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

Form 10-Q

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

For the quarterly period ended June 30, 2019

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, MA 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	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, $0.0005 par value	BIIB	The Nasdaq Global Select Market

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 x No o

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

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

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

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

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

The number of shares of the issuer's Common Stock, $0.0005 par value, outstanding as of July 19, 2019, was 184,447,218 shares.

BIOGEN INC.
FORM 10-Q — Quarterly Report
For the Quarterly Period Ended June 30, 2019

TABLE OF CONTENTS

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,” “goal,” “intend,” “may,” “plan,” “potential,” “possible,” “will,” "would" 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, milestone, royalty and other payments under licensing, collaboration, acquisition or divestiture 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;
- 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;
- patent terms, patent term extensions, patent office actions and expected availability and period of regulatory exclusivity;
- the potential impact of increased product competition in the markets in which we compete, including increased competition from generics, biosimilars, prodrugs and other products approved under abbreviated regulatory pathways;
- our plans and investments in our core and emerging growth areas, as well as implementation of our corporate strategy;
- the drivers for growing our business, including our plans and intention to commit resources relating to research and development programs and business development opportunities, as well as the potential benefits and results of, and the anticipated timing to complete, certain business development transactions, including divestitures;
- our ability to finance our operations and business initiatives and obtain funding for such activities;
- 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;
- adverse safety events involving our marketed products or generic or biosimilar versions of our marketed products;
- the potential impact of healthcare reform in the United States (U.S.) and measures being taken worldwide designed to reduce healthcare costs and limit the overall level of government expenditures, including the impact of pricing actions and reduced reimbursement for our products;
- our manufacturing capacity, use of third-party contract manufacturing organizations, plans and timing relating to changes in our manufacturing capabilities, including anticipated investments and divestitures, and activities in new or existing manufacturing facilities;
- 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 on our results of operations and liquidity of the United Kingdom's (U.K.) intent to voluntarily depart from the European Union (E.U.);
- lease commitments, purchase obligations and the timing and satisfaction of other contractual obligations; and
- the impact of new laws, including the Swiss Federal Act on Tax Reform and AHV Financing, regulatory requirements, judicial decisions 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; and
- "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).

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.

ENBREL®, FAMPYRA™, GAZYVA®, HUMIRA®, OCREVUS®, REMICADE®, SkySTAR™ and other trademarks referenced in this report are the property of their respective owners.

PART I FINANCIAL INFORMATION

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

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
	2019	2018	2019	2018
Revenues:				
Product, net	$ 2,880.3	$ 2,757.5	$ 5,560.3	$ 5,281.0
Revenues from anti-CD20 therapeutic programs	576.4	490.4	1,093.8	933.6
Other	160.0	108.6	452.4	273.0
Total revenues	3,616.7	3,356.5	7,106.5	6,487.6
Cost and expenses:				
Cost of sales, excluding amortization and impairment of acquired intangible assets	476.3	421.0	1,078.3	867.0
Research and development	484.8	981.0	1,048.5	1,477.7
Selling, general and administrative	587.6	516.2	1,155.3	1,017.5
Amortization and impairment of acquired intangible assets	70.1	107.4	138.3	211.3
Collaboration profit (loss) sharing	63.5	39.2	121.6	81.7
Loss on assets and liabilities held for sale	(2.3)	—	113.2	—
(Gain) loss on fair value remeasurement of contingent consideration	(20.0)	1.9	(8.5)	(3.7)
Restructuring charges	0.8	1.6	1.2	3.2
Acquired in-process research and development	—	75.0	—	85.0
Total cost and expenses	1,660.8	2,143.3	3,647.9	3,739.7
Income from operations	1,955.9	1,213.2	3,458.6	2,747.9
Other income (expense), net	(197.4)	(34.5)	159.9	(75.5)
Income before income tax expense and equity in loss of investee, net of tax	1,758.5	1,178.7	3,618.5	2,672.4
Income tax expense	248.1	263.7	670.6	586.2
Equity in loss of investee, net of tax	16.3	—	45.0	—
Net income	1,494.1	915.0	2,902.9	2,086.2
Net income (loss) attributable to noncontrolling interests, net of tax	—	48.4	—	46.7
Net income attributable to Biogen Inc.	$ 1,494.1	$ 866.6	$ 2,902.9	$ 2,039.5
Net income per share:				
Basic earnings per share attributable to Biogen Inc.	$ 7.85	$ 4.18	$ 15.01	$ 9.75
Diluted earnings per share attributable to Biogen Inc.	$ 7.85	$ 4.18	$ 14.99	$ 9.73
Weighted-average shares used in calculating:				
Basic earnings per share attributable to Biogen Inc.	190.3	207.1	193.4	209.2
Diluted earnings per share attributable to Biogen Inc.	190.4	207.3	193.7	209.5

See accompanying notes to these unaudited condensed consolidated financial statements.

BIOGEN INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(unaudited, in millions)

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
	2019	2018	2019	2018
Net income attributable to Biogen Inc.	$ 1,494.1	$ 866.6	$ 2,902.9	$ 2,039.5
Other comprehensive income:				
Unrealized gains (losses) on securities available for sale, net of tax	3.3	0.6	10.2	(1.6)
Unrealized gains (losses) on cash flow hedges, net of tax	(37.9)	132.8	(21.0)	103.8
Gains (losses) on net investment hedges	11.7	—	25.7	—
Unrealized gains (losses) on pension benefit obligation, net of tax	0.1	0.9	0.7	0.4
Currency translation adjustment	(10.3)	(92.0)	(28.1)	(47.3)
Total other comprehensive income (loss), net of tax	(33.1)	42.3	(12.5)	55.3
Comprehensive income attributable to Biogen Inc.	1,461.0	908.9	2,890.4	2,094.8
Comprehensive income (loss) attributable to noncontrolling interests, net of tax	(0.4)	48.4	(0.4)	46.7
Comprehensive income	$ 1,460.6	$ 957.3	$ 2,890.0	$ 2,141.5

See accompanying notes to these unaudited condensed consolidated financial statements.

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

	As of June 30, 2019	As of December 31, 2018
ASSETS		
Current assets:		
Cash and cash equivalents	$ 1,723.4	$ 1,224.6
Marketable securities	1,228.8	2,313.4
Accounts receivable, net	1,959.6	1,958.5
Due from anti-CD20 therapeutic programs	557.5	526.9
Inventory	776.7	929.9
Assets held for sale	683.4	—
Other current assets	980.4	687.6
Total current assets	7,909.8	7,640.9
Marketable securities	1,309.3	1,375.9
Property, plant and equipment, net	3,077.5	3,601.2
Operating lease assets	434.4	—
Intangible assets, net	3,681.3	3,120.0
Goodwill	5,749.2	5,706.4
Deferred tax asset	2,820.1	2,153.9
Investments and other assets	1,306.0	1,690.6
Total assets	$ 26,287.6	$ 25,288.9
LIABILITIES AND EQUITY		
Current liabilities:		
Taxes payable	427.2	63.5
Accounts payable	377.1	370.5
Liabilities held for sale	88.6	—
Accrued expenses and other	2,318.0	2,861.2
Total current liabilities	3,210.9	3,295.2
Notes payable	5,948.5	5,936.5
Deferred tax liability	2,400.6	1,636.2
Long-term operating lease liabilities	423.0	—
Other long-term liabilities	1,355.8	1,389.4
Total liabilities	13,338.8	12,257.3
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	—	—
Accumulated other comprehensive loss	(252.9)	(240.4)
Retained earnings	16,182.8	16,257.0
Treasury stock, at cost	(2,977.1)	(2,977.1)
Total Biogen Inc. shareholders' equity	12,952.9	13,039.6
Noncontrolling interests	(4.1)	(8.0)
Total equity	12,948.8	13,031.6
Total liabilities and equity	$ 26,287.6	$ 25,288.9

See accompanying notes to these unaudited condensed consolidated financial statements.

BIOGEN INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(unaudited, in millions)

	For the Six Months Ended June 30,	
	2019	2018
Cash flows from operating activities:		
Net income	$ 2,902.9	$ 2,086.2
Adjustments to reconcile net income to net cash flows from operating activities:		
Depreciation, amortization and impairments	238.1	340.4
Acquired in-process research and development	—	85.0
Share-based compensation	98.0	81.7
Contingent consideration	(8.5)	(3.7)
Loss on assets and liabilities held for sale	113.2	—
Deferred income taxes	71.6	(57.4)
Unrealized (gain) loss on strategic investments	(199.2)	1.0
Other	91.1	45.1
Changes in operating assets and liabilities, net:		
Accounts receivable	(2.9)	(187.2)
Inventory	108.7	(40.1)
Accrued expenses and other current liabilities	(216.1)	13.3
Income tax assets and liabilities	306.9	183.4
Other changes in operating assets and liabilities, net	(80.3)	8.7
Net cash flows provided by operating activities	3,423.5	2,556.4
Cash flows from investing activities:		
Proceeds from sales and maturities of marketable securities	3,255.8	6,802.7
Purchases of marketable securities	(2,075.1)	(4,774.3)
Contingent consideration paid related to Fumapharm AG acquisition	(300.0)	(900.0)
Acquisition of Nightstar Therapeutics plc, net of cash acquired	(744.4)	—
Purchases of property, plant and equipment	(314.0)	(381.5)
Acquired in-process research and development	—	(85.0)
Acquisitions of intangible assets	—	(3.0)
Purchase of Ionis Pharmaceuticals, Inc. stock	—	(462.9)
Proceeds from sales of strategic investments	309.7	—
Other	(4.0)	2.1
Net cash flows provided by investing activities	128.0	198.1
Cash flows from financing activities:		
Purchases of treasury stock	(3,057.3)	(3,000.0)
Payments related to issuance of stock for share-based compensation arrangements, net	(23.6)	(14.3)
Net distribution to noncontrolling interest	4.3	(38.9)
Other	21.6	(6.9)
Net cash flows used in financing activities	(3,055.0)	(3,060.1)
Net increase (decrease) in cash and cash equivalents	496.5	(305.6)
Effect of exchange rate changes on cash and cash equivalents	2.3	(18.0)
Cash and cash equivalents, beginning of the period	1,224.6	1,573.8
Cash and cash equivalents, end of the period	$ 1,723.4	$ 1,250.2

See accompanying notes to these unaudited condensed consolidated financial statements.

BIOGEN INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF EQUITY
(unaudited, 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, March 31, 2019	—	$ —	219.0	$ 0.1	$ —	$ (219.8)	$ 17,026.7	(23.8)	$ (2,977.1)	$ 13,829.9	$ (7.9)	$ 13,822.0
Net income							1,494.1			1,494.1	—	1,494.1
Other comprehensive income (loss), net of tax						(33.1)				(33.1)	(0.4)	(33.5)
Capital contribution by noncontrolling interest										—	4.2	4.2
Repurchase of common stock pursuant to the 2019 Share Repurchase Program, at cost								(3.9)	(909.9)	(909.9)		(909.9)
Retirement of common stock pursuant to the 2019 Share Repurchase Program, at cost			(3.9)	—	(19.7)		(890.2)	3.9	909.9	—		—
Repurchase of common stock pursuant to the 2018 Share Repurchase Program, at cost								(6.5)	(1,491.6)	(1,491.6)		(1,491.6)
Retirement of common stock pursuant to the 2018 Share Repurchase Program, at cost			(6.5)	—	(44.9)		(1,446.7)	6.5	1,491.6	—		—
Issuance of common stock under stock option and stock purchase plans			—	—	9.6					9.6		9.6
Issuance of common stock under stock award plan			—	—	—		(1.1)			(1.1)		(1.1)
Compensation related to share-based payments					55.0					55.0		55.0
Balance, June 30, 2019	—	$ —	208.6	$ 0.1	$ —	$ (252.9)	$ 16,182.8	(23.8)	$ (2,977.1)	$ 12,952.9	$ (4.1)	$ 12,948.8

See accompanying notes to these unaudited condensed consolidated financial statements.

BIOGEN INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF EQUITY - (Continued)
(unaudited, 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, 2018	—	$ —	221.0	$ 0.1	$ —	$ (240.4)	$ 16,257.0	(23.8)	$ (2,977.1)	$ 13,039.6	$ (8.0)	$ 13,031.6
Net income							2,902.9			2,902.9	—	2,902.9
Other comprehensive income (loss), net of tax						(12.5)				(12.5)	(0.4)	(12.9)
Capital contribution by noncontrolling interest										—	4.3	4.3
Repurchase of common stock pursuant to the 2019 Share Repurchase Program, at cost								(3.9)	(909.9)	(909.9)		(909.9)
Retirement of common stock pursuant to the 2019 Share Repurchase Program, at cost			(3.9)	—	(19.7)		(890.2)	3.9	909.9	—		—
Repurchase of common stock pursuant to the 2018 Share Repurchase Program, at cost								(8.9)	(2,147.4)	(2,147.4)		(2,147.4)
Retirement of common stock pursuant to the 2018 Share Repurchase Program, at cost			(8.9)	—	(110.5)		(2,036.9)	8.9	2,147.4	—		—
Issuance of common stock under stock option and stock purchase plans			0.1	—	26.2					26.2		26.2
Issuance of common stock under stock award plan			0.3	—	—		(50.0)			(50.0)		(50.0)
Compensation related to share-based payments					104.0					104.0		104.0
Balance, June 30, 2019	—	$ —	208.6	$ 0.1	$ —	$ (252.9)	$ 16,182.8	(23.8)	$ (2,977.1)	$ 12,952.9	$ (4.1)	$ 12,948.8

See accompanying notes to these unaudited condensed consolidated financial statements.

BIOGEN INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF EQUITY - (Continued)
(unaudited, 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, March 31, 2018	—	$ —	211.0	$ 0.1	$ —	$ (303.9)	$17,334.6	(23.8)	$(2,977.1)	$ 14,053.7	$ (16.2)	$14,037.5
Net income							866.6			866.6	48.4	915.0
Other comprehensive income (loss), net of tax						42.3				42.3	(0.5)	41.8
Capital contribution by noncontrolling interest										—	11.1	11.1
Distribution to noncontrolling interest										—	(50.0)	(50.0)
Repurchase of common stock pursuant to the 2016 Share Repurchase Program, at cost								(9.6)	(2,750.0)	(2,750.0)		(2,750.0)
Retirement of common stock pursuant to the 2016 Share Repurchase Program, at cost			(9.6)	—	(48.3)		(2,701.7)	9.6	2,750.0	—		—
Issuance of common stock under stock option and stock purchase plans			—	—	8.4					8.4		8.4
Issuance of common stock under stock award plan			—	—	(1.5)					(1.5)		(1.5)
Compensation related to share-based payments					41.4					41.4		41.4
Balance, June 30, 2018	—	$ —	201.4	$ 0.1	$ —	$ (261.6)	$15,499.5	(23.8)	$(2,977.1)	$ 12,260.9	$ (7.2)	$12,253.7

See accompanying notes to these unaudited condensed consolidated financial statements.

