participant's employment with the Company and its Affiliates for any reason, any portion of the Award that is not then vested will immediately terminate, except as follows:

(i) any portion of the Award held by the Participant immediately prior to the Participant's termination of employment on account of death or Disability will, to the extent not vested previously, become fully vested upon the later of (a) the date of death or Disability of the Participant or (b) the determination of the Eligible PSUs based on the achievement of the Annual Performance Goals and the Committee's approval, even if such determination occurs following the date of death or Disability of the Participant; and

(ii) any portion of the Award held by the Participant immediately prior to the Participant's Retirement, to the extent not vested previously, will become fully vested upon the later of the date of Retirement or determination of the Eligible PSUs based on the achievement of the Annual Performance Goals and the Committee's approval for fifty percent (50%) of the number of Eligible PSUs covered by such unvested portion and for an additional ten percent (10%) of the number of Eligible PSUs covered by such unvested portion for every full year of employment by the Company and its Affiliates beyond ten (10) years, up to the remaining amount of the unvested Eligible PSUs of the Award. For the avoidance of doubt, Retirement means the Participant's leaving the employment of the Company and its Affiliates after reaching age 55 with ten (10) consecutive years of service with the Company or its Affiliates, but not including pursuant to any termination For Cause or any termination for insufficient performance, as determined by the Company.

D. Notwithstanding anything herein to the contrary, any portion of the Award held by a Participant or a Participant's permitted transferee immediately prior to the cessation of the Participant's employment For Cause shall terminate at the commencement of business on the date of such termination.

3. **Delivery of Award**

A. With respect to a Participant who is not eligible for Retirement, within 30 days following the date on which Eligible PSUs becomes vested, with respect to, and in satisfaction of, such vested Eligible PSUs (determined in accordance with Section 2 of this Agreement and Section 10 of the Plan), the Company shall pay to the Participant, subject to applicable withholding as described in Section 7 of this Agreement, the cash value of one share of common stock of the Company ("Common Stock") in satisfaction of each vested Eligible PSU. For purposes of this Agreement, the cash value of a share of Common Stock ("Cash Value") will be equal to the 30 calendar-day average of the Company's closing stock price ending on the Vesting Date.

B. With respect to a Participant who is or becomes eligible for Retirement at any time during the Vesting Period, the Company shall pay to the Participant, subject to applicable withholding as described in Section 7 of this Agreement, the Cash Value in satisfaction of each vested Eligible PSU (determined in accordance with Section 2 of this Agreement and Section 10 of the Plan) within 30 days of the earliest of (i) the date the Eligible PSU otherwise would have vested under Section 2.B. of this Agreement, (ii) the date on which the Participant experiences a separation from service (within the meaning of Section 409A), subject to Section 3.C. of this Agreement or (iii) the date on which a Covered Transaction that satisfies the definition of a "change in control event" under Section 409A occurs.

C. If you are a "specified employee" (as defined in Section 409A), you will be paid on the earlier of (i) the date which is six months after you separate from service (within the meaning of Section 409A) or (ii) the date of your death or Disability. The preceding sentence will not apply to any payments that are exempt from or are not subject to the requirements of Section 409A. For the avoidance of doubt, if payments would be made under Section 3.B.(i) or Section 3.B.(iii) before the six month payment date on account of other than your separation from service, such payment will be made under Section 3.B.(i) or Section 3.B.(iii), as applicable.

4. **Cancellation and Rescission of Awards**

The Committee may cancel, rescind, withhold or otherwise limit or restrict the Award prior to payment at any time if the Participant is not in compliance with all applicable provisions of this Agreement and the Plan, or if the Participant engages in any Detrimental Activity.

5. **No Voting, Dividend or Other Rights as a Stockholder**

The Participant shall not have any rights as a stockholder with respect to any shares of Common Stock that are used to calculate the Cash Value to be delivered to the Participant in satisfaction of any vested Eligible PSUs or with respect to any other aspect of the Award. Accordingly, the Award shall not be interpreted to bestow upon the

Participant any equity interest or ownership in the Company or any Affiliate. Furthermore, the Participant is not entitled to vote any Common Stock or to receive or be credited with any dividends declared and payable on any share of Common Stock by reason of the granting of the Award.

6. **Unfunded Status**

The obligations of the Company and its Affiliates hereunder shall be contractual only and all such payments shall be made from the general assets of the Company or its Affiliates. The Participant shall rely solely on the unsecured promise of the Company and nothing herein shall be construed to give the Participant or any other person or persons any right, title, interest or claim in or to any specific asset, fund, reserve, account or property of any kind whatsoever owned by the Company or any Affiliate.

7. **Withholding**

Awards will be subject to income tax withholding and reporting as required under local law. If statutory withholding of taxes and/or social insurance is required at the time of vesting, the Company will withhold from delivery to the Participant an amount of cash equal in value to the statutory minimum amount required to be withheld. A similar amount of cash will be paid by the Company on behalf of the Participant to the applicable tax authorities. The amount of cash to be withheld will be calculated using the closing sales price of a share of Common Stock on the applicable vesting date. The Cash Value (net of the cash withheld for the payment of withholding taxes, if applicable) will be delivered to the Participant's stock plan account upon vesting in accordance with the Plan. The Company may, in its discretion, permit Participants to make alternative arrangements for payment of any such taxes and/or social insurance.

In certain cases, local law may require that an award be subject to tax earlier than the date of payment. If that occurs, the Company will notify the Participant and will deduct the required tax amount from the Participant's pay in accordance with applicable law.

8. **Provisions of the Plan**

The Award is subject to the provisions of the Plan, which are incorporated herein by reference, and in the event of any inconsistency or conflict between the provisions of this Agreement and the Plan, the provisions of the Plan shall control. A copy of the Plan as in effect on the Grant Date has been made available electronically to the Participant.

9. No Right to Employment

The grant of the Award shall not constitute a contract of employment or confer upon the Participant any right with respect to the continuance of his/her employment by or other service with the Company or any Affiliate, nor shall it or they be construed as affecting the rights of the Company (or any Affiliate) to terminate the service of the Participant at any time or otherwise change the terms of such service, including, without limitation, the right to promote, demote or otherwise re-assign the Participant from one position to another within the Company or any Affiliate.

10. Governing Law

The provisions of the Award and this Agreement shall be governed by and interpreted in accordance with the laws of the State of Delaware.

IN WITNESS WHEREOF, the Company has caused this instrument to be executed by its duly authorized officer.

Biogen Inc.

By: Michel Vounatsos
Chief Executive Officer

Exhibit 10.11

Performance STOCK Units AWARD AGREEMENT

Granted Under

Biogen Inc. 2017 Omnibus Equity Plan

1. **Grant of Performance Stock Units**

Pursuant to the Biogen Inc. 2017 Omnibus Equity Plan (as it may be amended from time to time, the "Plan"), Biogen Inc. (the "Company") hereby grants to you, an employee of the Company or one of its Affiliates (the "Participant"), on each of the grant dates specified on your Fidelity stock plan account (the "Grant Date"), the number of performance stock units (the "Granted PSUs" or the "Award") specified on your Fidelity stock plan account, subject to the terms and conditions of this award agreement ("Agreement") and the Plan. No Granted PSUs shall be paid unless vested in accordance with this Agreement. The Participant's rights to the Granted PSUs are subject to the restrictions described in this Agreement and the Plan, in addition to such other restrictions, if any, as may be imposed by law. All initially capitalized terms used herein will have the meaning specified in the Plan, unless another meaning is specified in this Agreement.