BIOGEN INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF EQUITY - (Continued)
(unaudited, 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, 2017	—	$ —	211.5	$ 0.1	$ 97.8	$ (318.4)	$15,810.4	(23.8)	$(2,977.1)	$ 12,612.8	$ (14.7)	$12,598.1
Net income							2,039.5			2,039.5	46.7	2,086.2
Other comprehensive income (loss), net of tax						55.3				55.3	(0.3)	55.0
Capital contribution by noncontrolling interest										—	11.1	11.1
Distribution to noncontrolling interest										—	(50.0)	(50.0)
Repurchase of common stock pursuant to the 2016 Share Repurchase Program, at cost								(10.5)	(3,000.0)	(3,000.0)		(3,000.0)
Retirement of common stock pursuant to the 2016 Share Repurchase Program, at cost			(10.5)	—	(171.2)		(2,828.8)	10.5	3,000.0	—		—
Issuance of common stock under stock option and stock purchase plans			0.1	—	24.6					24.6		24.6
Issuance of common stock under stock award plan			0.3	—	(38.8)					(38.8)		(38.8)
Compensation related to share-based payments					87.6					87.6		87.6
Adoption of new accounting guidance						1.5	478.4			479.9		479.9
Balance, June 30, 2018	—	$ —	201.4	$ 0.1	$ —	$ (261.6)	$15,499.5	(23.8)	$(2,977.1)	$ 12,260.9	$ (7.2)	$12,253.7

See accompanying notes to these unaudited condensed consolidated financial statements.

1. Summary of Significant Accounting Policies

References in these notes to "Biogen," the "company," "we," "us" and "our" refer to Biogen Inc. and its consolidated subsidiaries.

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 as well as related therapeutic adjacencies. Our core growth areas include multiple sclerosis (MS) and neuroimmunology, neuromuscular disorders, including spinal muscular atrophy (SMA) and amyotrophic lateral sclerosis (ALS), movement disorders, including Parkinson's disease and progressive supranuclear palsy, Alzheimer's disease (AD) and dementia and ophthalmology. We are also focused on discovering, developing and delivering worldwide innovative therapies in our emerging growth areas of immunology, neurocognitive disorders, acute neurology and pain. In addition, we commercialize biosimilars of advanced biologics. We support our drug discovery and development efforts through the commitment of significant resources to discovery, research and development programs and business development opportunities.

Our marketed products include TECFIDERA, AVONEX, PLEGRIDY, TYSABRI 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, RITUXAN HYCELA for the treatment of non-Hodgkin's lymphoma and CLL, 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 pursuant to our collaboration arrangements with Genentech, Inc. (Genentech), a wholly-owned member of the Roche Group. For additional information on our collaboration arrangements with Genentech, please read Note 19, *Collaborative and Other Relationships*, to our consolidated financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2018 (2018 Form 10-K).

Our innovative drug development and commercialization activities are complemented by our biosimilar products that expand access to medicines and reduce the cost burden for healthcare systems. Through Samsung Bioepis Co., Ltd. (Samsung Bioepis), our joint venture with Samsung BioLogics Co., Ltd. (Samsung BioLogics), we market and sell BENEPALI, an etanercept biosimilar referencing ENBREL, IMRALDI, an adalimumab biosimilar referencing HUMIRA, and FLIXABI, an infliximab biosimilar referencing REMICADE, in the European Union (E.U.). For additional information on our collaboration arrangement with Samsung Bioepis, please read Note 17, *Collaborative and Other Relationships*, to these unaudited condensed consolidated financial statements (condensed consolidated financial statements).

Basis of Presentation

In the opinion of management, our condensed consolidated financial statements include all adjustments, consisting of normal recurring accruals, necessary for a fair presentation of our financial statements for interim periods in accordance with accounting principles generally accepted in the United States (U.S. GAAP). The information included in this quarterly report on Form 10-Q should be read in conjunction with our audited consolidated financial statements and the accompanying notes included in our 2018 Form 10-K. Our accounting policies are described in the "*Notes to Consolidated Financial Statements*" in our 2018 Form 10-K and updated, as necessary, in this report. The year-end condensed consolidated balance sheet data presented for comparative purposes was derived from our audited financial statements but does not include all disclosures required by U.S. GAAP. The results of operations for the three and six months ended June 30, 2019, are not necessarily indicative of the operating results for the full year or for any other subsequent interim period.

We operate as one operating segment, focused on discovering, developing and delivering worldwide innovative therapies for people living with serious neurological and neurodegenerative diseases as well as related therapeutic adjacencies.

Consolidation

Our condensed 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 condensed 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 condensed 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 ongoing 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.

Assets and Liabilities Held For Sale

Upon determining that a long-lived asset or disposal group meets the criteria to be classified as held for sale, we cease depreciation and separately present such assets and liabilities of the disposal group in our condensed consolidated balance sheet. We initially measure a long-lived asset or disposal group that is classified as held for sale at the lower of its carrying value or fair value less any costs to sell. Any loss resulting from this measurement is recognized in the period in which the held for sale criteria are met. Conversely, gains are not recognized on the sale of a long-lived asset or disposal group until the date of sale. We assess the fair value of a long-lived asset or disposal group less any costs to sell each reporting period it remains classified as held for sale and recognize any subsequent changes as an adjustment to the carrying value of the asset or disposal group, as long as the remeasured carrying value does not exceed the carrying value less costs to sell of the asset or disposal group at the time it was initially classified as held for sale.

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 condensed consolidated financial statements or disclosures.

Leases

In February 2016 the FASB issued Accounting Standards Update (ASU) No. 2016-02, *Leases (Topic 842)*, a new standard issued to increase transparency and comparability among organizations related to their leasing activities. This standard established a right-of-use model that requires all lessees to recognize right-of-use assets and lease liabilities on their balance sheet that arise from leases as well as provide disclosures with respect to certain qualitative and quantitative information related to a company's leasing arrangements to meet the objective of allowing users of financial statements to assess the amount, timing and uncertainty of cash flows arising from leases.

The FASB subsequently issued the following amendments to ASU 2016-02 that have the same effective date and transition date: ASU No. 2018-01, *Leases (Topic 842): Land Easement Practical Expedient for Transition to Topic 842*, ASU No. 2018-10, *Codification Improvements to Topic 842, Leases*, ASU No. 2018-11, *Leases (Topic 842): Targeted Improvements*, ASU No. 2018-20, *Narrow-Scope Improvement for Lessors*, and ASU No. 2019-01, *Leases (Topic 842): Codification Improvements*. We adopted these amendments with ASU 2016-02 (collectively, the new leasing standards) effective January 1, 2019.

We adopted the new leasing standards using the modified retrospective transition approach, as of January 1, 2019, with no restatement of prior periods or cumulative adjustment to retained earnings. Upon adoption, we elected the package of transition practical expedients, which allowed us to carry forward prior conclusions related to whether any expired or existing contracts are or contain leases, the lease classification for any expired or existing leases and initial direct costs for existing leases. We also elected the practical expedient to not reassess certain land easements and made an accounting policy election to not recognize leases with an initial term of 12 months or less within our condensed consolidated balance sheets and to recognize those lease payments on a straight-line basis in our condensed consolidated statements of income over the lease term. Upon adoption of the new leasing standards we recognized an operating lease asset of approximately $463.0 million and a corresponding operating lease liability of approximately $526.0 million, which are included in our condensed consolidated balance sheet. The adoption of the new leasing standards did not have an impact on our condensed consolidated statements of income.

We determine if an arrangement is a lease at contract inception. Operating lease assets represent our right to use an underlying asset for the lease term and operating lease liabilities represent our obligation to make lease payments arising from the lease. Operating lease assets and liabilities are recognized at the commencement date of the lease based upon the present value of lease payments over the lease term. When determining the lease term, we include options to extend or terminate the lease when it is reasonably certain that we will exercise that option. We use the implicit rate when readily determinable and use our incremental borrowing rate when the implicit rate is not readily determinable based upon the information available at the commencement date in determining the present value of the lease payments. Our incremental borrowing rate is determined using a secured borrowing rate for the same currency and term as the associated lease.

The lease payments used to determine our operating lease assets may include lease incentives, stated rent increases and escalation clauses linked to rates of inflation when determinable and are recognized in our operating lease assets in our condensed consolidated balance sheets. In addition, our contracts contain lease and non-lease components. We separate lease payments for the identified assets from any non-lease payments included in the contract. For certain equipment leases, such as vehicles, we apply a portfolio approach to effectively account for the operating lease assets and liabilities.

Our operating leases are reflected in operating lease assets, accrued expenses and other and in long-term operating lease liabilities in our condensed consolidated balance sheets. Lease expense for minimum lease payments is recognized on a straight-line basis over the lease term.

We also have real estate lease agreements which are subleased to third parties. Operating leases for which we are the sublessor are included in accrued expenses and other and other long-term liabilities in our condensed consolidated balance sheets. We recognize sublease income on a straight-line basis over the lease term in our condensed consolidated statements of income.

For additional information on the adoption of the new leasing standards, please read Note 11, *Leases*, to these condensed consolidated financial statements.

Credit Losses

In June 2016 the FASB issued ASU No. 2016-13, *Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments*. The FASB has subsequently issued amendments to ASU 2016-13, which have the same effective date and transition date of January 1, 2020. These standards require that credit losses be reported using an expected losses model rather than the incurred losses model that is currently used, and establishes additional disclosures related to credit risks. For available-for-sale debt securities with unrealized losses, these standards now require allowances to be recorded instead of reducing the amortized cost of the investment. These standards limit the amount of credit losses to be recognized for available-for-sale debt securities to the amount by which carrying value exceeds fair value and requires the reversal of previously recognized credit losses if fair value increases.

Based on the composition of our investment portfolio and other financial assets, current market conditions and historical credit loss activity, the adoption of these standards is not expected to have a material impact on our consolidated financial position and results of operations and related disclosures.

Debt Securities

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 standard amends the amortization period for certain purchased callable debt securities held at a premium by shortening the amortization period to the earliest call date. This standard became effective for us on January 1, 2019, and was adopted using a modified retrospective transition approach. The adoption of this standard did not result in a significant adjustment to our marketable debt securities.

Fair Value Measurements

In August 2018 the FASB issued ASU No. 2018-13, *Fair Value Measurement (Topic 820): Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement*. This standard modifies certain disclosure requirements on fair value measurements. This standard will become effective for us on January 1, 2020. We do not expect that the adoption of this standard will have a material impact on our disclosures.

Derivative Instruments and Hedging Activities

In October 2018 the FASB issued ASU No. 2018-16, *Derivatives and Hedging (Topic 815): Inclusion of the Secured Overnight Financing Rate (SOFR) Overnight Index Swap (OIS) Rate as a Benchmark Interest Rate for Hedge Accounting Purposes*. This standard permits the use of the OIS rate based on the SOFR as a United States (U.S.) benchmark interest rate for hedge accounting purposes under Accounting Standards Codification (ASC) 815, *Derivative and Hedging*. This standard became effective for us on January 1, 2019, and did not have an impact on our condensed consolidated results of operations or financial position.

Collaborative Arrangements

In November 2018 the FASB issued ASU No. 2018-18, *Collaborative Arrangements (Topic 808): Clarifying the Interaction between Topic 808 and Topic 606*. This standard makes targeted improvements for collaborative arrangements as follows:

- Clarifies that certain transactions between collaborative arrangement participants should be accounted for as revenue under ASC 606, *Revenue from Contracts with Customers*, when the collaborative arrangement participant is a customer in the context of a unit of account. In those situations, all the guidance in ASC 606 should be applied, including recognition, measurement, presentation and disclosure requirements;
- Adds unit-of-account guidance to ASC 808, *Collaborative Arrangements*, to align with the guidance in ASC 606 (that is, a distinct good or service) when an entity is assessing whether the collaborative arrangement or a part of the arrangement is within the scope of ASC 606; and
- Precludes a company from presenting transactions with collaborative arrangement participants that are not directly related to sales to third parties with revenue recognized under ASC 606 if the collaborative arrangement participant is not a customer.

This standard will become effective for us on January 1, 2020; however, early adoption is permitted. A retrospective transition approach is required for either all contracts or only for contracts that are not completed at the date of initial application of ASC 606, with a cumulative adjustment to opening retained earnings, as of January 1, 2018. We are currently evaluating the potential impact that this standard may have on our consolidated financial position, results of operations and related disclosures.

2. Acquisitions

Acquisition of Nightstar Therapeutics plc

On June 7, 2019, we completed our acquisition of all of the outstanding shares of Nightstar Therapeutics plc (NST), a clinical-stage gene therapy company focused on adeno-associated virus treatments for inherited retinal disorders. As a result of this acquisition, we added two mid-to late-stage clinical assets, as well as preclinical programs, in ophthalmology. These assets include BIIB111 (formerly known as NSR-REP1), which is in Phase 3 development for the potential treatment of choroideremia, a rare, degenerative, X-linked inherited retinal disorder that leads to blindness and has no approved treatments, and BIIB112 (formerly known as NSR-RPGR), which is in Phase 2/3 development for the potential treatment of X-linked retinitis pigmentosa, which is a rare inherited retinal disease with no approved treatments.

Under the terms of this acquisition, we paid NST shareholders $25.50 in cash for each issued and outstanding NST share, which totaled $847.6 million. In addition, we paid $4.6 million in cash for equity compensation, which is attributable to pre-combination services and is reflected as a component of the total purchase price paid. The fair value of equity compensation attributable to the post-combination service period was $26.2 million, of which $18.4 million was recognized as a charge to selling, general and administrative expense with the remaining $7.8 million as a charge to research and development expense in our condensed consolidated statements of income. These amounts were associated with the accelerated vesting of stock options previously granted to NST employees and were fully paid in cash as of June 30, 2019. We funded this acquisition through available cash and accounted for it as an acquisition of a business.

The following table summarizes the estimated fair values of the separately identifiable assets acquired and liabilities assumed as of June 7, 2019:

(In millions)	
Cash and cash equivalents	$ 107.8
Marketable securities	7.5
In-process research and development intangible assets	700.0
Goodwill	112.6
Deferred tax liability	(77.0)
Other, net	1.3
Total purchase price	$ 852.2

Our estimate of the fair value of the in-process research and development (IPR&D) programs acquired was determined through a probability adjusted discounted cash flow analysis utilizing a discount rate of 12.5%. This valuation was primarily driven by the value associated with BIIB111. The fair value associated with BIIB111 was $480.0 million. We have recorded an additional IPR&D asset related to BIIB112 of $220.0 million. Some of the more significant assumptions utilized in our asset valuations included the estimated net cash flows for each year for each asset or product, including net revenues, cost of sales, research and development and other operating expenses, the potential regulatory and commercial success risks, competitive trends impacting the asset and each cash flow stream as well as other factors. These fair value measurements were based on significant inputs not observable in the market and thus represent Level 3 fair value measurements.

We have recognized goodwill in relation to the fair value associated with NST workforce's expertise and early research in retinal disorders. We also recognized goodwill in relation to the establishment of a deferred tax liability for the acquired IPR&D intangible assets, which have no tax basis. This deferred tax liability is net of the related impacts on the deferred taxes for global intangible low-taxed income (GILTI). Goodwill that is tax deductible for GILTI purposes is approximately $35.0 million.

Pro forma results of operations as a result of this acquisition have not been presented as this acquisition is not material to our condensed consolidated statements of income. Subsequent to the acquisition date, our results of operations include the results of operations of NST.

Our preliminary estimate of the fair value of the specifically identifiable assets acquired and liabilities assumed as of the date of acquisition is subject to the finalization of management’s analysis related to certain matters, such

as finalizing our assessment of the IPR&D programs acquired and preparing and submitting certain income tax and non-income tax filings and returns. The final determination of these fair values will be completed as additional information becomes available but no later than one year from the acquisition date. Although the final determination may result in asset and liability fair values that are different than the preliminary estimates of these amounts included herein, it is not expected that those differences will be material to our financial position.

3. Divestitures

Proposed Divestiture of Hillerød, Denmark Manufacturing Operations

In March 2019 we entered into a share purchase agreement with FUJIFILM Corporation (FUJIFILM) under which FUJIFILM will acquire all of the outstanding shares of our subsidiary that owns our biologics manufacturing operations in Hillerød, Denmark. Upon closing of the proposed transaction, we expect to receive up to $890.0 million in cash, subject to certain working capital adjustments and other contractual terms.

As part of the proposed transaction, we have provided FUJIFILM with certain minimum batch production commitment guarantees. There is a risk that the minimum contractual batch production commitments will not be met. Based upon current estimates we expect to incur an adverse commitment obligation of approximately $120.0 million associated with such guarantees. We may adjust this estimate based upon changes in business conditions, which may result in the recognition of additional losses. We are also obligated to indemnify FUJIFILM for liabilities that may exist relating to certain business activities incurred prior to the closing of the proposed transaction.

In addition, we may earn certain contingent payments based on future manufacturing activities at the Hillerød facility. For the disposition of a business, our policy is to recognize contingent consideration when the consideration is realizable. We currently believe the probability of earning these payments is remote and therefore we have not included these contingent payments in our estimate of the fair value of the operations.

As part of the proposed transaction, we also expect to enter into certain manufacturing services agreements with FUJIFILM pursuant to which FUJIFILM would use the Hillerød facility to produce commercial products for us, such as TYSABRI, as well as other third-party products.

We determined that the operations to be disposed of in the proposed transaction did not meet the criteria to be classified as discontinued operations under the applicable guidance.

In February 2019 the assets and liabilities related to our Hillerød, Denmark manufacturing operations met the criteria to be classified as held for sale. The following table presents information related to the carrying value of the major classes of assets and liabilities that were reclassified as held for sale in our condensed consolidated balance sheets:

(In millions)	As of June 30, 2019
Assets:	
Inventory	$ 20.6
Property, plant and equipment, net	641.9
Operating lease assets	2.2
Goodwill	69.5
Other assets	62.4
Valuation allowance on disposal group on assets held for sale	(113.2)
Assets held for sale	$ 683.4
Liabilities:	
Accrued expenses and other liabilities	$ 33.4
Long-term operating lease liabilities	1.4
Deferred tax liability	53.8
Liabilities held for sale	$ 88.6

For the six months ended June 30, 2019, we recorded a loss of approximately $174.5 million in our condensed consolidated statements of income. This estimated loss includes a pre-tax loss of $113.2 million, which reflects a $2.3 million decrease to our original estimate as of March 31, 2019, reflecting our current estimated fair value of the assets and liabilities held for sale, adjusting for our expected costs to sell our Hillerød, Denmark manufacturing operations of approximately $10.0 million and our estimate of the fair value of an adverse commitment of approximately $120.0 million associated with the guarantee of future minimum batch production at the Hillerød facility. The value of this adverse commitment was determined using a probability-weighted estimate of future manufacturing activity. In addition, we recorded a tax expense of $61.3 million related to the proposed transaction. Our total estimated loss is based on current exchange rates and business conditions, and any changes to these factors through the closing date of the transaction will result in adjustments to the carrying values of the related assets and liabilities as well as a corresponding adjustment to the loss amount recognized on the sale.

Following the closing of the proposed transaction, the final purchase price will be adjusted by an amount equal to the difference between our current estimates of working capital and inventory balances that will be transferred to FUJIFILM and the amounts that are ultimately transferred.

In addition, upon closing of the proposed transaction, we expect to separately sell certain raw materials remaining at the Hillerød facility to FUJIFILM at carrying value.

Our estimate of the fair value of assets and liabilities expected to be sold to FUJIFILM is a Level 3 measurement and is based on the expected consideration from the sale, including the valuation of the adverse commitment, as discussed above.

The proposed transaction remains subject to certain closing conditions. We expect to complete the proposed transaction in the third quarter of 2019.

4. Revenues

Product Revenues

Revenues by product are summarized as follows:

(In millions)	For the Three Months Ended June 30, 2019 United States	2019 Rest of World	2019 Total	2018 United States	2018 Rest of World	2018 Total
Multiple Sclerosis (MS):						
TECFIDERA	$ 869.8	$ 280.4	$ 1,150.2	$ 825.8	$ 261.0	$ 1,086.8
Interferon*	379.7	174.7	554.4	444.7	180.8	625.5
TYSABRI	264.3	211.0	475.3	265.5	201.7	467.2
FAMPYRA	—	24.1	24.1	—	23.0	23.0
Subtotal: MS product revenues	1,513.8	690.2	2,204.0	1,536.0	666.5	2,202.5
Spinal Muscular Atrophy:						
SPINRAZA	230.6	257.6	488.2	205.9	216.8	422.7
Biosimilars:						
BENEPALI	—	120.3	120.3	—	115.6	115.6
IMRALDI	—	47.3	47.3	—	—	—
FLIXABI	—	16.8	16.8	—	11.2	11.2
Subtotal: Biosimilar product revenues	—	184.4	184.4	—	126.8	126.8
Other:						
FUMADERM	—	3.7	3.7	—	5.5	5.5
Total product revenues	$ 1,744.4	$ 1,135.9	$ 2,880.3	$ 1,741.9	$ 1,015.6	$ 2,757.5

*Interferon includes AVONEX and PLEGRIDY.

BIOGEN INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(unaudited, continued)

(In millions)	For the Six Months Ended June 30, 2019 United States	2019 Rest of World	2019 Total	2018 United States	2018 Rest of World	2018 Total
Multiple Sclerosis (MS):						
TECFIDERA	$ 1,587.5	$ 561.5	$ 2,149.0	$ 1,554.7	$ 519.0	$ 2,073.7
Interferon*	707.0	348.3	1,055.3	816.0	359.8	1,175.8
TYSABRI	509.3	426.4	935.7	515.2	414.1	929.3
FAMPYRA	—	47.0	47.0	—	47.4	47.4
ZINBRYTA	—	—	—	—	1.4	1.4
Subtotal: MS product revenues	2,803.8	1,383.2	4,187.0	2,885.9	1,341.7	4,227.6
Spinal Muscular Atrophy:						
SPINRAZA	453.9	552.8	1,006.7	393.9	392.7	786.6
Biosimilars:						
BENEPALI	—	244.3	244.3	—	236.5	236.5
IMRALDI	—	83.0	83.0	—	—	—
FLIXABI	—	31.5	31.5	—	17.8	17.8
Subtotal: Biosimilar product revenues	—	358.8	358.8	—	254.3	254.3
Other:						
FUMADERM	—	7.8	7.8	—	12.5	12.5
Total product revenues	$ 3,257.7	$ 2,302.6	$ 5,560.3	$ 3,279.8	$ 2,001.2	$ 5,281.0

*Interferon includes AVONEX and PLEGRIDY.

We recognized revenues from two wholesalers accounting for 30.5% and 18.2% of gross product revenues for the three months ended June 30, 2019, and 30.9% and 16.3% of gross product revenues for the six months ended June 30, 2019.

We recognized revenues from two wholesalers accounting for 32.5% and 18.6% of gross product revenues for the three months ended June 30, 2018, and 33.2% and 17.3% of gross product revenues for the six months ended June 30, 2018.

An analysis of the change in reserves for discounts and allowances is summarized as follows:

(In millions)	Discounts	Contractual Adjustments	Returns	Total
Balance, as of December 31, 2018	$ 127.8	$ 888.8	$ 34.7	$ 1,051.3
Current provisions relating to sales in current year	308.8	1,391.0	10.6	1,710.4
Adjustments relating to prior years	(0.4)	(41.9)	(0.1)	(42.4)
Payments/credits relating to sales in current year	(189.6)	(827.6)	(0.6)	(1,017.8)
Payments/credits relating to sales in prior years	(121.9)	(505.2)	(11.9)	(639.0)
Balance, as of June 30, 2019	$ 124.7	$ 905.1	$ 32.7	$ 1,062.5

The total reserves above, which are included in our condensed consolidated balance sheets, are summarized as follows:

(In millions)	As of June 30, 2019	As of December 31, 2018
Reduction of accounts receivable, net	$ 199.0	$ 176.6
Component of accrued expenses and other	863.5	874.7
Total revenue-related reserves	$ 1,062.5	$ 1,051.3

Revenues from Anti-CD20 Therapeutic Programs

Revenues from anti-CD20 therapeutic programs are summarized as follows:

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
(In millions)	2019	2018	2019	2018
Biogen's share of pre-tax profits in the U.S. for RITUXAN, RITUXAN HYCELA and GAZYVA	$ 377.2	$ 359.0	$ 768.0	$ 708.6
Other revenues from anti-CD20 therapeutic programs	199.2	131.4	325.8	225.0
Total revenues from anti-CD20 therapeutic programs	$ 576.4	$ 490.4	$ 1,093.8	$ 933.6

For additional information on our collaboration arrangements with Genentech, please read Note 19, *Collaborative and Other Relationships,* to our consolidated financial statements included in our 2018 Form 10-K.

Other Revenues

Other revenues are summarized as follows:

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
(In millions)	2019	2018	2019	2018
Revenues from collaborative and other relationships:				
(Loss) profit earned under our 50% share of the co-promotion losses on ZINBRYTA in the U.S. with AbbVie	$ (0.1)	$ (2.5)	$ (0.5)	$ (7.2)
Revenues earned under our technical development agreement, manufacturing services agreements and royalty revenues on biosimilar products with Samsung Bioepis	52.2	14.7	77.0	32.6
Other royalty and corporate revenues:				
Royalty	2.7	17.3	6.6	27.9
Other corporate	105.2	79.1	369.3	219.7
Total other revenues	$ 160.0	$ 108.6	$ 452.4	$ 273.0

Other corporate revenues primarily reflect amounts earned under contract manufacturing agreements with our strategic partners, including Bioverativ Inc. (Bioverativ). During the three and six months ended June 30, 2019, we recognized $34.5 million and $241.3 million, respectively, in revenues under the manufacturing and supply agreement with Bioverativ entered into in connection with the spin-off of our hemophilia business, compared to $47.6 million and $94.6 million, respectively, in the prior year comparative periods.

For additional information on our collaboration arrangement with Samsung Bioepis, please read Note 17, *Collaborative and Other Relationships,* to these condensed consolidated financial statements. For additional information on our collaboration arrangement with AbbVie Inc., please read Note 19, *Collaborative and Other Relationships,* to our consolidated financial statements included in our 2018 Form 10-K. For additional information on our manufacturing and supply agreement with Bioverativ, please read Note 3, *Hemophilia Spin-Off*, to our consolidated financial statements included in our 2018 Form 10-K.

5. Inventory

The components of inventory are summarized as follows:

(In millions)	As of June 30, 2019	As of December 31, 2018
Raw materials	$ 205.0	$ 196.3
Work in process	427.6	606.7
Finished goods	144.1	133.5
Total inventory	$ 776.7	$ 936.5
Balance Sheet Classification:		
Inventory	$ 776.7	$ 929.9
Investments and other assets	—	6.6
Total inventory	$ 776.7	$ 936.5

In the first quarter of 2019 we sold to Bioverativ most of the remaining hemophilia-related inventory on hand with a cost basis totaling $173.5 million pursuant to the terms of the manufacturing and supply agreement with Bioverativ entered into in connection with the spin-off of our hemophilia business.

Long-term inventory, which primarily consists of work in process, is included in investments and other assets in our condensed consolidated balance sheets.

Proposed Divestiture of Hillerød, Denmark Manufacturing Operations

In March 2019 we entered into a share purchase agreement with FUJIFILM under which FUJIFILM will acquire all of the outstanding shares of our subsidiary that owns our biologics manufacturing operations in Hillerød, Denmark. Upon closing of the proposed transaction, we expect to receive up to $890.0 million in cash, subject to certain working capital adjustments and other contractual terms. As a result, $20.6 million of work in process inventory was reclassified to assets held for sale in our condensed consolidated balance sheets as of June 30, 2019. Following the closing of the proposed transaction, the final purchase price will be adjusted by an amount equal to the difference between our current estimates of working capital and inventory balances that will be transferred to FUJIFILM and the amounts that are ultimately transferred. In addition, upon closing of the proposed transaction, we expect to separately sell certain raw materials remaining at the Hillerød facility to FUJIFILM at carrying value.

For additional information on the proposed divestiture of our Hillerød, Denmark manufacturing operations, please read Note 3, *Divestitures*, to these condensed consolidated financial statements.

6. Intangible Assets and Goodwill

Intangible Assets

Intangible assets, net of accumulated amortization, impairment charges and adjustments, are summarized as follows:

(In millions)	Estimated Life	As of June 30, 2019 Cost	Accumulated Amortization	Net	As of December 31, 2018 Cost	Accumulated Amortization	Net
Out-licensed patents	13-23 years	$ 543.3	$ (542.4)	$ 0.9	$ 543.3	$ (542.3)	$ 1.0
Developed technology	15-23 years	3,005.3	(2,754.1)	251.2	3,005.3	(2,734.8)	270.5
In-process research and development	Indefinite until commercialization	1,175.6	—	1,175.6	476.0	—	476.0
Trademarks and tradenames	Indefinite	64.0	—	64.0	64.0	—	64.0
Acquired and in-licensed rights and patents	4-18 years	3,638.7	(1,449.1)	2,189.6	3,638.7	(1,330.2)	2,308.5
Total intangible assets		$ 8,426.9	$ (4,745.6)	$ 3,681.3	$ 7,727.3	$ (4,607.3)	$ 3,120.0

For the three and six months ended June 30, 2019, amortization and impairment of acquired intangible assets totaled $70.1 million and $138.3 million, respectively, compared to $107.4 million and $211.3 million, respectively, in the prior year comparative periods. The decrease in amortization and impairment of acquired intangible assets was primarily due to a net overall decrease in our expected rate of amortization for acquired intangible assets. This decrease was primarily due to lower amortization subsequent to the impairment in the fourth quarter of 2018 of the U.S. license to Forward Pharma A/S' (Forward Pharma) intellectual property, including Forward Pharma's intellectual property related to TECFIDERA, and higher expected lifetime revenues of TYSABRI. For the three and six months ended June 30, 2019 and 2018, we had no impairment charges.

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 June 30, 2019, was $246.6 million.

IPR&D

In connection with our acquisition of NST on June 7, 2019, we acquired IPR&D programs with an estimated fair value of $700.0 million. For additional information on our acquisition of NST, please read Note 2, *Acquisitions*, to these condensed consolidated financial statements.

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 Pharma International Ltd., an affiliate of Elan Corporation plc. Acquired and in-licensed rights and patents also includes our rest of world license to Forward Pharma's intellectual property, including Forward Pharma's intellectual property related to TECFIDERA, and other amounts related to our other marketed products and other programs acquired through business combinations. The net book value of the TYSABRI asset as of June 30, 2019, was $1,933.3 million and the net book value of the TECFIDERA asset as of June 30, 2019, was $55.2 million. For additional information on our TECFIDERA license rights, please read Note 7, *Intangible Assets and Goodwill*, to our consolidated financial statements included in our 2018 Form 10-K.

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 TYSABRI, AVONEX, SPINRAZA and TECFIDERA products and other programs acquired through business combinations. Annually, during our long-range planning cycle, we perform an analysis of anticipated lifetime revenues of our TYSABRI, AVONEX, SPINRAZA and TECFIDERA products. This analysis

is also updated whenever events or changes in circumstances would significantly affect the anticipated lifetime revenues of any of these products. Impairments are recorded in the period in which they are incurred.