2. **Vesting**

A. The Participant shall have a non-forfeitable right to a portion of the Award only upon the vesting dates specified on your Fidelity stock plan account, except as otherwise provided herein or determined by the Committee in its sole discretion. No portion of any Award shall become vested on the vesting date unless the Participant is then, and since the Grant Date has continuously been, employed by the Company or any Affiliate. If the Participant ceases to be employed by the Company and its Affiliates for any reason, any then outstanding and unvested portion of the Award shall be automatically and immediately forfeited and terminated, except as otherwise provided in this Agreement and the Plan.

B. The Award will become eligible to vest upon achievement of the Granted PSUs goals ("Performance Goals"), as adopted by the Committee in the first calendar quarter of the year in which the Award is granted and communicated. The calculation of the number of Granted PSUs that will vest is specified in the Long-Term Incentive Program Overview for Executives for the year in which the Award is granted ("LTI Overview"), which is also found on your Fidelity stock plan account. Granted PSUs that become eligible to vest are referred to as the "Eligible PSUs." In the event and to the extent that the Performance Goals are not satisfied, such Granted PSUs shall not become eligible to vest and shall be immediately forfeited. As specified in the Performance Goals, in the event and to the extent that the Performance Goals are exceeded, an additional number of Granted PSUs will become eligible to vest. In no event shall the number of Eligible PSUs exceed 200% of the number of Granted PSUs. All Eligible PSUs shall vest on the later of the third anniversary of the Grant Date or the date of the Committee's determination of the degree to which the Performance Goals have been satisfied (the "Vesting Date").

C. Except as otherwise provided in the Plan, upon termination of the Participant's employment with the Company and its Affiliates for any reason, any portion of the Award that is not then vested will immediately terminate, except as follows:

(i) any portion of the Award held by the Participant immediately prior to the Participant's termination of employment on account of death or Disability will, to the extent not vested previously, become fully vested upon the later of (a) the date of death or Disability of the Participant or (b) the determination of the Eligible PSUs based on the Performance Goals and the Committee's approval, even if such determination occurs following the date of death or Disability of the Participant; and

(ii) any portion of the Award held by the Participant immediately prior to the Participant's Retirement, to the extent not vested previously, will become fully vested upon the later of the date of Retirement or determination of the Eligible PSUs based on the Performance Goals and the

Committee's approval for fifty percent (50%) of the number of Eligible PSUs covered by such unvested portion and for an additional ten percent (10%) of the number of Eligible PSUs covered by such unvested portion for every full year of employment by the Company and its Affiliates beyond ten (10) years, up to the remaining amount of the unvested Eligible PSUs of the Award. For the avoidance of doubt, Retirement means the Participant's leaving the employment of the Company and its Affiliates after reaching age 55 with ten (10) consecutive years of service with the Company or its Affiliates, but not including pursuant to any termination For Cause or any termination for insufficient performance, as determined by the Company.

D. Notwithstanding anything herein to the contrary, any portion of the Award held by a Participant or a Participant's permitted transferee immediately prior to the cessation of the Participant's employment For Cause shall terminate at the commencement of business on the date of such termination.

3. **Delivery of Award**

A. With respect to a Participant who is not eligible for Retirement, within 30 days following the date on which Eligible PSUs becomes vested, with respect to, and in satisfaction of, such vested Eligible PSUs (determined in accordance with Section 2 of this Agreement and Section 10 of the Plan), the Company shall pay to the Participant, subject to applicable withholding as described in Section 7 of this Agreement, one share of common stock of the Company ("Common Stock") in satisfaction of each vested Eligible PSU.

B. With respect to a Participant who is or becomes eligible for Retirement at any time after the Grant Date and on or before the Vesting Date, the Company shall pay to the Participant, subject to applicable withholding as described in Section 7 of this Agreement, one share of Common Stock in satisfaction of each vested Eligible PSU (determined in accordance with Section 2 of this Agreement and Section 10 of the Plan) within 30 days of the earliest of (i) the date the Eligible PSU otherwise would have vested under Section 2.B. of this Agreement, (ii) the date on which the Participant experiences a separation from service (within the meaning of Section 409A), subject to Section 3.C. of this Agreement or (iii) the date on which a Covered Transaction that satisfies the definition of a "change in control event" under Section 409A occurs.

C. If you are a "specified employee" (as defined in Section 409A), you will be paid on the earlier of (i) the date which is six months after you separate from service (within the meaning of Section 409A) or (ii) the date of your death or Disability. The preceding sentence will not apply to any payments that are exempt from or are not subject to the requirements of Section 409A. For the avoidance of doubt, if payments would be made under Section 3.B.(i) or Section 3.B.(iii) before the six month payment date on account of other than your separation from service, such payment will be made under Section 3.B.(i) or Section 3.B.(iii), as applicable.

4. **Cancellation and Rescission of Awards**

The Committee may cancel, rescind, withhold or otherwise limit or restrict the Award prior to payment at any time if the Participant is not in compliance with all applicable provisions of this Agreement and the Plan, or if the Participant engages in any Detrimental Activity.

5. **No Voting, Dividend or Other Rights as a Stockholder**

The Participant shall not have any rights as a stockholder with respect to any shares of Common Stock to be issued under the Award until he or she becomes the holder of such shares. Accordingly, the Award shall not be interpreted to bestow upon the Participant any equity interest or ownership in the Company or any Affiliate prior to the date on which the Company delivers to the Participant shares of Common Stock. Furthermore, the Participant is not entitled to vote any Common Stock or to receive or be credited with any dividends declared and payable on any share of Common Stock underlying the Award prior to the payment date with respect to such share.

6. **Unfunded Status**

The obligations of the Company and its Affiliates hereunder shall be contractual only and all such payments shall be made from the general assets of the Company or its Affiliates. The Participant shall rely solely on the

unsecured promise of the Company and nothing herein shall be construed to give the Participant or any other person or persons any right, title, interest or claim in or to any specific asset, fund, reserve, account or property of any kind whatsoever owned by the Company or any Affiliate.

7. **Withholding**

Awards will be subject to income tax withholding and reporting as required under local law. If statutory withholding of taxes and/or social insurance is required at the time of vesting, the Company will withhold from delivery to the Participant an amount of cash equal in value to the statutory minimum amount required to be withheld. A similar amount of cash will be paid by the Company on behalf of the Participant to the applicable tax authorities. The amount of cash to be withheld will be calculated using the closing sales price of a share of Common Stock on the applicable vesting date. The Cash Value (net of the cash withheld for the payment of withholding taxes, if applicable) will be delivered to the Participant's stock plan account upon vesting in accordance with the Plan. The Company may, in its discretion, permit Participants to make alternative arrangements for payment of any such taxes and/or social insurance.