Our most recent long-range planning cycle was completed in the second quarter of 2019. 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 June 30, 2019
2019 (remaining six months)	$ 130.0
2020	255.0
2021	215.0
2022	215.0
2023	220.0
2024	210.0

Goodwill

The following table provides a roll forward of the changes in our goodwill balance:

(In millions)	As of June 30, 2019
Goodwill, beginning of period	$ 5,706.4
Increase to goodwill	112.6
Reclassification of goodwill to assets held for sale	(69.5)
Other	(0.3)
Goodwill, end of period	$ 5,749.2

The increase in goodwill during the six months ended June 30, 2019, was related to our acquisition of NST. For additional information on our acquisition of NST, please read Note 2, *Acquisitions*, to these condensed consolidated financial statements.

The reclassification of goodwill to assets held for sale relates to an allocation based upon the relative fair value of the proposed divestiture of our Hillerød, Denmark manufacturing operations.

In connection with our Hillerød, Denmark manufacturing operations meeting the criteria to be classified as held for sale due to the proposed divestiture, goodwill was reviewed for impairment, and based upon this review, no impairments were recognized. As of June 30, 2019, we had no accumulated impairment losses related to goodwill.

For additional information on the proposed divestiture of our Hillerød, Denmark manufacturing operations, please read Note 3, *Divestitures*, to these condensed consolidated financial statements.

Other includes changes related to foreign currency exchange rate fluctuations.

7. 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:

As of June 30, 2019 (In millions)	Total	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents	$ 1,120.4	$ —	$ 1,120.4	$ —
Marketable debt securities:				
Corporate debt securities	1,687.7	—	1,687.7	—
Government securities	604.4	—	604.4	—
Mortgage and other asset backed securities	246.0	—	246.0	—
Marketable equity securities	510.0	176.6	333.4	—
Derivative contracts	88.2	—	88.2	—
Plan assets for deferred compensation	29.5	—	29.5	—
Total	$ 4,286.2	$ 176.6	$ 4,109.6	$ —
Liabilities:				
Derivative contracts	$ 17.5	$ —	$ 17.5	$ —
Contingent consideration obligations	401.3	—	—	401.3
Total	$ 418.8	$ —	$ 17.5	$ 401.3

As of December 31, 2018 (In millions)	Total	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets:				
Cash equivalents	$ 705.5	$ —	$ 705.5	$ —
Marketable debt securities:				
Corporate debt securities	2,459.2	—	2,459.2	—
Government securities	969.6	—	969.6	—
Mortgage and other asset backed securities	260.5	—	260.5	—
Marketable equity securities	615.4	51.7	563.7	—
Derivative contracts	66.9	—	66.9	—
Plan assets for deferred compensation	25.4	—	25.4	—
Total	$ 5,102.5	$ 51.7	$ 5,050.8	$ —
Liabilities:				
Derivative contracts	$ 24.6	$ —	$ 24.6	$ —
Contingent consideration obligations	409.8	—	—	409.8
Total	$ 434.4	$ —	$ 24.6	$ 409.8

There have been no impairments of our assets measured and carried at fair value during the three and six months ended June 30, 2019. In addition, there were no changes in valuation techniques or inputs utilized or transfers between fair value measurement levels during the three and six months ended June 30, 2019. The fair value of Level 2 instruments classified as cash equivalents, marketable debt securities and our marketable equity security investment in Ionis Pharmaceuticals, Inc. (Ionis) were determined through third-party pricing services or an option pricing valuation model. For additional information on our agreement with Ionis, please read Note 19, *Collaborative and Other Relationships,* to our consolidated financial statements included in our 2018 Form 10-K. For a description of our validation procedures related to prices provided by third-party pricing services and our option

pricing valuation model, please read Note 1, *Summary of Significant Accounting Policies - Fair Value Measurements,* to our consolidated financial statements included in our 2018 Form 10-K.

Debt Instruments

The fair and carrying values of our debt instruments, which are Level 2 liabilities, are summarized as follows:

	As of June 30, 2019		As of December 31, 2018	
(In millions)	Fair Value	Carrying Value	Fair Value	Carrying Value
2.900% Senior Notes due September 15, 2020	$ 1,507.5	$ 1,491.1	$ 1,489.5	$ 1,480.8
3.625% Senior Notes due September 15, 2022	1,032.3	996.0	1,000.4	995.5
4.050% Senior Notes due September 15, 2025	1,867.4	1,738.7	1,745.1	1,737.8
5.200% Senior Notes due September 15, 2045	1,953.2	1,722.7	1,802.6	1,722.4
Total	$ 6,360.4	$ 5,948.5	$ 6,037.6	$ 5,936.5

The fair values of each of our series of Senior Notes were determined through market, observable and corroborated sources. For additional information on our debt instruments, please read Note 12, *Indebtedness,* to our consolidated financial statements included in our 2018 Form 10-K.

Contingent Consideration Obligations

In connection with our acquisitions of Convergence Pharmaceuticals Ltd., Stromedix Inc. and Biogen International Neuroscience GmbH 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:

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
(In millions)	2019	2018	2019	2018
Fair value, beginning of period	$ 421.3	$ 498.0	$ 409.8	$ 523.6
Changes in fair value	(20.0)	1.9	(8.5)	(3.7)
Payments	—	—	—	(20.0)
Fair value, end of period	$ 401.3	$ 499.9	$ 401.3	$ 499.9

As of June 30, 2019 and December 31, 2018, $255.1 million and $265.0 million, respectively, of the fair value of our total contingent consideration obligations was reflected as a component of other long-term liabilities in our condensed consolidated balance sheets with the remaining balance reflected as a component of accrued expenses and other.

For the three and six months ended June 30, 2019, changes in the fair value of our contingent consideration obligations were primarily due to changes in the probability and expected timing of achieving certain development milestones, partially offset by a decrease in interest rates used to revalue our contingent consideration liabilities and the passage of time.

For the three and six months ended June 30, 2018, changes in the fair value of our contingent consideration obligations were primarily due to an increase in interest rates used to revalue our contingent consideration liabilities, the passage of time and a milestone payment.

8. 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 condensed consolidated balance sheets:

(In millions)	As of June 30, 2019	As of December 31, 2018
Commercial paper	$ 338.7	$ 231.2
Overnight reverse repurchase agreements	97.0	—
Money market funds	405.7	279.5
Short-term debt securities	279.0	194.8
Total	$ 1,120.4	$ 705.5

The carrying values of our commercial paper, including accrued interest, overnight reverse repurchase agreements, money market funds and short-term debt securities approximate fair value due to their short-term maturities.

Our marketable equity securities gains (losses) are recorded in other income (expense), net in our condensed consolidated statements of income. The following tables summarize our marketable debt and equity securities:

As of June 30, 2019 (In millions)	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
Corporate debt securities				
Current	$ 933.4	$ 1.1	$ —	$ 934.5
Non-current	748.9	4.4	(0.1)	753.2
Government securities				
Current	293.6	0.4	—	294.0
Non-current	309.7	0.9	(0.2)	310.4
Mortgage and other asset backed securities				
Current	0.3	—	—	0.3
Non-current	244.5	1.5	(0.3)	245.7
Total marketable debt securities	$ 2,530.4	$ 8.3	$ (0.6)	$ 2,538.1
Marketable equity securities				
Current	$ 117.9	$ 46.3	$ —	$ 164.2
Non-current	111.4	247.9	(13.5)	345.8
Total marketable equity securities	$ 229.3	$ 294.2	$ (13.5)	$ 510.0

As of December 31, 2018 (In millions)	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Fair Value
Corporate debt securities				
Current	$ 1,608.4	$ —	$ (0.9)	$ 1,607.5
Non-current	854.9	0.7	(3.9)	851.7
Government securities				
Current	706.1	0.1	(0.4)	705.8
Non-current	264.0	0.1	(0.3)	263.8
Mortgage and other asset backed securities				
Current	0.1	—	—	0.1
Non-current	260.5	0.4	(0.5)	260.4
Total marketable debt securities	$ 3,694.0	$ 1.3	$ (6.0)	$ 3,689.3
Marketable equity securities, non-current	$ 496.2	$ 127.7	$ (8.5)	$ 615.4

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 June 30, 2019		As of December 31, 2018	
(In millions)	Amortized Cost	Estimated Fair Value	Amortized Cost	Estimated Fair Value
Due in one year or less	$ 1,227.3	$ 1,228.8	$ 2,314.6	$ 2,313.4
Due after one year through five years	1,196.1	1,202.2	1,235.9	1,232.7
Due after five years	107.0	107.1	143.5	143.2
Total available-for-sale securities	$ 2,530.4	$ 2,538.1	$ 3,694.0	$ 3,689.3

The average maturity of our marketable debt securities available-for-sale as of June 30, 2019 and December 31, 2018, were approximately 14 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 Three Months Ended June 30,		For the Six Months Ended June 30,	
(In millions)	2019	2018	2019	2018
Proceeds from maturities and sales	$ 1,766.6	$ 2,733.7	$ 3,255.8	$ 6,802.7
Realized gains	$ 1.0	$ 0.8	$ 1.6	$ 2.6
Realized losses	$ (0.3)	$ (0.8)	$ (0.6)	$ (10.2)

Strategic Investments

As of June 30, 2019, our strategic investment portfolio was comprised of investments totaling $569.8 million, of which $164.2 million was reflected as a component of other current assets in our condensed consolidated balance sheet, with the remaining balance included in investments and other assets. As of December 31, 2018, our strategic investment portfolio was comprised of investments totaling $676.3 million, which is included in investments and other assets in our condensed consolidated balance sheet.

Our strategic investment portfolio includes investments in equity securities of certain biotechnology companies, which are reflected within our disclosures included in Note 7, *Fair Value Measurements*, to these condensed consolidated financial statements, venture capital funds where the underlying investments are in equity securities of certain biotechnology companies and non-marketable equity securities.

Our investments in equity securities include shares of Ionis common stock acquired in June 2018. This investment is classified as a Level 2 marketable security due to certain holding period restrictions and is remeasured each reporting period and carried at fair value. The effect of the holding period restrictions on our Ionis stock valuation are estimated using an option pricing valuation model. The most significant assumptions within the model are the term of the restrictions and the stock price volatility, which is based upon historical volatility of similar companies. We also use a constant maturity risk-free interest rate to match the remaining term of the restrictions on our investment in Ionis common stock and a dividend yield of zero based upon the fact that Ionis and similar companies generally have not historically granted cash dividends. The remainder of our investments in equity securities of certain publicly-traded biotechnology companies are regularly measured and carried at fair value and classified as Level 1.

The decrease in our strategic investment portfolio for the six months ended June 30, 2019, primarily reflects the sale of a portion of our investment in Ionis common stock for approximately $213.3 million as well as the sale of our investment in a non-marketable equity security, partially offset by an increase in the fair value of our remaining investment in Ionis common stock.

For additional information on our June 2018 investment in Ionis common stock, please read Note 19, *Collaborative and Other Relationships,* to our consolidated financial statements included in our 2018 Form 10-K.

9. 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 June 30, 2019 and December 31, 2018, had durations of 1 to 18 months and 1 to 12 months, respectively. These contracts have been designated as cash flow hedges and unrealized gains or losses on the portion of these foreign currency forward contracts that are included in the effectiveness test are reported in accumulated other comprehensive income (loss) (referred to as AOCI in the tables below). Realized gains and losses 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. We recognize all cash flow hedge reclassifications from accumulated other comprehensive income and fair value changes of excluded portions in the same line item in our condensed consolidated statements of income that has been impacted by the hedged item.

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	
(In millions)	As of June 30, 2019	As of December 31, 2018
Euro	$ 2,111.3	$ 1,701.4
British pound	117.2	215.3
Swiss franc	69.7	131.4
Japanese yen	56.0	98.8
Canadian dollar	48.1	92.2
Total foreign currency forward contracts	$ 2,402.3	$ 2,239.1

The pre-tax portion of the fair value of these foreign currency forward contracts that were included in accumulated other comprehensive income (loss) in total equity reflected net gains of $6.3 million and $27.3 million as of June 30, 2019 and December 31, 2018, respectively. We expect the net gains of $6.3 million to be settled over the next 18 months, of which $9.8 million of these gains are 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 revenues or operating expenses. 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 June 30, 2019 and December 31, 2018, credit risk did not change the fair value of our foreign currency forward contracts.

The following tables summarize the effect of foreign currency forward contracts designated as hedging instruments in our condensed consolidated statements of income:

For the Three Months Ended June 30,				
Net Gains/(Losses) Reclassified from AOCI into Operating Income (in millions)			Net Gains/(Losses) Recognized in Operating Income (in millions)	
Location	2019	2018	Location	2019	2018
Revenues	$ 29.8	$ (10.4)	Revenues	$ 3.7	$ 7.9
Operating expenses	$ (0.7)	$ (0.4)	Operating expenses	$ (0.3)	$ (0.1)

For the Six Months Ended June 30,						
Net Gains/(Losses) Reclassified from AOCI into Operating Income (in millions)			Net Gains/(Losses) Recognized in Operating Income (in millions)			
Location	2019	2018	Location	2019	2018	
Revenues	$ 44.6	$ (43.3)	Revenues	$ 7.4	$ 7.0	
Operating expenses	$ (1.2)	$ 0.9	Operating expenses	$ (1.2)	$ (0.4)	

Interest Rate Contracts - Hedging Instruments

We have entered into interest rate swap contracts on certain borrowing transactions to manage our exposure to interest rate changes.

In connection with the issuance of our 2.90% Senior Notes, 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 our 2.90% Senior Notes attributable to changes in interest rates. The carrying value of our 2.90% Senior Notes as of June 30, 2019 and December 31, 2018, includes approximately $5.5 million and $14.5 million, respectively, related to changes in the fair value of these interest rate swap contracts. 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 our 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 recorded as a component of interest expense in our condensed consolidated statements of income.

Net Investment Hedges - Hedging Instruments

In February 2012 we entered into a joint venture agreement with Samsung BioLogics, establishing an entity, Samsung Bioepis, to develop, manufacture and market biosimilar products. In June 2018 we exercised our option under our joint venture agreement to increase our ownership percentage in Samsung Bioepis from approximately 5% to approximately 49.9%. The share purchase transaction was completed in November 2018 and, upon closing, we paid 759.5 billion South Korean won ($676.6 million) to Samsung BioLogics. Our investment in the equity of Samsung Bioepis is exposed to the currency fluctuations in the South Korean won.

In order to mitigate the currency fluctuations between the U.S. dollar and South Korean won, we have entered into foreign currency forward contracts. Foreign currency forward contracts in effect as of June 30, 2019, had remaining durations of four months. These contracts have been designated as net investment hedges. We recognize changes in the spot exchange rate in accumulated other comprehensive income (loss). The pre-tax portion of the fair value of these foreign currency forward contracts that were included in accumulated other comprehensive income (loss) in total equity reflected net gains of $19.6 million and net losses of $3.8 million as of June 30, 2019 and December 31, 2018, respectively. We exclude fair value changes related to the forward rate from our hedging relationship and will amortize the forward points in other income (expense), net in our condensed consolidated statements of income over the term of the contract. The pre-tax portion of the fair value of the forward points that were included in accumulated other comprehensive income (loss) in total equity reflected gains of $9.6 million and $7.3 million as of June 30, 2019 and December 31, 2018, respectively.