In certain cases, local law may require that an award be subject to tax earlier than the date of payment. If that occurs, the Company will notify the Participant and will deduct the required tax amount from the Participant's pay in accordance with applicable law.

8. **Provisions of the Plan**

The Award is subject to the provisions of the Plan, which are incorporated herein by reference, and in the event of any inconsistency or conflict between the provisions of this Agreement and the Plan, the provisions of the Plan shall control. A copy of the Plan as in effect on the Grant Date has been made available electronically to the Participant.

9. No Right to Employment

The grant of the Award shall not constitute a contract of employment or confer upon the Participant any right with respect to the continuance of his/her employment by or other service with the Company or any Affiliate, nor shall it or they be construed as affecting the rights of the Company (or any Affiliate) to terminate the service of the Participant at any time or otherwise change the terms of such service, including, without limitation, the right to promote, demote or otherwise re-assign the Participant from one position to another within the Company or any Affiliate.

10. Governing Law

The provisions of the Award and this Agreement shall be governed by and interpreted in accordance with the laws of the State of Delaware.

IN WITNESS WHEREOF, the Company has caused this instrument to be executed by its duly authorized officer.

Biogen Inc.

By: Michel Vounatsos
Chief Executive Officer

Exhibit 10.28

Non-Employee Director Compensation

The following is a summary of the retainers and meeting fees payable to non-employee directors effective July 1, 2017:

Retainers	
Annual Board Retainer	$65,000
Annual Retainers (in addition to Annual Board Retainer):	
Independent Chairman of the Board	$75,000
Audit Committee Chair	$25,000
Compensation and Management Development Committee Chair	$20,000
Corporate Governance Committee Chair	$15,000
Finance Committee Chair	$15,000
Risk Committee Chair	$15,000
Science and Technology Committee Chair	$15,000
Audit Committee Member (other than Chair)	$5,000
Meeting Fees	
Board of Directors Meetings (per meeting day):	
In-person attendance	$2,500
Telephonic attendance	$1,500
Committee Meetings (per meeting attended in person or telephonically)	$1,500
Attendance at Annual Science and Technology Committee Portfolio Review (per day)	$1,500
Special service fee (for each full day of service other than in connection with Board or Committee meetings)	$1,000

November 14, 2017

Jeffrey Capello
[address]
[address]

Dear Jeffrey,

I am pleased to extend you this offer of employment to join Biogen with the job title of EVP and Chief Financial Officer. This position will report to Michel Vounatsos, Chief Executive Officer. Please note that neither this letter nor any other materials constitute a contract of employment with Biogen. Your employment at Biogen is employment at-will. This means that just as you are free to leave your employment at any time, with or without cause or notice, Biogen also has the same right to terminate your employment at any time, with or without cause or notice. The specific terms of our offer are listed below; please take the time to review the offer, electronically sign and submit by November 18, 2017.

The position will be based at our Cambridge, MA facility.

Salary: This is a full-time, exempt position and your starting annual salary will be $750,000.00, which will be paid biweekly in accordance with our standard payroll policies.

Sign-On Bonus: Upon employment, you will receive $520,000.00 as a one-time cash bonus. The bonus will be paid to you within two pay periods after your start date provided that you sign the enclosed Cash Sign-On Bonus Agreement, which describes the terms and conditions of the cash sign-on bonus.

Annual Bonus Plan: Beginning in 2018,you will be eligible to participate in the Biogen Annual Bonus Plan, with a target bonus opportunity of 70% of your annual base salary. Eligibility details and other terms of the Plan are included in the Annual Bonus Plan document, which will be made available upon your employment with the Company.

Long-Term Incentive (LTI) Plan: You will be granted Performance Stock Units (PSU) in connection with the commencement of your employment. The approximate grant date value of your PSU award will be $1,500,000.00. The number of shares granted to you will be calculated by dividing the grant date value by the closing price of Biogen stock (NASDAQ) on the grant date, with the resulting number of shares rounded to the nearest five shares. You will also be granted Market Stock Units (MSU) in connection with the commencement of your employment. The approximate grant date value of your MSU award will be $1,500,000.00. The number of shares granted to you will be calculated by dividing the grant date value by the closing price of Biogen stock (NASDAQ) on the grant date, with the resulting number of shares rounded to the nearest five shares. Your PSU and MSU awards will be granted on the first trading day of the month following your start date. Your PSU award will be subject to three-year cliff vesting and your MSU award will vest ratably over three years beginning on the first anniversary of the grant date. Your grant amount has been determined based upon the start date listed in this offer letter. If your start date is delayed, the amount of the grant may decrease.

The actual terms of your PSU and MSU awards will be communicated to you following the grant date. Your grants will be awarded under the Biogen Inc. 2017 Omnibus Equity Plan (the "2017 Plan"). You are considered a "designated employee," as defined in the Plan. The Plan and Prospectus will be available on HRConnect: [website]. Please read these documents for information about your Long-term Incentive grants.

Beginning in 2019, we expect that you will be eligible to participate in the Biogen Annual Long Term Incentive (LTI) program. Approved awards would be made under the 2017 Plan. Actual LTI award values and details, including, amounts, delivery vehicles and payout percentages and metrics will be determined by the Compensation and Management Development Committee of the Board of Directors (CMDC) in its sole discretion based upon performance, future contribution expectations and other considerations. The first time you will be eligible for an annual grant will be February 2019.

Employee Benefits: Biogen offers a robust and highly competitive employee benefits program. As an employee, you will be able to choose from a menu of options through our flexible benefits program. These benefits include a 401(k) savings plan; group health care, including medical, dental, prescription drug and vision coverage; life, dependent life and disability insurance; as well as flexible spending accounts for eligible medical and dependent care expenses.

You are also entitled to up to 20 vacation days (160 hours) per year (pro-rated if you work part time). Additional benefit offerings include an Employee Stock Purchase Plan (ESPP) and work/life benefits such as a concierge service and access to subsidized back-up dependent care. Please visit Biogen's Benefits website using the below link and login information to familiarize yourself with Biogen's complete benefit plan offerings.

URL: [website]
Username: [username]
Password: [password]

Additional Executive Benefits

Supplemental Savings Plan: You will be entitled to participate in Biogen's Supplemental Savings Plan (SSP). This plan allows you to make pre-tax deferrals of up to 80% of your base salary and up to 100% of your Annual Bonus payment and certain other eligible incentive payments. Your contributions to this plan may be limited by your contributions towards other plans (e.g., 401(k), ESPP, medical, etc.). You will be provided with SSP enrollment information upon your employment with the Company.

Life Insurance: You will be provided life insurance coverage equal to three times your annual base salary, subject to meeting the medical standards stated in the group term life insurance policy for U.S. employees. Biogen pays the premium for this insurance. The IRS requires employers to impute the value of company-paid life insurance for coverage over $50,000. This imputed income will be displayed on your pay stub.

Severance: You will be entitled to severance benefits in accordance with the attached executive severance document, as it may be amended in the future from time to time, and should refer to such document for details regarding terms, conditions, eligibility and potential tax implications.

Tax & Financial Planning and Executive Physicals: You are eligible for annual reimbursement of expenses for qualified services such as federal and state income tax planning and/or preparation, financial and estate planning services, and the purchase of tax and/or financial planning tools. Additionally, the Company will reimburse you for the expenses of an annual comprehensive physical exam when coordinated by the Executive Health Services team at Mass. General Hospital (MGH).

The combined annual reimbursement you are eligible to receive is $7,500 per calendar year (January 1 - December 31), subject to the guidelines of the Tax & Financial Planning and Executive Physical Reimbursement Program. The details of these benefits are available upon your employment with the Company.

Stock Trading Plan: Upon employment with the Company, you will become subject to Biogen's Global Insider Trading Policy, a copy of which will be provided to you. The Biogen Global Insider Trading Policy sets forth guidelines designed to promote compliance with applicable federal and state securities laws that prohibit persons who are aware of material nonpublic information about the company from trading in securities of the company or providing material nonpublic information to other persons who may trade on the basis of that information. Upon your employment, you will be assigned, based on your job, to a specific trading group that will determine your obligations and restrictions under the policy, and you will be required to complete training on the policy.

Share Ownership Requirement: A key objective of our long-term incentive plans is to ensure strong alignment between the interests of our senior executives and those of our stockholders. It is expected that through our annual long-term incentive grants, you will accumulate and retain Biogen shares in an amount equivalent to 3x salary through the first 5 years of employment.

You are required to satisfy the following contingencies prior to employment at Biogen.

- **Pre-employment screening:** Employment at Biogen is contingent upon your successful completion and passing of both a background check and drug screen. Biogen's background check includes verification of employment history, educational and professional licenses, degrees and/or credentials, a criminal records check, a Social Security Number search and verification of any other professional qualifications that your position responsibilities at Biogen may warrant. Completion of your online Application for Employment authorizes Biogen to conduct these background checks. If you have any questions about the background check, please contact HRConnect@biogen.com.

- **Authorization to Work in the United States:** Please note that Biogen is an E-Verify employer. The Federal government requires you to provide proper identification verifying your eligibility to work in the United States.

  If you will be working at one of our office locations: Please complete Section 1 of the Employment Eligibility Verification Form 1-9, electronically as specified in your emails from Guardian. ***On your first day of employment***, please bring original and unexpired documents and a scanned copy of your documents to complete the 1-9 process. A list of acceptable documents can be found on the last page of the Form 1-9 packet.

  If you are a fleld employee: You will receive a separate email from HR Operations providing you with instructions to complete your 1-9 form. Please complete per instructions within 3 days of receipt.

Signed Employee Proprietary Information and Inventions and Non-Compete Agreement: Prior to and as a condition of employment with Biogen you will be required to sign Biogen's Proprietary Information and Inventions and Non-Compete Agreement. This is required to, among other things, protect Biogen's substantial investment in creating and maintaining its confidential and proprietary information, and to maintain goodwill with our customers, vendors and other business partners. You will receive an email shortly that contains a link to this agreement for your review and electronic signature.

Jeffrey, we are excited at the prospect of your joining Biogen. To confirm your acceptance of this offer of employment, please electronically sign this letter by November 18, 2017. You will be provided with a signed copy electronically for your personal records. We would anticipate your first day of employment to be December 11, 2017. If you have any questions, please feel free to contact me.

Best Regards,

/s/ Ginger Gregory

Ginger Gregory
EVP, Human Resources

Cc: Michel Vounatsos
31947BR

I accept this offer of employment and acknowledge the contingencies of employment described above, including the at-will nature of my employment.

ACCEPTED:

/s/ Jeffrey Capello

Signature

BIOGEN CASH SIGN-ON BONUS AGREEMENT

I have accepted a position of employment with Biogen that provides for payment of a cash sign on bonus of $520,000.00 to me following commencement of employment. I understand that the full benefit of this cash sign-on bonus is conditioned upon my remaining an employee of Biogen for at least 36 months. I hereby accept Biogen's offer of a cash sign-on bonus according to the following terms:

The payment of the cash sign-on bonus by Biogen is taxable income to me and will be taxed at the time of payment.

I acknowledge and agree that if, within 36 months of the effective date of my employment (start date), I voluntarily terminate my employment or Biogen terminates my employment For Cause, as defined in the Biogen Inc. 2017 Omnibus Equity Plan, or for misconduct or poor performance, as determined in good faith by the Company, I will not have earned the cash sign-on bonus provided to me under this Agreement and I will repay such bonus according to the following schedule:

(i) If my employment terminates on or before 12 months from my start date, the full amount of the cash sign-on bonus, net of the applicable proportion of tax withholdings;
(ii) If my employment terminates after 12 months and on or before 24 months from my start date, 70% of the amount of the cash sign-on bonus, net of the applicable proportion of tax withholdings; or
(iii) If my employment terminates after 24 months and on or before 36 months from my start date, 35% of the amount of the cash sign-on bonus, net of the applicable proportion of tax withholdings.

I shall pay to Biogen all such repayable amounts within thirty (30) days of the effective date of my employment termination or by the end of the year in which my employment terminates, whichever comes first. I voluntarily authorize Biogen to deduct, withhold and/or retain all or any portion of the amount which I may be required to refund or repay to Biogen hereunder from any wages, salary, vacation pay, severance pay or other pay which may be due and owing to me upon termination of employment, to the extent permitted under applicable law. I shall remain liable to Biogen for any amounts in excess of the sums so deducted, withheld and/or retained by Biogen.

Except as stated above, I shall have no liability or responsibility to refund or repay to Biogen any amounts paid by Biogen to me in connection with this sign-on bonus.

Nothing in this Agreement shall alter the at-will employment relationship between Biogen and me (e.g., Biogen and I can end the employment relationship at *any* time with or without cause). Therefore, I understand that nothing in this Agreement guarantees that the Company will employ me for any specific period of time.

My signature below acknowledges that I have read and understand this Agreement and agree to be bound by its terms.

/s/ Jeffrey Capello	Jeffrey Capello	11/18/2017
Employee Signature	Employee Name (Please Print)	Date

biogen idec®

February 25, 2012

Greg Covino
[address]
[address]

Dear Greg:

I am pleased to extend you this offer of employment to join Biogen Idec as Vice President of Finance. You will be appointed as the Company's Chief Accounting Officer as of the day following the filing of the Company's Form 10-Q for Q1 of 2012. This position will report to Paul Clancy, Executive Vice President, and Chief Financial Officer. The position will be based at our Weston, Massachusetts facility.

Base Salary: Your starting bi-weekly salary will be $11,923.08, which is equivalent to an annual salary of $310,000.08.

One-time Cash Sign-On Bonus: Upon employment, you will receive $35,000.00 as a one-time cash bonus. The bonus will be paid to you within two pay periods after your start date provided that you sign the enclosed Cash Sign-On Bonus Agreement, which describes the terms and conditions of the cash sign-on bonus.