The following tables summarize the effect of our net investment hedge in our condensed consolidated financial statements:

For the Three Months Ended June 30,								
Net Gains/(Losses) Recognized in Other Comprehensive Income (Effective Portion) (in millions)			Net Gains/(Losses) Recognized in Other Comprehensive Income (Amounts Excluded from Effectiveness Testing) (in millions)			Net Gains/(Losses) Recognized in Net Income (Amounts Excluded from Effectiveness Testing) (in millions)		
Location	2019	2018	Location	2019	2018	Location	2019	2018
Gains (losses) on net investment hedge	$ 11.6	$ —	Gains (losses) on net investment hedge	$ 2.3	$ —	Other income (expense)	$ 2.2	$ —

For the Six Months Ended June 30,								
Net Gains/(Losses) Recognized in Other Comprehensive Income (Effective Portion) (in millions)			Net Gains/(Losses) Recognized in Other Comprehensive Income (Amounts Excluded from Effectiveness Testing) (in millions)			Net Gains/(Losses) Recognized in Net Income (Amounts Excluded from Effectiveness Testing) (in millions)		
Location	2019	2018	Location	2019	2018	Location	2019	2018
Gains (losses) on net investment hedge	$ 23.4	$ —	Gains (losses) on net investment hedge	$ 6.7	$ —	Other income (expense)	$ 4.4	$ —

For additional information on our collaboration arrangement with Samsung Bioepis, please read Note 17, *Collaborative and Other Relationships*, to these condensed consolidated financial statements.

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 forward contracts was $934.4 million and $735.1 million as of June 30, 2019 and December 31, 2018, respectively. Net gains of $0.9 million and net losses of $3.9 million, related to these contracts were recognized as a component of other income (expense), net for the three and six months ended June 30, 2019, respectively, compared to net gains of $5.2 million and net losses of $0.4 million, respectively, in the prior year comparative periods.

Summary of Derivatives

While certain of our derivative instruments are subject to netting arrangements with our counterparties, we do not offset derivative assets and liabilities in our condensed consolidated balance sheets. The amounts in the table below would not be materially different if the derivative assets and liabilities were offset.

The following table summarizes the fair value and presentation in our condensed consolidated balance sheets of our outstanding derivative instruments, including those designated as hedging instruments:

(In millions)	Balance Sheet Location	As of June 30, 2019	As of December 31, 2018
Cash Flow Hedging Instruments:			
Asset derivative instruments	Other current assets	$ 81.8	$ 65.8
Liability derivative instruments	Accrued expenses and other	$ 5.5	$ 6.9
	Other long-term liabilities	$ 2.2	$ —
Fair Value Hedging Instruments:			
Liability derivative instruments	Other long-term liabilities	$ 5.5	$ 14.5
Other Derivatives:			
Asset derivative instruments	Other current assets	$ 6.4	$ 1.1
Liability derivative instruments	Accrued expenses and other	$ 4.3	$ 3.2

10. Property, Plant and Equipment

Property, plant and equipment are recorded at historical cost, net of accumulated depreciation. Accumulated depreciation on property, plant and equipment was $1,886.2 million and $1,797.4 million as of June 30, 2019 and December 31, 2018, respectively. For the three and six months ended June 30, 2019, depreciation expense totaled $47.0 million and $99.9 million, respectively, compared to $64.2 million and $129.2 million, respectively, in the prior year comparative periods.

Solothurn, Switzerland Facility

We are building a large-scale biologics manufacturing facility in Solothurn, Switzerland. We expect this facility to be partially operational by the end of 2020. 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 June 30, 2019 and December 31, 2018, we had approximately $1.8 billion and $1.6 billion, respectively, capitalized as construction in progress related to this facility. As of June 30, 2019, we had contractual commitments of approximately $57.0 million outstanding related to the construction of this facility.

Proposed Divestiture of Hillerød, Denmark Manufacturing Operations

In March 2019 we entered into a share purchase agreement with FUJIFILM under which FUJIFILM will acquire all of the outstanding shares of our subsidiary that owns our biologics manufacturing operations in Hillerød, Denmark. As a result, $641.9 million of property, plant and equipment, which is primarily comprised of $318.4 million for buildings and $290.8 million for machinery and equipment, was reclassified to assets held for sale in our condensed consolidated balance sheets as of June 30, 2019. Additionally, we ceased recording depreciation on these assets as depreciation is not recorded during the period in which a long-lived asset or disposal group is classified as held for sale, even if the asset or disposal group continues to generate revenue during the period. For additional information on the proposed divestiture of our Hillerød, Denmark manufacturing operations, please read Note 3, *Divestitures*, to these condensed consolidated financial statements.

11. Leases

We lease real estate, including laboratory and office space, and certain equipment.

Our leases have remaining lease terms ranging from less than one year to nine years. Certain leases include one or more options to renew, exercised at our sole discretion, with renewal terms that can extend the lease term from one year to six years.

In addition, we sublease certain real estate to third parties. Our sublease portfolio consists of operating leases, with remaining lease terms ranging from less than one year to nine years. Our subleases do not include an option to renew as they are coterminous with our operating leases.

All of our leases qualify as operating leases. The following table summarizes the presentation in our condensed consolidated balance sheets of our operating leases:

(In millions)	Balance sheet location	As of June 30, 2019
Assets:		
Operating lease assets	Operating lease assets	$ 434.4
Liabilities		
Current operating lease liabilities	Accrued expenses and other	$ 72.3
Non-current operating lease liabilities	Long-term operating lease liabilities	423.0
Total operating lease liabilities		$ 495.3

The following table summarizes the effect of lease costs in our condensed consolidated statements of income:

(In millions)	Income Statement Location	For the Three Months Ended June 30, 2019	For the Six Months Ended June 30, 2019
Operating lease cost	Research and development	$ 3.4	$ 3.7
	Selling, general and administrative	17.9	41.4
Sublease income	Selling, general and administrative	(6.0)	(13.1)
	Other (income) expense, net	(0.9)	(1.9)
Net lease cost		$ 14.4	$ 30.1

The minimum lease payments for the next five years and thereafter is expected to be as follows:

(In millions)	As of June 30, 2019
2019 (remaining six months)	$ 50.2
2020	80.5
2021	74.9
2022	70.9
2023	69.4
2024	66.7
Thereafter	147.6
Total lease payments	$ 560.2
Less: interest	64.9
Present value of operating lease liabilities	$ 495.3

Under the prior lease guidance minimum rental commitments under non-cancelable leases, net of income from subleases, for each of the next five years and total thereafter as of December 31, 2018, were as follows:

(In millions)	2019	2020	2021	2022	2023	Thereafter	Total
Minimum lease payments	$ 87.0	$ 80.7	$ 75.9	$ 71.7	$ 71.0	$ 215.3	$ 601.6
Less: income from subleases(1)	(26.8)	(25.6)	(23.7)	(24.0)	(24.3)	(58.4)	(182.8)
Net minimum lease payments	$ 60.2	$ 55.1	$ 52.2	$ 47.7	$ 46.7	$ 156.9	$ 418.8

(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.

The weighted average remaining lease term and weighted average discount rate of our operating leases are as follows:

	As of June 30, 2019
Weighted average remaining lease term in years	7.4
Weighted average discount rate	3.3%

Supplemental disclosure of cash flow information related to our operating leases included in cash flows provided by operating activities in our condensed consolidated statements of cash flows is as follows:

(In millions)	For the Three Months Ended June 30, 2019	For the Six Months Ended June 30, 2019
Cash paid for amounts included in the measurement of lease liabilities	$ 27.4	$ 46.8
Operating lease assets obtained in exchange for lease obligations	$ 7.3	$ 12.7

Proposed Divestiture of Hillerød, Denmark Manufacturing Operations

In March 2019 we entered into a share purchase agreement with FUJIFILM under which FUJIFILM will acquire all of the outstanding shares of our subsidiary that owns our biologics manufacturing operations in Hillerød, Denmark. As a result, $2.2 million of operating lease assets and $2.2 million of operating lease liabilities were reclassified to assets and liabilities held for sale in our condensed consolidated balance sheets as of June 30, 2019. For additional information on the proposed divestiture of our Hillerød, Denmark manufacturing operations, please read Note 3, *Divestitures*, to these condensed consolidated financial statements.

12. Equity

Share Repurchases

In March 2019 our Board of Directors authorized a program to repurchase up to $5.0 billion of our common stock (2019 Share Repurchase Program). Our 2019 Share Repurchase Program does not have an expiration date. All share repurchases under our 2019 Share Repurchase Program will be retired. Under our 2019 Share Repurchase Program, we repurchased and retired approximately 3.9 million shares of our common stock at a cost of approximately $909.9 million during the three and six months ended June 30, 2019. Approximately $4.1 billion remained available under our 2019 Share Repurchase program as of June 30, 2019.

In August 2018 our Board of Directors authorized a program to repurchase up to $3.5 billion of our common stock (2018 Share Repurchase Program), which was completed as of June 30, 2019. All share repurchases under our 2018 Share Repurchase Program were retired. Under our 2018 Share Repurchase Program, we repurchased and retired approximately 6.5 million and 8.9 million shares of our common stock at a cost of approximately $1.5 billion and $2.1 billion during the three and six months ended June 30, 2019, respectively.

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), which was completed as of June 30, 2018. All share repurchases under our 2016 Share Repurchase Program were retired. Under our 2016 Share Repurchase Program, we repurchased and retired approximately 9.6 million and 10.5 million shares of our common stock at a cost of approximately $2.75 billion and $3.0 billion during the three and six months ended June 30, 2018, respectively.

Accumulated Other Comprehensive Income (Loss)

The following tables summarize 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	Gains (Losses) on Net Investment Hedge	Unfunded Status of Postretirement Benefit Plans, Net of Tax	Currency Translation Adjustments	Total
Balance, December 31, 2018	$ (4.0)	$ 34.7	$ 3.5	$ (31.3)	$ (243.3)	$ (240.4)
Other comprehensive income (loss) before reclassifications	11.0	22.3	30.1	0.7	(28.1)	36.0
Amounts reclassified from accumulated other comprehensive income (loss)	(0.8)	(43.3)	(4.4)	—	—	(48.5)
Net current period other comprehensive income (loss)	10.2	(21.0)	25.7	0.7	(28.1)	(12.5)
Balance, June 30, 2019	$ 6.2	$ 13.7	$ 29.2	$ (30.6)	$ (271.4)	$ (252.9)

BIOGEN INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(unaudited, continued)

(In millions)	Unrealized Gains (Losses) on Securities Available for Sale, Net of Tax	Unrealized Gains (Losses) on Cash Flow Hedges, Net of Tax	Gains (Losses) on Net Investment Hedge	Unfunded Status of Postretirement Benefit Plans, Net of Tax	Currency Translation Adjustments	Total
Balance, December 31, 2017	$ (1.6)	$ (104.5)	$ —	$ (36.8)	$ (175.5)	$ (318.4)
Amounts reclassified, net of tax, upon adoption of ASU No. 2016-01	1.5	—	—	—	—	1.5
Balance, January 1, 2018	(0.1)	(104.5)	—	(36.8)	(175.5)	(316.9)
Other comprehensive income (loss) before reclassifications	(7.6)	61.7	—	0.4	(47.3)	7.2
Amounts reclassified from accumulated other comprehensive income (loss)	6.0	42.1	—	—	—	48.1
Net current period other comprehensive income (loss)	(1.6)	103.8	—	0.4	(47.3)	55.3
Balance, June 30, 2018	$ (1.7)	$ (0.7)	$ —	$ (36.4)	$ (222.8)	$ (261.6)

The following table summarizes the amounts reclassified from accumulated other comprehensive income:

		Amounts Reclassified from Accumulated Other Comprehensive Income			
		For the Three Months Ended June 30,		For the Six Months Ended June 30,	
(In millions)	Income Statement Location	2019	2018	2019	2018
Gains (losses) on securities available for sale	Other income (expense)	$ 0.7	$ —	$ 1.0	$ (7.6)
	Income tax benefit (expense)	(0.1)	—	(0.2)	1.6
Gains (losses) on cash flow hedges	Revenues	29.8	(10.4)	44.6	(43.3)
	Operating expenses	(0.7)	(0.4)	(1.2)	0.9
	Other income (expense)	—	—	0.1	0.1
	Income tax benefit (expense)	(0.1)	0.1	(0.2)	0.2
Gains (losses) on net investment hedge	Other income (expense)	2.2	—	4.4	—
	Income tax benefit (expense)	—	—	—	—
Total reclassifications, net of tax		$ 31.8	$ (10.7)	$ 48.5	$ (48.1)

13. Earnings per Share

Basic and diluted earnings per share are calculated as follows:

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
(In millions)	2019	2018	2019	2018
Numerator:				
Net income attributable to Biogen Inc.	$ 1,494.1	$ 866.6	$ 2,902.9	$ 2,039.5
Denominator:				
Weighted average number of common shares outstanding	190.3	207.1	193.4	209.2
Effect of dilutive securities:				
Stock options and employee stock purchase plan	—	—	—	—
Time-vested restricted stock units	0.1	0.1	0.2	0.2
Market stock units	—	0.1	0.1	0.1
Performance stock units settled in stock	—	—	—	—
Dilutive potential common shares	0.1	0.2	0.3	0.3
Shares used in calculating diluted earnings per share	190.4	207.3	193.7	209.5

Amounts excluded from the calculation of net income per diluted share because their effects were anti-dilutive were insignificant.

14. Share-based Payments

Share-based Compensation Expense

The following table summarizes share-based compensation expense included in our condensed consolidated statements of income:

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
(In millions)	2019	2018	2019	2018
Research and development	$ 28.1	$ 17.6	$ 49.8	$ 39.5
Selling, general and administrative	54.8	25.2	82.6	53.7
Subtotal	82.9	42.8	132.4	93.2
Capitalized share-based compensation costs	(2.8)	(2.8)	(6.1)	(6.2)
Share-based compensation expense included in total cost and expenses	80.1	40.0	126.3	87.0
Income tax effect	(13.6)	(6.5)	(21.0)	(14.1)
Share-based compensation expense included in net income attributable to Biogen Inc.	$ 66.5	$ 33.5	$ 105.3	$ 72.9

The following table summarizes share-based compensation expense associated with each of our share-based compensation programs:

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
(In millions)	2019	2018	2019	2018
Market stock units	$ 7.8	$ 7.1	$ 15.5	$ 13.2
Time-vested restricted stock units	31.8	30.6	66.5	66.7
Cash settled performance units	0.4	(0.7)	(0.6)	3.6
Performance units	0.3	2.0	0.8	1.2
Performance stock units settled in stock	12.1	1.4	14.1	2.1
Performance stock units settled in cash	0.9	0.3	1.9	0.4
Employee stock purchase plan	3.4	2.1	8.0	6.0
NST stock options	26.2	—	26.2	—
Subtotal	82.9	42.8	132.4	93.2
Capitalized share-based compensation costs	(2.8)	(2.8)	(6.1)	(6.2)
Share-based compensation expense included in total cost and expenses	$ 80.1	$ 40.0	$ 126.3	$ 87.0

We estimate the fair value of our obligations associated with our performance units, cash settled performance units and performance stock units settled in cash at the end of each reporting period through expected settlement. Cumulative adjustments to these obligations are recognized each quarter to reflect changes in the stock price and estimated outcome of the performance-related conditions.

Stock option expense reflects the accelerated vesting of stock options previously granted to NST employees as a result of our acquisition of NST. For additional information on our acquisition of NST, please read Note 2, *Acquisitions*, to these condensed consolidated financial statements.

15. Income Taxes

Tax Rate

A reconciliation between the U.S. federal statutory tax rate and our effective tax rate is summarized as follows:

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
	2019	2018	2019	2018
Statutory rate	21.0 %	21.0 %	21.0 %	21.0 %
State taxes	0.9	0.6	0.6	0.8
Taxes on foreign earnings	(4.6)	(1.8)	(4.6)	(2.0)
Credits and net operating loss utilization	(0.9)	(0.7)	(0.8)	(0.8)
Purchased intangible assets	0.4	0.6	0.4	0.6
Denmark assets held for sale	—	—	2.2	—
Internal reorganization of certain intellectual property rights	(5.0)	—	(2.4)	—
Global Intangible Low-Taxed Income (GILTI)	1.4	1.8	1.7	1.6
Other permanent items	0.4	0.4	0.3	0.4
Other	0.5	0.5	0.1	0.3
Effective tax rate	14.1 %	22.4 %	18.5 %	21.9 %

Changes in Tax Rate

For the three months ended June 30, 2019, compared to the same period in 2018, the decrease in our effective tax rate was primarily due to the combination of an internal reorganization of certain intellectual property rights related to the intercompany sale of the intellectual property (the effective tax rate decrease from this internal reorganization is not expected to recur post 2019) and a higher effective tax rate in 2018 resulting from the sale of

inventory, the tax effect of which had been included within prepaid taxes at January 1, 2018, at a higher effective tax rate.

For the six months ended June 30, 2019, compared to the same period in 2018, the decrease in our effective tax rate was primarily due to the combination of the internal reorganization of certain intellectual property rights, offset by a $61.3 million tax expense related to the proposed divestiture of our subsidiary that owns our Hillerød, Denmark manufacturing operations and a higher effective tax rate in 2018 resulting from the sale of inventory, the tax effect of which had been included within prepaid taxes at January 1, 2018, at a higher effective tax rate.

Specifically in regard to the Hillerød, Denmark manufacturing operations, although we are recognizing a loss on the proposed divestiture of such subsidiary, the proposed divestiture requires us to write off certain deferred tax assets upon the classification of the operations as held for sale and results in a taxable gain in certain jurisdictions.

As a result of the internal reorganization of certain intellectual property rights, we have recorded a deferred tax asset of $856.7 million and a deferred tax liability of $685.3 million in the second quarter of 2019.

Accounting for Uncertainty in Income Taxes

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.

The U.S. 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.

Federal and State Uncertain Tax Positions

It is reasonably possible that we will adjust the value of our uncertain tax positions related to certain transfer pricing, collaboration and other issues as we receive additional information from various taxing authorities, including reaching settlements with such authorities.

International Uncertain Tax Positions

We have made payments totaling approximately $60.0 million to the Danish Tax Authority (SKAT) for assessments received for 2009, 2011 and 2013 regarding withholding taxes on certain payments made by our subsidiary that owns our biologics manufacturing operations in Hillerød, Denmark. We continue to dispute the assessments for all of these periods and believe that the tax positions taken related to these payments are valid. Any amount refunded by SKAT associated with this withholding tax receivable will be paid to our subsidiary that owns our biologics manufacturing operations in Hillerød, Denmark.

Proposed Divestiture of Hillerød, Denmark Manufacturing Operations

In March 2019 we entered into a share purchase agreement with FUJIFILM under which FUJIFILM will acquire all of the outstanding shares of our subsidiary that owns our biologics manufacturing operations in Hillerød, Denmark. This withholding tax receivable from SKAT will be included within the assets that will be transferred to FUJIFILM as part of the proposed transaction. Under the share purchase agreement, FUJIFILM is required to remit any future proceeds refunded by SKAT to us. We have assessed the collectability of the receivable from FUJIFILM and regard it as a contingent gain, which does not meet the probable threshold for recognition under ASC 450, *Contingencies*, and therefore we have recorded a pre-tax charge of $60.0 million to write the asset down to zero as a component of the loss on assets and liabilities held for sale in the first quarter of 2019.

We have also reclassified $53.8 million of our deferred tax liability to liabilities held for sale in our condensed consolidated balance sheets as of June 30, 2019.

For additional information on the proposed divestiture of our Hillerød, Denmark manufacturing operations, please read Note 3, *Divestitures*, to these condensed consolidated financial statements.

16. Other Consolidated Financial Statement Detail

Other Income (Expense), Net

Components of other income (expense), net, are summarized as follows:

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
(In millions)	2019	2018	2019	2018
Interest income	$ 29.1	$ 28.7	$ 60.3	$ 55.4
Interest expense	(47.7)	(51.7)	(95.6)	(102.2)
Gain (loss) on investments, net	(173.4)	5.3	203.0	(9.1)
Foreign exchange gains (losses), net	1.7	(13.0)	(0.5)	(14.0)
Other, net	(7.1)	(3.8)	(7.3)	(5.6)
Total other income (expense), net	$ (197.4)	$ (34.5)	$ 159.9	$ (75.5)

Gain (loss) on investments, net, as reflected in the table above, relate to debt securities, equity securities of certain biotechnology companies, venture capital funds where the underlying investments are in equity securities of certain biotechnology companies and non-marketable equity securities.

The following table summarizes our gain (loss) on investments, net that relates to our equity securities held as of June 30, 2019:

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
(In millions)	2019	2018	2019	2018
Net gains (losses) recognized during the period on equity securities	(174.2)	5.4	201.9	(1.5)
Less: Net gains (losses) recognized during the period on equity securities sold during the period	(42.9)	—	42.4	(0.5)
Unrealized gains (losses) recognized during the period on equity securities held as of June 30, 2019	(131.3)	5.4	159.5	(1.0)

Accrued Expenses and Other

Accrued expenses and other consists of the following:

(In millions)	As of June 30, 2019	As of December 31, 2018
Revenue-related reserves for discounts and allowances	$ 863.5	$ 874.7
Royalties and licensing fees	212.8	224.7
Employee compensation and benefits	199.4	320.9
Current portion of contingent consideration obligations	146.2	444.8
Collaboration expenses	130.4	261.6
Construction in progress	38.2	125.2
Other	727.5	609.3
Total accrued expenses and other	$ 2,318.0	$ 2,861.2

Other Long-term Liabilities

Other long-term liabilities were $1,355.8 million and $1,389.4 million as of June 30, 2019 and December 31, 2018, respectively, and included accrued income taxes totaling $801.5 million and $791.4 million, respectively.

17. Collaborative and Other Relationships

Eisai Co., Ltd.

BAN2401 and Elenbecestat Collaboration

We have a collaboration agreement with Eisai Co., Ltd. (Eisai) to jointly develop and commercialize BAN2401, a monoclonal antibody that targets amyloid beta aggregates, and elenbecestat, the oral BACE (base amyloid cleaving enzyme) inhibitor, two Eisai product candidates for the treatment of AD (the BAN2401 and Elenbecestat Collaboration).

The BAN2401 and Elenbecestat Collaboration 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). 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.

For additional information on our BAN2401 and Elenbecestat Collaboration, please read Note 19, *Collaborative and Other Relationships*, to our consolidated financial statements included in our 2018 Form 10-K.

For the three and six months ended June 30, 2019 and 2018, sales and marketing expense related to the BAN2401 and Elenbecestat Collaboration was immaterial.

A summary of development expense related to the BAN2401 and Elenbecestat Collaboration is as follows:

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
(In millions)	2019	2018	2019	2018
Total development expense incurred by the collaboration related to the advancement of BAN2401 and Elenbecestat	$ 68.6	$ 54.6	$ 136.6	$ 111.1
Biogen's share of BAN2401 and Elenbecestat development expense reflected in research and development expense in our condensed consolidated statements of income	$ 34.3	$ 27.3	$ 68.3	$ 55.5

Aducanumab Collaboration Agreement

For the period through March 31, 2018, we were responsible for 100% of development costs incurred by the collaboration for the advancement of aducanumab (aducanumab development expense). For the period April 1, 2018 through December 31, 2018, Eisai reimbursed us for 15% of aducanumab development expense incurred and, beginning January 1, 2019, is reimbursing us for 45% of aducanumab development expense incurred.

In March 2019 we and Eisai announced the decision to discontinue the global Phase 3 trials, ENGAGE and EMERGE, designed to evaluate the efficacy and safety of aducanumab in patients with mild cognitive impairment due to AD and mild AD dementia. As a result of this decision, in the first quarter of 2019, we accrued approximately $45.0 million related to the termination of various clinical trials and research and development contracts net of the expected 45% Eisai reimbursement of development costs incurred by the collaboration for the advancement of aducanumab.

Sales and marketing expense incurred was shared in proportion to the same region-based profit split that would have been utilized to co-promote aducanumab had it been commercialized. For additional information on the Aducanumab Collaboration Agreement, please read Note 19, *Collaborative and Other Relationships*, to our consolidated financial statements included in our 2018 Form 10-K.

A summary of development and sales and marketing expense related to the Aducanumab Collaboration Agreement is as follows:

	For the Three Months Ended June 30,		For the Six Months Ended June 30,	
(In millions)	2019	2018	2019	2018
Total aducanumab development expense	$ 3.2	$ 76.5	$ 165.8	$ 140.0
Biogen's share of aducanumab development expense reflected in research and development expense in our condensed consolidated statements of income	$ 1.7	$ 65.0	$ 91.2	$ 128.5
Total aducanumab sales and marketing expense incurred by the collaboration	$ 0.2	$ 14.0	$ 21.2	$ 21.2
Biogen's share of aducanumab sales and marketing expense reflected in selling, general and administrative expense in our condensed consolidated statements of income	$ 0.1	$ 9.2	$ 11.7	$ 13.9

In addition, we and Eisai co-promote AVONEX, TYSABRI and TECFIDERA in Japan in certain settings and Eisai distributes AVONEX, TYSABRI, TECFIDERA and PLEGRIDY in India and other Asia-Pacific markets, excluding China.

Other Research and Discovery Arrangements

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.

Skyhawk Therapeutics, Inc.

In January 2019 we entered into a collaboration and research and development services agreement with Skyhawk Therapeutics, Inc. (Skyhawk) pursuant to which the companies will leverage Skyhawk's SkySTAR technology platform with the goal of discovering innovative small molecule treatments for patients with neurological diseases, including MS and SMA. We will be responsible for the development and potential commercialization of any therapies resulting from this collaboration and we may also pay Skyhawk up to a total of approximately $2.0 billion in additional milestone payments as well as potential royalties on net commercial sales.

In connection with this agreement, we made an upfront payment of $74.0 million to Skyhawk, of which $38.5 million was recorded as research and development expense in our condensed consolidated statements of income and $35.5 million was recorded as prepaid research and development expenditures within investments and other assets in our condensed consolidated balance sheets and will be expensed as the services are provided.

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 products. In June 2018 we exercised our option under our joint venture agreement to increase our ownership percentage in Samsung Bioepis from approximately 5% to approximately 49.9%. The share purchase transaction was completed in November 2018 and, upon closing, we paid 759.5 billion South Korean won ($676.6 million) to Samsung BioLogics. As of June 30, 2019, our ownership percentage remained at approximately 49.9%.

We recognize our share of the results of operations related to our investment in Samsung Bioepis under the equity method of accounting one quarter in arrears when the results of the entity become available, which is reflected as equity in income (loss) of investee, net of tax in our condensed consolidated statements of income. During 2015, as our share of losses exceeded the carrying value of our initial investment, we suspended recognizing additional losses. In the first quarter of 2019 we restarted recognizing our share of Samsung Bioepis' income (losses), and we began recognizing amortization on certain basis differences resulting from our November 2018 investment.

Upon investment, the equity method of accounting requires us to identify and allocate differences between the fair value of our investment and the carrying value of our interest in the underlying net assets of the investee. These

basis differences are amortized over their economic life. The total basis difference was approximately $675 million, consisting of approximately $115 million attributed to inventory, approximately $615 million attributed to developed technology and approximately $170 million attributed to IPR&D. A deferred tax liability of $225 million was established for the acquired assets that had no tax basis. The basis differences related to inventory and developed technology will be amortized, net of tax, over their estimated useful lives of 1.5 years and 15 years, respectively, one quarter in arrears.

Our joint venture partner, Samsung BioLogics, is currently subject to an ongoing criminal investigation that we continue to monitor. While this investigation could impact the operations of Samsung Bioepis and its business, we have assessed the value of our investment in Samsung Bioepis and continue to believe that the fair value of the investment is in excess of its net book value.

For the three and six months ended June 30, 2019, we recognized losses on our investment of $16.3 million and $45.0 million, respectively. These losses reflect our share of income totaling $5.5 million and losses totaling $8.5 million, respectively, and amortization of basis differences totaling $21.8 million and $36.5 million, respectively.

As of June 30, 2019 and December 31, 2018, the carrying value of our investment in Samsung Bioepis totaled 712.8 billion South Korean won ($615.5 million) and 759.5 billion South Korean won ($680.6 million), respectively, which is classified as a component of investments and other assets in our condensed consolidated balance sheets.

Commercial Agreement

We reflect revenues on sales of BENEPALI, IMRALDI and FLIXABI to third parties in product revenues, net in our condensed consolidated statements of income and record the related cost of revenues and sales and marketing expenses in our condensed 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, which is recognized in collaboration profit (loss) sharing in our condensed consolidated statements of income. For the three and six months ended June 30, 2019, we recognized net profit-sharing expense of $63.4 million and $121.5 million, respectively, to reflect Samsung Bioepis' 50% sharing of the net collaboration profits, compared to $39.7 million and $83.5 million, respectively, in the prior year comparative periods.

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. For the three and six months ended June 30, 2019, we recognized $52.2 million and $77.0 million, respectively, in revenues related to these services, which is reflected in collaborative and other relationships revenues as a component of other revenues in our condensed consolidated statements of income, compared to $14.7 million and $32.6 million, respectively, in the prior year comparative periods.

For additional information on our collaboration arrangement with Samsung Bioepis and our other significant collaboration arrangements, please read Note 19, *Collaborative and Other Relationships,* to our consolidated financial statements included in our 2018 Form 10-K.

18. Investments in Variable Interest Entities

Consolidated Variable Interest Entities

Our condensed 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 SubOne AG

We have a collaboration and license agreement with Neurimmune SubOne AG (Neurimmune) for the development and commercialization of antibodies for the treatment of AD, including aducanumab. 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.

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.

In March 2019 we and Eisai announced the decision to discontinue the global Phase 3 trials, ENGAGE and EMERGE, of aducanumab.

Research and development costs for which we reimbursed Neurimmune are reflected in research and development expense in our condensed consolidated statements of income. During the three and six months ended June 30, 2019 and 2018, amounts reimbursed were immaterial.

The assets and liabilities of Neurimmune are not significant to our condensed consolidated financial position or results of operations as it is a research and development organization. We have provided no financing to Neurimmune other than contractually required amounts.

Unconsolidated Variable Interest Entities

We have relationships with 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 June 30, 2019 and December 31, 2018, the carrying value of our investments in certain biotechnology companies representing potential unconsolidated variable interest entities totaled $24.0 million and $28.7 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 condensed consolidated statements of income as they are incurred. We have provided no financing to these variable interest entities other than previously contractually required amounts.

For additional information on our investments in Neurimmune and other variable interest entities, please read Note 20, *Investments in Variable Interest Entities,* to our consolidated financial statements included in our 2018 Form 10-K.