Annual Bonus Plan: You will be eligible to participate in the Biogen Idec Annual Bonus Plan, with a target bonus opportunity of 35% of your annualized base salary. Based upon your start date, your target bonus amount may be pro-rated. Eligibility details and other terms of the Plan are included in the current years Plan document which will be made available upon your employment with the Company.

Long-Term Incentive: You will be granted Cash-Settled Performance Shares (CSPS) in connection with the commencement of your employment. The approximate grant date value of your CSPS award will be $137,500. You will also be granted Market Stock Units (MSU) in connection with the commencement of your employment. The approximate grant date value of your MSU award will be $137,500. Your CSPS and MSU awards will be granted on the first trading day of the month following your start date.

The actual terms of your CSPS and MSU awards will be communicated to you following the grant date. Your grants will be awarded under the Biogen Idec Inc. 2008 Omnibus Equity Plan. You are considered a "designated employee," as defined in the 2008 Omnibus Equity Plan. Our 2008 Omnibus Equity Plan and Prospectus are available to you on Biogen Idec's benefits website at [website]. Please read these documents for information about your Long-term Incentive grants.

Stock Trading Plan: You have been designated as a member of Trading Group A pursuant to Biogen Idec's Global Insider Trading Policy. As a member of Trading Group A, you are required to enter into a 10b5-1 trading plan for all sales of Biogen Idec stock and you may only purchase Biogen Idec stock on the open market during Biogen Idec's quarterly open trading window periods, as described and in accordance with the requirements outlined in the Global Insider Trading Policy, More information about the Biogen Idec Global Insider Trading Policy, insider trading restrictions, and 10b5-1 trading plans will be made available upon your employment with the Company.

Employee Benefits and Total Rewards: Biogen Idec offers a robust and highly competitive employee benefits program. As an employee, you will be able to choose from a menu of options through our flexible Total Rewards program. These benefits include a 401(k) savings plan; group health care, including medical, dental, prescription drug and vision coverage; life, dependent life and disability insurance; as well as flexible spending accounts for eligible medical and dependent care expenses. You are also entitled to 20 vacation days per year, accrued on a per pay period basis. Additional benefit offerings include an Employee Stock Purchase Plan (ESPP) and work/life benefits such as a concierge service and access to subsidized back-up dependent care. Please visit Biogen Idec's Total Rewards website at [website] (user ID = [user ID], password = [password]) to familiarize yourself with Biogen Idec's complete benefit plan offerings.

Additional Executive Benefits

Supplemental Savings Plan: You will be entitled to participate in Biogen Idec's Supplemental Savings Plan (SSP). This plan allows you to make pre-tax deferrals of up to 80% of your base salary and up to 100% of your Annual Bonus payment and certain other eligible incentive payments. Your contributions to this plan may be limited by your contributions towards other plans (e.g., 401(k), ESPP, medical, etc.). You will be provided with SSP enrollment information upon your employment with the Company.

Life Insurance: You will be provided life insurance coverage equal to three times your annual base salary, subject to meeting the medical standards stated in the group term life insurance policy for U.S. employees. Biogen Idec pays the premium for this insurance. The IRS requires employers to impute the value of company-paid life insurance for coverage over $50,000. This imputed income will be displayed on your pay stub.

Severance: Under certain circumstances, you will be entitled to receive severance benefits. Your severance benefits are explained in detail in the attached executive severance document. If your total severance benefits will trigger 280G excise taxes, you may elect to have Biogen Idec reduce the amount of your total payment to reduce your total payments to an amount below the 280G trigger. To facilitate your decision, Biogen Idec will estimate whether any 280G excise tax will be owed on severance and the amount of that excise tax.

Tax Preparation, Financial and Estate Planning: You are entitled to reimbursement of up to $4,500 per calendar year (January 1 - December 31) for expenses incurred due to tax preparation, financial and/or estate planning services, as well as the purchase of tax preparation and/or financial planning software. You will be provided with details of this benefit upon your employment with the Company. Reimbursement must be made no later than the end of the calendar year following the year in which the expense is incurred, and must be requested within the deadlines and processes established in the policy.

You are required to satisfy the following contingencies prior to employment at Biogen Idec.

- **Drug Screen:** A completed drug-screening test is required within one (1) week of accepting this offer of employment. Please see the enclosed information regarding Biogen Idec's Pre-Employment Drug Testing program. Your employment is subject to Biogen Idec receiving negative results (i.e., no drugs found) from your drug test.

- **Background Check:** Your employment is subject to satisfactory completion of Biogen Idec's background check, which includes verification of employment history, educational and professional licenses, degrees and/or credentials, a criminal records check, a Social Security Number search and verification of any other professional qualifications that your position responsibilities at Biogen Idec may warrant. Completion of your online Application for Employment authorizes Biogen Idec to conduct these background checks. If you have any questions about the background check, please contact your Biogen idec recruiter.

- **New Employee Forms:** Upon your acceptance of Biogen Idec's offer of employment, please visit our Company website, www.biogenidec.com. Under 'Careers,' click 'New Employees.' This site contains the forms you must complete in order to add you to Biogen Idec's Payroll and Human Resources systems. Completion of these forms is required within 48 hours of accepting this offer of employment at Biogen idec. Your username is [username] and your password is [password].

- **Authorization to Work in the United States:** The Federal government requires you to provide proper identification verifying your eligibility to work in the United States. Please bring documents necessary to complete the Employment Eligibility Verification Form 1-9 on your first day of employment.

- **Signed Proprietary Agreement:** In order to protect Biogen Idec's substantial investment in creating and maintaining its confidential and proprietary information, and to maintain goodwill with our customers, vendors and other business partners, you will be required to sign our 'Employee Proprietary Information and Inventions and Dispute Resolution Agreement' as a condition of employment. A copy of the Agreement is enclosed with this letter for your reference. Please sign and return this Agreement with your signed acceptance of our offer.

Your employment at Biogen Idec is employment at-will. This means that just as you are free to leave your employment at any time, with or without cause or notice, Biogen Idec also has the same right to terminate your employment at any time, with or without cause or notice.

To confirm your acceptance of this offer of employment, please sign and return this letter and keep the other copy for your records. Review and complete the enclosed New Employee Checklist with actions required in order to begin your acceptance process. Your new employee paperwork should be completed on line within 48 hours of accepting this offer and the drug screen should be completed within one (1) week of accepting this offer of employment.

Please work with your supervisor or Biogen Idec recruiter to establish a start date. Your start date must be a Monday coinciding with Biogen Idec's New Employee Orientation schedule which is included in your offer package details. (unless it is a holiday, in which case your start date will be on the Tuesday of that week). The New Employee Checklist provides an overview of all required steps and instructions to prepare for your first day of employment.

We are very excited about the prospect of you joining Biogen Idec. We encourage you to accept this offer of employment, noting your intended start date, by February 29, 2012.

Best regards,

/s/ Luci Celona

Luci Celona
Vice President, Human Resources

cc: Paul Clancy

I accept this offer of employment and acknowledge the contingencies of employment described above, including the at-will nature of my employment.