19. 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 our consolidated financial statements included in our 2018 Form 10-K.

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

IMRALDI Patent Litigation

In September 2018 Fresenius Kabi Deutschland GmbH (Fresenius Kabi) commenced proceedings for damages and injunctive relief against Biogen France SAS in the Tribunal de Grande Instance de Paris, alleging that IMRALDI, the adalimumab biosimilar product of Samsung Bioepis UK Limited that Biogen commercializes in Europe, infringes the French counterpart of European Patent No. 3 148 510 (the '510 Patent), which was issued in June 2018 and expires in May 2035. A hearing has been scheduled for late 2019.

In October 2018 Fresenius Kabi commenced preliminary injunction proceedings against Biogen (Denmark) Manufacturing ApS and Biogen Denmark A/S in Denmark's Maritime and Commercial High Court alleging infringement of the Danish Utility Models. In June 2019 the Danish court denied Fresenius Kabi's request for a preliminary injunction and Fresenius Kabi has appealed that decision.

In November 2018 Fresenius Kabi commenced infringement proceedings for damages and injunctive relief against Biogen Italia S.R.L. in the District Court of Milan relating to the Italian counterpart of the '510 Patent, and against Biogen GmbH in the Düsseldorf Regional Court relating to the German counterpart of the '510 Patent. A hearing in the proceeding in Germany has been set for March 2020. No hearing has been set in the proceeding in Italy.

An estimate of the possible loss or range of loss in the above matters cannot be made at this time.

In August 2018 Biogen Idec Ltd. (Biogen UK) and Samsung Bioepis UK Limited filed an action in the United Kingdom Patents Court to revoke the United Kingdom counterpart of the '510 Patent. Fresenius Kabi counterclaimed for infringement, damages and injunctive relief. In July 2019 the United Kingdom Patents Court entered a consent order in which it declared that the United Kingdom counterpart of the '510 Patent is invalid, ordered the patent revoked and dismissed Fresenius Kabi's counterclaims.

In December 2018 Biogen B.V. and Samsung Bioepis UK Limited filed an action in the District Court of the Hague, Netherlands to revoke the Dutch counterpart of the '510 Patent. A trial is scheduled in the Dutch matter for October 2019.

In July 2019 Gedeon Richter PLC commenced proceedings against Biogen GmbH in the Düsseldorf Regional Court alleging infringement of the German counterpart of European Patent No. 3 212 667, which was issued in September 2018 and expires in October 2035, and seeking damages and injunctive relief. A hearing has been set for November 2020. An estimate of the possible loss or range of loss cannot be made at this time.

Qui Tam Litigation

In July 2015 a qui tam action filed by Michael Bawduniak on behalf of the U.S. 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 was denied in part. No trial date has been set. The U.S. has not made an intervention decision. An estimate of the possible loss or range of loss cannot be made at this time.

In July 2018 we and certain other drug manufacturers and pharmacy benefit managers were served with a qui tam action filed by John Borzilleri on behalf of the U.S. and certain states in the U.S. District Court for the District of Rhode Island. The case was filed under seal in January 2014 and unsealed in April 2018 after the U.S. declined to intervene. The case alleges agreements with pharmacy benefit managers 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. We, the other defendants and the U.S. have moved to dismiss the case and the motions are pending. No trial date has been set. 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 in October 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. In June 2019 the U.S. Court of Appeals for the First Circuit affirmed the judgment below dismissing the complaint with prejudice.

Other Matters

Hatch-Waxman Act Litigation relating to TECFIDERA Orange-Book Listed Patents

In 2017, 2018 and 2019 we initiated patent infringement proceedings against multiple parties pursuant to the Drug Price Competition and Patent Term Restoration Act of 1984, commonly known as the Hatch-Waxman Act, in the U.S. District Courts.

Patent infringement proceedings pursuant to the Hatch-Waxman Act are pending against Accord Healthcare Inc., Alkem Laboratories Ltd., Amneal Pharmaceuticals LLC, Aurobindo Pharma U.S.A., Inc., Banner Life Sciences LLC, Cipla Limited, Glenmark Pharmaceuticals Ltd., Graviti Pharmaceuticals Pvt. Ltd., Hetero USA Inc., Lupin Atlantis Holdings SA, Macleods Pharmaceuticals, Ltd., MSN Laboratories Pvt. Ltd., Pharmathen S.A., Prinston Pharmaceutical Inc., Sandoz Inc., Sawai USA, Inc., Shilpa Medicare Limited, Slayback Pharma LLC, Torrent Pharmaceuticals Ltd., TWi Pharmaceuticals, Inc., Windlas Healthcare Pvt. Ltd. and Zydus Pharmaceuticals (USA) Inc. in the U.S. District Court for the District of Delaware and against Mylan Pharmaceuticals Inc. in the U.S. District Court for the Northern District of West Virginia.

A trial date has not been set in the Delaware action against Banner Life Sciences LLC. A trial date has been set for December 2019 in the other Delaware actions, and a trial date has been set for February 2020 in the West Virginia action against Mylan Pharmaceuticals Inc.

Petition for Inter Partes Review

In July 2018 Mylan Pharmaceuticals Inc. filed a petition with the U.S. Patent Trial and Appeal Board seeking *inter partes* review of 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 per day as provided for in our TECFIDERA label. On February 6, 2019, the U.S. Patent Trial and Appeal Board instituted *inter partes* review of the '514 Patent.

European Patent Office Oppositions

In 2016 the European Patent Office (EPO) revoked our European patent number 2 137 537 (the '537 Patent), which includes claims covering the treatment of MS with 480 mg of dimethyl fumarate as provided for in our TECFIDERA label. We have appealed to the Technical Boards of Appeal of the EPO and the appeal is pending. A hearing has been set for March 2020.

In March 2018 the EPO revoked Forward Pharma's European Patent No. 2 801 355, which expires in October 2025. Forward Pharma has filed an appeal to the Technical Boards of Appeal of the EPO and the appeal is pending. A hearing has been set for June 2020. 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 Boards of Appeal and the Enlarged Board of Appeal, if applicable, to make a final determination.

TYSABRI Patent Revocation Matters

In November 2017 Bioeq GMBH, affiliated with the Polpharma Group, brought an action in the Polish Patent Office seeking to revoke Polish Patent Number 215263 (the Polish '263 Patent), the Polish patent corresponding to our European Patent Number 1 485 127 (the EU '127 Patent) ("Administration of agents to treat inflammation"). The Polish '263 Patent concerns administration of natalizumab (TYSABRI) to treat MS. The Polish '263 Patent expires in February 2023.

Swiss Pharma International AG, also affiliated with the Polpharma Group, filed actions in the District Court of The Hague (January 2016), the German Patents Court (March 2016) and the Commercial Court of Rome (November 2017) seeking to invalidate the Dutch, German and Italian counterparts of the EU '127 Patent, which also concerns administration of natalizumab (TYSABRI) to treat MS and expires in February 2023. The Dutch and German counterparts were ruled invalid and we have appealed. No date for a hearing on the merits has been set in the Italian action.

'755 Patent Litigation

In May 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 (the '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, Pfizer, Novartis and EMD Serono filed counterclaims seeking declaratory judgments of patent invalidity and non-infringement and seeking monetary relief in the form of costs and attorneys' fees. 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 '755 Patent is invalid, and seeking monetary relief in the form of attorneys' fees, costs and expenses.

In September 2018 the trial court entered judgment against EMD Serono and Pfizer that the '755 Patent is infringed and valid and ordered a new trial on damages. In October 2018 EMD Serono and Pfizer filed an appeal from the judgment in the U.S. Court of Appeals for the Federal Circuit, which is pending. The trial court has not yet scheduled the new damages trial or a trial against Bayer and Novartis.

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 assist patients taking drugs sold by Biogen and Biogen's co-pay assistance programs. We are cooperating with the government.

Tax Matter

In the second quarter of 2018 the State Treasury of Goias, Brazil issued tax assessments for the period 2013 through February 2018 relating to tax on the circulation of goods and totaling approximately $70.0 million including interest and penalties. We dispute the assessments and have filed defenses with the Administrative Court of Appeals for the State of Goias, which are pending. We have not formed an opinion that an unfavorable outcome of the dispute is either probable or remote.

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.

Item 2. *Management's Discussion and Analysis of Financial Condition and Results of Operations*

The following discussion should be read in conjunction with our unaudited condensed consolidated financial statements (condensed consolidated financial statements) and the accompanying notes beginning on page 5 of this quarterly report on Form 10-Q and our audited consolidated financial statements and the accompanying notes included in our Annual Report on Form 10-K for the year ended December 31, 2018 (2018 Form 10-K).

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 as well as related therapeutic adjacencies. Our core growth areas include multiple sclerosis (MS) and neuroimmunology, neuromuscular disorders, including spinal muscular atrophy (SMA) and amyotrophic lateral sclerosis (ALS), movement disorders, including Parkinson's disease and progressive supranuclear palsy (PSP), Alzheimer's disease (AD) and dementia and ophthalmology. We are also focused on discovering, developing and delivering worldwide innovative therapies in our emerging growth areas of immunology, neurocognitive disorders, acute neurology and pain. In addition, we commercialize biosimilars of advanced biologics. We support our drug discovery and development efforts through the commitment of significant resources to discovery, research and development programs and business development opportunities.

Our marketed products include TECFIDERA, AVONEX, PLEGRIDY, TYSABRI 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, RITUXAN HYCELA for the treatment of non-Hodgkin's lymphoma and CLL, 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 pursuant to our collaboration arrangements with Genentech, Inc. (Genentech), a wholly-owned member of the Roche Group. For additional information on our collaboration arrangements with Genentech, please read Note 19, *Collaborative and Other Relationships*, to our consolidated financial statements included in our 2018 Form 10-K.

Our revenues depend upon continued sales of our products, as well as the financial rights we have in our anti-CD20 therapeutic programs, and, unless we develop, acquire rights to and/or commercialize new products and technologies, we will be substantially dependent on sales from our products and our financial rights in our anti-CD20 therapeutic programs for many years. Additionally, a significant portion of our revenues are concentrated on sales of our products in increasingly competitive markets.

In the longer term, our revenue growth will depend 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. Drug development and commercialization involve a high degree of risk, and only a small number of research and development programs result in commercialization of a product. Results in early stage clinical trials may not be indicative of full results or results from later stage or larger scale clinical trials and do not ensure regulatory approval.

Our innovative drug development and commercialization activities are complemented by our biosimilar products that expand access to medicines and reduce the cost burden for healthcare systems. Through Samsung Bioepis Co., Ltd. (Samsung Bioepis), our joint venture with Samsung BioLogics Co., Ltd. (Samsung BioLogics), we market and sell BENEPALI, an etanercept biosimilar referencing ENBREL, IMRALDI, an adalimumab biosimilar referencing HUMIRA, and FLIXABI, an infliximab biosimilar referencing REMICADE, in the E.U. For additional information on our collaboration arrangement with Samsung Bioepis, please read Note 17, *Collaborative and Other Relationships*, to our condensed 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 products, products of our collaborators and pipeline product candidates may negatively impact

future sales of our existing products. Our products may also face increased competitive pressures from the introduction of generic versions, prodrugs of existing therapies, biosimilars of existing products, other products approved under abbreviated regulatory pathways and other technologies.

Sales of our products depend, to a significant extent, on the availability and extent of adequate 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.

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.

Our failure to obtain or maintain adequate coverage, pricing or reimbursement for our products could have an adverse effect on our business, reputation, 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 or could cause a decline or volatility in our stock price.

In addition to the impact of competition, pricing actions and other measures being taken worldwide designed to reduce healthcare costs and limit the overall level of government expenditures, our sales and operations could also be affected by other risks of doing business internationally, including the impact of foreign currency exchange fluctuations, changes in intellectual property legal protections and changes in trade regulations and procedures as well as the impact of the continued uncertainty of the credit and economic conditions in certain countries in Europe.

For additional information on the competition and pricing risks that could negatively impact our product sales, please read Item 3. *Quantitative and Qualitative Disclosures About Market Risk* and Item 1A. *Risk Factors* included in this report.

Brexit

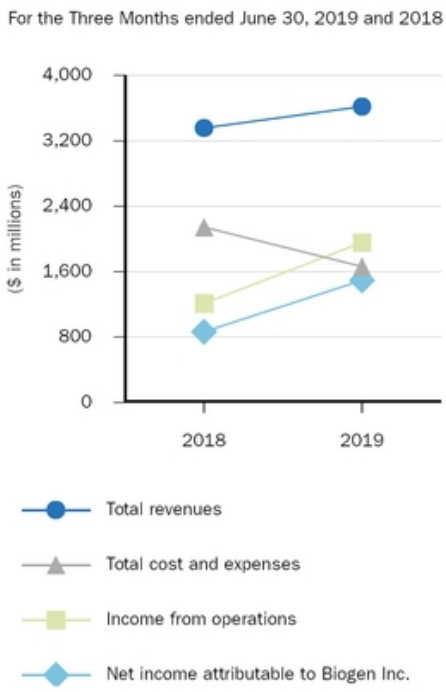
In June 2016 the U.K. electorate voted in a referendum to voluntarily depart from the E.U., known as Brexit. In March 2017 the U.K. government formally notified the European Council of its intention to leave the E.U. and began to negotiate the terms of the future relationship between the U.K. and the E.U. upon exit, which is expected to occur in October 2019.

The potential impact on our results of operations and liquidity resulting from Brexit remains unclear. The actual effects of Brexit will depend upon many factors and significant uncertainty remains with respect to the ultimate resolution of the Brexit negotiations. The final outcome of these negotiations may impact certain of our research, commercial and general business operations in the U.K. and the E.U., including the approval and supply of our products.

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. We do not, however, expect Brexit to have a material impact on our consolidated results of operations as 3.3% and 3.5% of our total product revenues for the three and six months ended June 30, 2019, respectively, and 3.3% and 3.4% for the prior year comparative periods, respectively, were derived from U.K. sales.

We have implemented measures to meet E.U. legal requirements and continue to modify our business operations to prepare for the U.K.'s separation from the E.U. However, we cannot predict the direction Brexit-related developments will take nor the impact of those developments on our European operations and the economies of the markets where we operate. Therefore, we will continue to monitor developments in this area and assess any potential impact on our business and results of operations.

Financial Highlights



Diluted earnings per share attributable to Biogen Inc. was $7.85 for the three months ended June 30, 2019, representing an increase of 87.8% over $4.18 in the same period in 2018.