ACCEPTED:

/s/ Greg Covino	2/27/12	4/2/12
Greg Covino	Signature Date	Start Date

REVISED
April 18, 2016

Michael Ehlers
[address]
[address]

Dear Mike,

I am pleased to extend you this offer of employment to join Biogen with the job title of Executive Vice President, Research and Development. This position will report to George Scangos, Chief Executive Officer. Please note that neither this letter nor any other materials constitute a contract of employment with Biogen. Your employment at Biogen is employment at-will. This means that just as you are free to leave your employment at any time, with or without cause or notice, Biogen also has the same right to terminate your employment at any time, with or without cause or notice. The specific terms of our offer are listed below; please take the time to review the offer, sign and return to me by April 25, 2016.

The position will be based at our Cambridge, MA facility.

Salary: This is a full-time, exempt position and your starting bi-weekly salary will be $29,807.70, which is equivalent to an annual salary of $775,000.20, and which will be paid in accordance with our standard payroll policies.

Sign-On Bonus: Upon employment, you will receive $300,000.00 as a one-time cash bonus. The bonus will be paid to you within two pay periods after your start date provided that you sign the enclosed Cash Sign-On Bonus Agreement, which describes the terms and conditions of the cash sign on bonus.

Annual Bonus Plan: You will be eligible to participate in the Biogen Annual Bonus Plan, with a target bonus opportunity of 70% of your annual base salary. Based upon your start date, your target bonus amount may be pro-rated. Eligibility details and other terms of the Plan are included in the current year's Plan document, which will be made available upon your employment with the Company.

Long-Term Incentive Plan: You will be granted Cash-Settled Performance Units (CSPU) in connection with the commencement of your employment. The approximate grant date value of your CSPU award will be $1,250,000.00. The number of CSPU shares granted to you will be calculated by dividing the approximate grant date value by the closing price of Biogen stock (NASDAQ) on the date of grant, with the resulting number of shares rounded to the nearest five shares. You will also be granted Market Stock Units (MSU) in connection with the commencement of your employment. The approximate grant date value of your MSU award will be $1.250,000.00. The number of MSU shares granted to you will be calculated by dividing the approximate grant date value by the closing price of Biogen stock (NASDAQ) and the MSU accounting valuation factor effective at the time of grant, with the resulting number of shares rounded to the nearest five shares. Your CSPU and MSU awards will be granted on the first trading day of the month following your start dale.

The actual terms of your CSPU and MSU awards will be communicated to you following the grant date. Your grants will be awarded under the Biogen Inc. Amended and Restated 2008 Omnibus Equity Plan (the "2008 Plan"). You are considered a "designated employee," as defined in the Plan. The Plan and Prospectus are available to you on Biogen's benefits website at [website]. Please read these documents for information about your LTI grants.

Each year, typically in February, you will be eligible to receive an annual Long Term Incentive (LTI) award which will be based on the planning range in effect at the time of grant. The current planning reference point is $2,150,000.00. Actual LTI award amounts and delivery vehicles will be determined by the Compensation and Management Development Committee of the Board of Directors (CMDC) based upon performance, contribution expectations and other considerations at the discretion of the CMDC.

Employee Benefits: Biogen offer a robust and highly competitive employee benefits program. As an employee, you will be able to chose from a menu of options through our flexible benefits program. These benefits include a 401(k) savings plan; group health care, including medical, dental, prescription drug and vision coverage; life dependent life and disability insurance; as well as flexible spending accounts for eligible medical and dependent care expenses.

You are also entitled to up to 20 vacation days (160 hours) per year (pro-rated if you work part time). Additional benefit offerings include an Employee Stock Purchase Plan (ESPP) and work/life benefits such as a concierge service and access to subsidized back-up dependent care. Please visit Biogen's benefits website at [website], (user ID = [user ID], password= [password]) to familiarize yourself with Biogen's complete benefit plan offerings.

Additional Executive Benefits

Supplemental Savings Plan: You will be entitled to participate In Biogen's Supplemental Savings Plan (SSP). This plan allows you to make pre-tax deferrals of up to 80% of your base salary and up to 100% of your Annual Bonus payment and certain other eligible incentive payments. Your contributions to this plan may be limited by your contributions towards other plans (e.g., 401(k), ESPP, medical, etc.) You will be provided with SSP enrollment information upon your employment with the Company.

Life Insurance: You will be provided life insurance coverage equal to three times your annual base salary, subject to meeting the medical standards stated in the group term life insurance policy for U.S. employees. Biogen pays the premium for this insurance. The IRS requires employers to impute the value of company-paid life insurance for coverage over $50,000. This imputed income will be displayed on your pay stub.

Severance: You will be entitled to severance benefits In accordance with the attached Severance Plan for U.S. Executive Vice Presidents effective January 1, 2014 (the "EVP Severance Plan"), and should refer to the document for details regarding terms, conditions, eligibility and potential tax implications.

If there is a CEO Employment Event (defined below) at any time within two (2) years after your start date with Biogen, then you shall be entitled to receive the severance benefits under the EVP Severance Plan and accelerated vesting of your unvested Long Term Incentive Awards under the 2008 Plan as if a Corporate Change in Control and Involuntary Employment Action had occurred under both the EVP Severance Plan and the 2008 Plan. A "CEO Employment Event" shall mean the involuntary termination of your employment, other than for Cause, or the termination by you of your employment with Biogen, upon the occurrence of the following: a new Chief Executive Officer (CEO) of the Company is appointed and as a result there is either (1) a material and substantial change in the financial spend committed to the Research & Development Organization or (2) a material alteration and diminution in your authority, duties or responsibilities (other than a mere change in title) as they existed immediately prior to the appointment of the new CEO; provided, however, that you must notify the Chief Legal Officer or the Chief Human Resources Officer of the Company in writing of the basis for your involuntary or voluntary termination within 45 days of the occurrence of the circumstance and the Company does not cure such circumstance within 30 days thereafter.

Tax & Financial Planning and Executive Physicals: You are eligible for annual reimbursement of expenses for qualified services such as federal and state income tax planning and/or preparation, financial and estate planning services, and the purchase of tax and/or financial planning tools. Additionally, the Company will reimburse you for the expenses of an annual comprehensive physical exam when coordinated by the Executive Health Services team at Mass. General Hospital (MGH). The combined annual reimbursement you are eligible to receive is $7,500 per calendar year (January 1 - December 31), subject to the guidelines of the Tax & Financial Planning and Executive Physical Reimbursement Program. The details of these benefits are available upon your employment with the Company.

Stock Trading Plan: Upon employment with the Company, you will become subject to Biogen's Global Insider Trading Policy, a copy of which will be provided to you. The Biogen Global Insider Trading Policy sets forth guidelines designed to promote compliance with applicable federal and state securities laws that prohibit persons who are aware of material nonpublic information about the company from trading in securities of the company or providing material nonpublic information to other persons who may trade on the basis of that information. Upon your employment, you will be assigned, based on your job, to a specific trading group that will determine your obligations and restrictions under the policy, and you will be required to complete training on the policy.

Share Ownership Requirement: A key objective of our long-term incentive plans is to ensure strong alignment between the interests of our senior executives and those of our stockholders. It is expected that through our annual long-term incentive grants, you will accumulate and retain Biogen shares in an amount equivalent to 3x salary through the first 5 years of employment.

You are required to satisfy the following contingencies prior to employment at Biogen.

- **Pre-employment screening**: Employment at Biogen is contingent upon your successful completion and passing of both a background check and drug screen. Biogen's background check includes verification of employment history, educational and professional licenses, degrees and/or credentials, a criminal records check, a Social Security Number search and verification of any other professional qualifications that your position responsibilities at Biogen may warrant. Completion of your online Application for Employment authorizes Biogen to conduct these background checks. If you have any questions about the background check, please contact your Biogen recruiter.

- **New Employee Forms**: Upon receiving your signed offer letter and new hire paperwork, you will receive an email containing a link to a new hire form. Please complete this form as soon as possible upon receipt. This form will allow us to begin creating internal resources for you prior to your start date.

- **Authorization to Work in the United States:** Please note that Biogen is an E-Verify employer. The Federal government requires you to provide proper identification verifying your eligibility to work in the United States.

  If you will be working at one of our office locations: Please complete Section 1 of the enclosed Employment Eligibility Verification Form 1-9. **On your first day of employment**, please bring with you the completed Form 1-9, your original and unexpired documents and a scanned copy of your documents. A list of acceptable documents can be found on the last page of the Form 1-9 packet.

If you are a field employee: enclosed you will find notary instructions and a Form 1-9 packet. You are required to complete the entire Form 1-9 of the 1-9 packet within 3 days of your start at a Notary Public and mail your original as instructed in the packet.

- **Signed Proprietary Agreement:** In order to protect Biogen's substantial investment in creating and maintaining its confidential and proprietary information, and to maintain goodwill with our customers, vendors and other business partners, you will be required to sign our 'Employee Proprietary Information and Inventions and Dispute Resolution Agreement' as a condition of employment. A copy of the Agreement is enclosed with this letter for your reference. Please sign and return this Agreement with your signed acceptance of our offer.

Mike, we are excited at the prospect of your joining Biogen. To confirm your acceptance of this offer of employment, please sign and return this letter by April 25, 2016 and keep the other copy for your records. Review and complete the enclosed New Employee Checklist with actions required in order to begin your acceptance process. We would anticipate your first day of employment to be on or prior to May 16, 2016. If you have any questions, please feel free to contact me.

Best Regards,

/s/ Matt McSherry

Matt McSherry
Senior Director, Talent Acquisition

Cc: George Scangos
27669BR

I accept this offer of employment and acknowledge the contingencies of employment described above, including the at-will nature of my employment.

ACCEPTED:

/s/ Michael Ehlers	Michael Ehlers	4/25/16
Signature	Name (Print)	Signature Date

BIOGEN CASH SIGN-ON BONUS AGREEMENT

I have accepted a position of employment with Biogen that provides for payment of a cash sign-on bonus of $300,000.00 to me following commencement of employment. I understand that the full benefit of this cash sign-on bonus is conditioned upon my remaining an employee of Biogen for at least 24 months. I hereby accept Biogen's offer of a cash sign-on bonus according to the following terms:

The payment of the cash sign-on bonus by Biogen is taxable income to me and will be taxed at the time of payment.

I acknowledge and agree that if, within 24 months of the effective date of my employment (start date), I voluntarily terminate my employment or Biogen terminates my employment For Cause, as defined in the Biogen Inc. 2008 Omnibus Equity Plan, or for misconduct or poor performance, as determined in good faith by the Company, I will not have earned the cash sign-on bonus provided to me under this Agreement and I will repay such bonus according to the following schedule:

(i) If my employment terminates on or before 12 months from my start date, the full amount of the cash sign-on bonus, net of the applicable proportion of tax withholdings;

(ii) If my employment terminates after 12 months and on or before 24 months from my start date, 50% of the amount of the cash sign-on bonus, net of the applicable proportion of tax withholdings; or

I shall pay to Biogen all such repayable amounts within thirty (30) days of the effective date of my employment termination or by the end of the year in which my employmen terminates, whichever comes first. I voluntarily authorize Biogen to deduct, withhold and/or retain all or any portion of the amount which I may be required to refund or repay to Biogen hereunder from any wages, salary, vacation pay, severance pay or other pay which may be due and owing to me upon termination of employment, to the extent permitted under applicable law. I shall remain liable to Biogen for any amounts in excess of the sums so deducted, withheld and/or retained by Biogen.

Except as stated above. I shall have no liability or responsibility to refund or repay to Biogen any amounts paid by Biogen to me in connection with this sign-on bonus.

Nothing in this Agreement shall alter the at-will employment relationship between Biogen and me (e.g., Biogen and I can end the employment relationship at any time with or without cause). Therefore, I understand that nothing in this Agreement guarantees that the Company will employ me for any specific period of time.

My signature below acknowledges that I have read and understand this Agreement and agree to be bound by its terms.

/s/ Michael Ehlers	Michael Ehlers	4/25/16
Employee Signature	Employee Name (Please Print)	Date

April 25, 2016

Mike Ehlers
[address]
[address]

Dear Mike:

This letter hereby confirms Biogen's agreement that in the event it is determined that Biogen is a company that is in competition with Pfizer and as a result the Pfizer Compensation Committee, pursuant to its rights under the Executive Long-Term Incentive Program Points of Interest (Part 6, Section 36), terminates all or a portion of your outstanding and vested TSRUs, PPSs and RSUs that have not yet been paid or settled in Pfizer common stock (the "Terminated Awards") and/or requires you to return to Pfizer all or a portion of any shares, cash paid to or gain realized by you with respect to the grant of TSRUs, PPSs or RSUs for the one year period described in Part 6, Section 36, the Company will pay you the value of the Terminated Awards and reimburse you for the value of the shares or cash you are required to return and have returned to Pfizer. Biogen and you acknowledge that the value of this reimbursement obligation is expected to be no more than $1,800,000 with some consideration for reasonable market fluctuations The foregoing obligation of Biogen is conditioned upon your (1) promptly informing the EVP, HR and the Biogen VP, People Rewards of any contact or notice you receive from Pfizer regarding its rights under Part 6, Section 36 (2) first questioning Pfizer on the applicability of Part 6, Section 36, including requesting Pfizer to provide written explanation of how the provision has been breached, and (3) not agreeing or conceding with Pfizer as to the applicability of Part 6, Section 36 to Biogen's employment of you without prior consultation with and written approval of Biogen, which approval will not be unreasonably delayed or withheld. Further this agreement is not intended to and does not imply that Biogen agrees or believes that Part 6, Section 36 is enforceable or reasonable or that Biogen is a company or employer in competition with Pfizer for any purpose. The foregoing does not affect the at-will status of your employment; provided, that, if your employment is terminated as a result of your death or Disability, or by Biogen without Cause or following a CEO Employment Event, Biogen shall continue to owe you any amounts due under this letter. Any such payments shall be made by Biogen promptly after any Pfizer awards become Terminated Awards and/or any shares or cash are returned to Pfizer by you. If, after consultation with Biogen, it is agreed that you should dispute a determination by Pfizer as to the applicability of Part 6, Section 36, then Biogen shall pay for or reimburse you for reasonable attorneys' fees and other reasonable legal costs incurred to dispute such determination. Notwithstanding anything in the immediately preceding sentence to the contrary, Biogen's obligations to bear the fees and costs of disputing the determination depend upon: (a) your providing written notice to Biogen within 30 days of Pfizer informing you of an adverse determination pursuant to Part 6, Section 36; (b) Biogen's right to select and retain appropriate counsel, following consultation with you; (c) Biogen retaining the right to control the defense/prosecution of any legal action and to approve any compromise, settlement or resolution of the determination; and (d) such reasonable cooperation by you in any legal proceedings to dispute the determination.

Please acknowledge your agreement to the foregoing by signing and dating below.

Best Regards,

Ken DIPietro
EVP, Human Resources

Acknowledged and Agreed:

/s/ Michael Ehlers	Michael Ehlers	4/25/16
Signature	Name (Print)	Signature Date

BIOGEN INC.

The following is a list of subsidiaries of Biogen Inc. as of December 31, 2017, omitting some subsidiaries which, considered in the aggregate, would not constitute a significant subsidiary.

SUBSIDIARY	STATE OR OTHER JURISDICTION OF INCORPORATION OR ORGANIZATION
Biogen Foundation Inc.	Massachusetts
Biogen MA Inc.	Massachusetts
Biogen Realty Corporation	Massachusetts
Biogen Realty Limited Partnership	Massachusetts
Biogen U.S. Corporation	Massachusetts
Biogen U.S. Limited Partnership	Massachusetts
Biogen (RTP) Realty LLC	Delaware
Biogen Chesapeake LLC	Delaware
Biogen Holding I LLC	Delaware
Biogen Holding II LLC	Delaware
Biogen Manufacturing Holding LLC	Delaware
Biogen New Ventures Inc.	Delaware
Biogen SRO Inc.	Delaware
Biogen Therapeutics Inc.	Delaware
Biogen U.S. Pacific LLC	Delaware
Biogen U.S. West Corporation	Delaware
Conforma Therapeutics Corporation	Delaware
Stromedix, Inc.	Delaware
Biogen (Argentina) SRL	Argentina
Biogen Australia PTY Ltd	Australia
Biogen Austria GmbH	Austria
Biogen Belgium N.V./S.A.	Belgium
Biogen International Holding Limited	Bermuda
Biogen Brasil Produtos Farmaceuticos LTDA	Brazil
Biogen Canada Inc.	Canada
Biogen Chile Spa	Chile
Biogen Idec Pharmaceutical Consultancy (Shanghai) Co., Ltd.	China
Biogen Biotechnology (Shanghai) Co., Ltd.	China
Biogen (Czech Republic) s.r.o.	Czech Republic
Biogen (Denmark) A/S	Denmark
Biogen (Denmark) Manufacturing ApS	Denmark
Biogen Holding APS	Denmark
Biogen (Denmark) New Manufacturing ApS	Denmark
Biogen Finland OY	Finland
Biogen France S.A.S.	France
Biogen GmbH	Germany
Biogen Idec (Hong Kong) Limited	Hong Kong
Biogen Hungary KFT	Hungary
Biogen Idec Biotech India Pvt. Ltd.	India
Biogen Idec (Ireland) Ltd.	Ireland
Biogen Italia SRL	Italy

Biogen Japan Ltd.	Japan
Biogen Korea	Korea
Biogen Luxembourg Holding SARL	Luxembourg
Biogen Mexico S. DE R.L. DE C.V.	Mexico
Biogen NZ Biopharma Ltd.	New Zealand
Biogen Norway AS	Norway
Biogen Poland Sp. z.o.o	Poland
Biogen Portugal Sociedade Farmaceutica, Unipessoal, Lda.	Portugal
Biogen (Singapore) Pte Ltd	Singapore
Biogen Slovakia s.r.o.	Slovak Republic
Biogen Pharma, farmacevtska in biotehnoloska druzba d.o.o	Slovenia
Biogen Spain, S.L.	Spain
Fundacion Biogen	Spain
Biogen Sweden AB	Sweden
Biogen International GmbH	Switzerland
Biogen International Neuroscience GmbH	Switzerland
Biogen Management Services GmbH	Switzerland
Biogen Swiss Investments GmbH	Switzerland
Biogen Swiss Manufacturing GmbH	Switzerland
Biogen Switzerland AG	Switzerland
Biogen Switzerland Holdings GmbH	Switzerland
Eidetica Biopharma GmbH	Switzerland
Biogen Taiwan Limited	Taiwan
Biogen B.V.	The Netherlands
Biogen Netherlands B.V.	The Netherlands
Biogen Idec Ltd.	United Kingdom
Biogen Idec Research Ltd.	United Kingdom
Convergence Pharmaceuticals Ltd.	United Kingdom
Convergence Pharmaceuticals Holdings Ltd.	United Kingdom
Old Convergence Pharmaceuticals Ltd.	United Kingdom
Panion Ltd.	United Kingdom
Silver Acquisition Co. Ltd.	United Kingdom
Biogen Idec Uruguay SA	Uruguay

Exhibit 23

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statement on Form S-3 (No. 333-206799) and Registration Statements on Form S-8 (Nos. 333-218799, 333-205254, 333-110432, 333-110433, 333-128339, 333-152456, 333-140817 and 333-170133) of Biogen Inc. of our report dated February 1, 2018 relating to the financial statements and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP
Boston, Massachusetts
February 1, 2018

Exhibit 31.1

CERTIFICATION OF CHIEF EXECUTIVE OFFICER PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Michel Vounatsos, certify that:

1. I have reviewed this annual report of Biogen Inc.;

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

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

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

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

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

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

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

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

Date: February 1, 2018

/s/ Michel Vounatsos

Michel Vounatsos
Chief Executive Officer

Exhibit 31.2

CERTIFICATION OF CHIEF FINANCIAL OFFICER PURSUANT TO SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, Jeffrey Capello, certify that:

1. I have reviewed this annual report of Biogen Inc.;

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

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

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

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

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

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

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

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

Date: February 1, 2018

/s/ Jeffrey Capello

Jeffrey Capello

Executive Vice President, Finance
Chief Financial Officer (principal financial officer)

Exhibit 32.1

CERTIFICATION
PURSUANT TO SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

Pursuant to section 906 of the Sarbanes-Oxley Act of 2002 (subsections (a) and (b) of section 1350, chapter 63 of title 18, United States Code), each of the undersigned officers of Biogen Inc., a Delaware corporation (the "Company"), does hereby certify, to such officer's knowledge, that:

The Annual Report on Form 10-K for the year ended December 31, 2017 (the "Form 10-K") of the Company fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, and the information contained in the Form 10-K fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: February 1, 2018

/s/ Michel Vounatsos

Michel Vounatsos
Chief Executive Officer
[principal executive officer]

Dated: February 1, 2018

/s/ Jeffrey Capello

Jeffrey Capello
Executive Vice President, Finance and
Chief Financial Officer
[principal financial officer]

A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.