As described below under *Results of Operations*, our net income and diluted earnings per share attributable to Biogen Inc. for the three months ended June 30, 2019, compared to the three months ended June 30, 2018, reflects the following:

- Total revenues were $3,616.7 million for the second quarter of 2019, representing an increase of 7.8% over $3,356.5 million in the same period in 2018.
- Product revenues, net totaled $2,880.3 million for the second quarter of 2019, representing an increase of 4.5% over $2,757.5 million in the same period in 2018. This increase was primarily due to a 45.4% increase in revenues from our biosimilar products and a 15.5% increase in revenues from SPINRAZA. These increases were partially offset by the unfavorable impact of foreign currency exchange, net of gains recognized related to the settlement of certain cash flow hedge instruments under our foreign currency hedging program, of $24.6 million.
- Revenues from anti-CD20 therapeutic programs totaled $576.4 million for the second quarter of 2019, representing an increase of 17.5% over $490.4 million in the same period in 2018. This increase was primarily due to a 61.8% increase in royalty revenues on sales of OCREVUS.
- Other revenues totaled $160.0 million for the second quarter of 2019, representing an increase of 47.3% over $108.6 million in the same period in 2018. This increase was primarily due to higher contract manufacturing revenues.
- Total cost and expenses were $1,660.8 million for the second quarter of 2019, representing a decrease of 22.5% over $2,143.3 million in the same period in 2018. This decrease was primarily due to a 50.6% decrease in research and development in relation to the prior year recognition of a $486.2 million net charge to research and development expense upon the closing of a 10-year exclusive agreement with Ionis Pharmaceuticals, Inc. (Ionis) to develop novel antisense oligonucleotide drug candidates for a broad range of neurological diseases (the 2018 Ionis Agreement), a decrease in acquired in-process research and development (IPR&D) in relation to the prior year acquisitions of BIIB104 from Pfizer Inc. (Pfizer) and BIIB100 from Karyopharm Therapeutics Inc. (Karyopharm) and a 34.7% decrease in amortization and impairment of acquired intangible assets. These decreases were partially offset by a 13.8% increase in selling, general and administrative expenses and a 13.1% increase in cost of sales.
- Net income attributable to Biogen Inc. was favorably impacted by a decrease in our effective tax rate to 14.1% for the second quarter of 2019, from 22.4% for the same period in 2018, due in part to an internal reorganization of certain intellectual property rights in the second quarter of 2019.

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

- Cash, cash equivalents and marketable securities totaled approximately $4.3 billion and $4.9 billion as of June 30, 2019 and December 31, 2018, respectively.
- We repurchased and retired approximately 6.5 million shares of our common stock at a cost of approximately $1.5 billion during the second quarter of 2019 under a program

authorized by our Board of Directors in August 2018 to repurchase up to $3.5 billion of our common stock (2018 Share Repurchase Program). Our 2018 Share Repurchase Program was completed as of June 30, 2019.

- We repurchased and retired approximately 3.9 million shares of our common stock at a cost of approximately $909.9 million during the second quarter of 2019 under a program authorized by our Board of Directors in March 2019 to repurchase up to $5.0 billion of our common stock (2019 Share Repurchase Program).

Acquisitions, Divestitures, Collaborative and Other Relationships

Skyhawk Therapeutics, Inc.

In January 2019 we entered into a collaboration and research and development services agreement with Skyhawk Therapeutics Inc. (Skyhawk) pursuant to which the companies will leverage Skyhawk's SkySTAR technology platform with the goal of discovering innovative small molecule treatments for patients with neurological diseases, including MS and SMA. In connection with this agreement, we made an upfront payment of $74.0 million to Skyhawk.

For additional information on our collaboration arrangement with Skyhawk, please read Note 17, *Collaborative and Other Relationships*, to our condensed consolidated financial statements included in this report.

Acquisition of Nightstar Therapeutics plc

On June 7, 2019, we completed our acquisition of all of the outstanding shares of Nightstar Therapeutics plc (NST), a clinical-stage gene therapy company focused on adeno-associated virus (AAV) treatments for inherited retinal disorders. As a result of this acquisition, we added two mid-to late-stage clinical assets, as well as preclinical programs, in ophthalmology. These assets include BIIB111 (formerly known as NSR-REP1), which is in Phase 3 development for the potential treatment of choroideremia, a rare, degenerative, X-linked inherited retinal disorder that leads to blindness and has no approved treatments, and BIIB112 (formerly known as NSR-RPGR), which is in Phase 2/3 development for the potential treatment of X-linked retinitis pigmentosa (XLRP), which is a rare inherited retinal disease with no approved treatments.

Under the terms of this acquisition, we paid NST shareholders $25.50 in cash for each issued and outstanding NST share, which totaled $847.6 million.

For additional information on our acquisition of NST, please read Note 2, *Acquisitions*, to our condensed consolidated financial statements included in this report.

Proposed Divestiture of Hillerød, Denmark Manufacturing Operations

In March 2019 we entered into a share purchase agreement with FUJIFILM Corporation (FUJIFILM) under which FUJIFILM will acquire all of the outstanding shares of our subsidiary that owns our biologics manufacturing operations in Hillerød, Denmark. Upon closing of the proposed transaction, we expect to receive up to $890.0 million in cash, subject to certain working capital adjustments and other contractual terms. The proposed transaction remains subject to certain closing conditions. We expect to complete the proposed transaction in the third quarter of 2019.

For additional information on the proposed divestiture of our Hillerød, Denmark manufacturing operations, please read Note 3, *Divestitures,* to our condensed consolidated financial statements included in this report.

Other Key Developments

BIIB098 (diroximel fumarate)

In February 2019 we and Alkermes plc announced that the U.S. Food and Drug Administration (FDA) has accepted for review the New Drug Application (NDA) for diroximel fumarate (BIIB098), a novel oral fumarate in development for the treatment of RMS. The NDA has been assigned a PDUFA (Prescription Drug User Fee Act) target action date in the fourth quarter of 2019. If approved, we intend to market diroximel fumarate under the brand name VUMERITY, which has been conditionally accepted by the FDA and will be confirmed upon approval.

Aducanumab (AB mAb)

In March 2019 we and Eisai Co., Ltd. (Eisai) announced the decision to discontinue the global Phase 3 trials, ENGAGE and EMERGE, designed to evaluate the efficacy and safety of aducanumab in patients with mild cognitive impairment due to AD and mild AD dementia. We continue to analyze the data from the ENGAGE and EMERGE trials and plan to share results of these trials following the completion of our analysis.

For additional information on our collaboration arrangements with Eisai, please read Note 17, *Collaborative and Other Relationships*, to our condensed consolidated financial statements included in this report.

2019 Share Repurchase Program

In March 2019 our Board of Directors authorized our 2019 Share Repurchase Program, which is a program to repurchase up to $5.0 billion of our common stock. Our 2019 Share Repurchase Program does not have an expiration date. All share repurchases under our 2019 Share Repurchase Program will be retired.

Results of Operations

Revenues

Revenues are summarized as follows:

	For the Three Months Ended June 30,				For the Six Months Ended June 30,			
(In millions, except percentages)	2019		2018		2019		2018	
Product revenues, net:								
United States	$ 1,744.4	48.2%	$ 1,741.9	51.9%	$ 3,257.7	45.8%	$ 3,279.8	50.6%
Rest of world	1,135.9	31.4%	1,015.6	30.3%	2,302.6	32.4%	2,001.2	30.8%
Total product revenues, net	2,880.3	79.6%	2,757.5	82.2%	5,560.3	78.2%	5,281.0	81.4%
Revenues from anti-CD20 therapeutic programs	576.4	15.9%	490.4	14.6%	1,093.8	15.4%	933.6	14.4%
Other revenues	160.0	4.4%	108.6	3.2%	452.4	6.4%	273.0	4.2%
Total revenues	$ 3,616.7	100.0%	$ 3,356.5	100.0%	$ 7,106.5	100.0%	$ 6,487.6	100.0%

Product Revenues

Product revenues are summarized as follows:

(In millions, except percentages)	For the Three Months Ended June 30, 2019		For the Three Months Ended June 30, 2018		For the Six Months Ended June 30, 2019		For the Six Months Ended June 30, 2018	
Multiple Sclerosis:								
TECFIDERA	$ 1,150.2	39.9%	$ 1,086.8	39.4%	$ 2,149.0	38.6%	$ 2,073.7	39.3%
Interferon*	554.4	19.2%	625.5	22.7%	1,055.3	19.0%	1,175.8	22.3%
TYSABRI	475.3	16.5%	467.2	16.9%	935.7	16.8%	929.3	17.6%
FAMPYRA	24.1	0.8%	23.0	0.8%	47.0	0.8%	47.4	0.9%
ZINBRYTA	—	—%	—	—%	—	—%	1.4	—%
Subtotal: MS product revenues	2,204.0	76.5%	2,202.5	79.9%	4,187.0	75.3%	4,227.6	80.1%
Spinal Muscular Atrophy:								
SPINRAZA	488.2	16.9%	422.7	15.3%	1,006.7	18.1%	786.6	14.9%
Biosimilars:								
BENEPALI	120.3	4.2%	115.6	4.2%	244.3	4.4%	236.5	4.5%
IMRALDI	47.3	1.6%	—	—%	83.0	1.5%	—	—%
FLIXABI	16.8	0.6%	11.2	0.4%	31.5	0.6%	17.8	0.3%
Subtotal: Biosimilar product revenues	184.4	6.4%	126.8	4.6%	358.8	6.5%	254.3	4.8%
Other:								
FUMADERM	3.7	0.1%	5.5	0.2%	7.8	0.1%	12.5	0.2%
Total product revenues	$ 2,880.3	100.0%	$ 2,757.5	100.0%	$ 5,560.3	100.0%	$ 5,281.0	100.0%

*Interferon includes AVONEX and PLEGRIDY.

Multiple Sclerosis (MS)

TECFIDERA

For the three months ended June 30, 2019, compared to the same period in 2018, the increase of 5.3% in U.S. TECFIDERA revenues was primarily due to price increases, partially offset by higher rates in discounts and allowances. U.S. TECFIDERA revenues for the three months ended June 30, 2019, benefited from a lower decrease in channel inventory levels as compared to the same period in the prior year.

For the six months ended June 30, 2019, compared to the same period in 2018, the increase of 2.1% in U.S. TECFIDERA revenues was primarily due to price increases, partially offset by a decrease in unit sales volume of 3% and higher rates in discounts and allowances.

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the increases of 7.4% and 8.2%, respectively, in rest of world TECFIDERA revenues were primarily due to increases in unit sales volumes of 15% in both periods, primarily related to our European and Japanese markets, partially offset by pricing reductions in certain European countries.

We anticipate an increase in TECFIDERA demand on a global basis in 2019, compared to 2018,

notwithstanding increasing competition from additional treatments for MS. We expect volume growth in our international markets to exceed volume declines in the U.S. We also expect price reductions in certain European countries.

Interferon

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the decreases of 14.6% and 13.4%, respectively, in U.S. Interferon revenues were primarily due to decreases in Interferon unit sales volumes of 13% in both periods, which were primarily attributable to patients transitioning to other MS therapies and higher rates in discounts and allowances, partially offset by price increases.

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the decreases of 3.4% and 3.2%, respectively, in rest of world Interferon revenues were primarily due to pricing reductions in certain European countries, partially offset by increases in Interferon unit sales volumes of 5% and 16%, respectively.

We expect that Interferon revenues will continue to decline in both the U.S. and international markets in 2019, compared to 2018, as a result of increasing competition from our other MS products as well as other treatments for MS, including biosimilars, and pricing reductions in certain European markets.

TYSABRI

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the decreases of 0.5% and 1.2%, respectively, in U.S. TYSABRI revenues were primarily due to decreases in unit sales volumes of 4% and 6%, respectively, partially offset by price increases.

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the increases of 4.6% and 3.0%, respectively, in rest of world TYSABRI revenues were primarily due to increases in unit sales volumes of 2% and 4%, respectively.

We anticipate TYSABRI demand to be stable on a global basis in 2019, compared to 2018, with expected volume declines in the U.S. due to increasing competition from additional treatments for MS, including OCREVUS, to be offset by volume growth in our international markets.

Spinal Muscular Atrophy

SPINRAZA

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the increases of 12.0% and 15.2%, respectively, in U.S. SPINRAZA revenues were primarily due to increases in unit sales volumes of 13% and 15%, respectively.

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the increases of 18.8% and 40.8%, respectively, in rest of world SPINRAZA revenues were primarily due to increases in unit sales volumes of 47% and 66%, respectively, partially offset by the unfavorable impact of foreign currency exchange of $14.0 million and $27.1 million, respectively.

For the six months ended June 30, 2019, rest of world SPINRAZA revenues were favorably impacted by approximately $14.0 million as we reached a price reimbursement agreement in France, which resulted in the recognition of additional revenues in relation to sales for the period from August 2017, the date upon which we began to sell SPINRAZA in France, until December 2018 as we had a change in the estimated amount of revenues for which we determined that a significant reversal was not probable.

Rest of world SPINRAZA revenues for the three months ended June 30, 2019, compared to the three months ended March 31, 2019, were also unfavorably impacted by $10.4 million due to the timing of shipments occurring in the first quarter of 2019 in advance of expected commercialization activities.

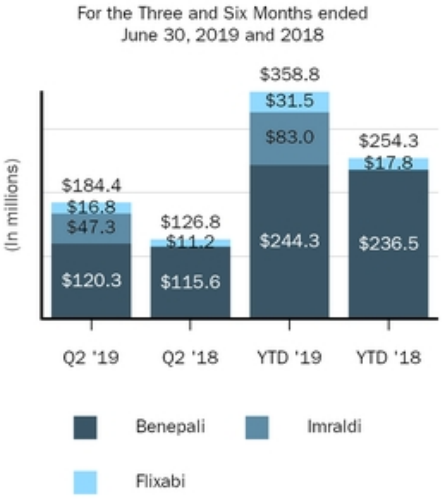
We expect that the rate at which SPINRAZA revenues will grow will moderate in 2019, compared to 2018, primarily due to a lower rate of new patient starts combined with the impact of loading dose dynamics as patients transition to dosing once every four months.

We face competition from a new gene therapy product, which was approved in the U.S. in May 2019 for the treatment of SMA. Additionally, we are aware of other products in development that, if successfully developed and approved, may compete with SPINRAZA in the SMA market. Future sales of SPINRAZA may be adversely affected by the commercialization of these competing products.

For additional information on our collaboration arrangements with Ionis, please read Note 19, *Collaborative and Other Relationships,* to our consolidated financial statements included in our 2018 Form 10-K.

Biosimilars

BENEPALI, IMRALDI and FLIXABI



For the three and six months ended June 30, 2019, compared to the same periods in 2018, the increases of 45.4% and 41.1%, respectively, in biosimilar revenues were primarily due to the launch of IMRALDI in the fourth quarter of 2018, partially offset by the unfavorable impact of foreign currency exchange of $7.6 million and $17.2 million, respectively.

In 2019 we expect strong revenue growth for our biosimilar business, primarily driven by the continued launch of IMRALDI.

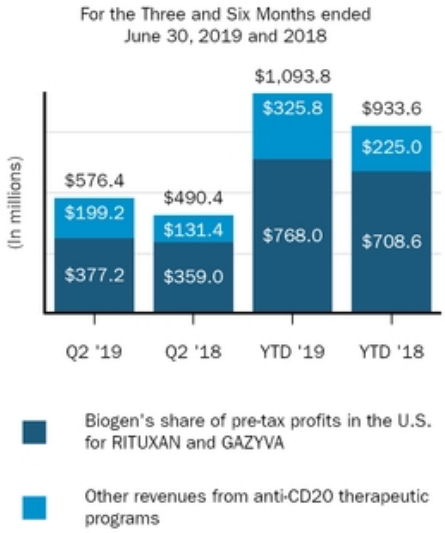
For additional information on our collaboration arrangement with Samsung Bioepis, please read Note 17, *Collaborative and Other Relationships,* to our

condensed consolidated financial statements included in this report.

Revenues from Anti-CD20 Therapeutic Programs

Genentech (Roche Group)

Our share of RITUXAN, including RITUXAN HYCELA, and GAZYVA collaboration operating profits in the U.S. and other revenues from anti-CD20 therapeutic programs are summarized in the table below. For purposes of this discussion, we refer to RITUXAN and RITUXAN HYCELA collectively as RITUXAN.



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

The following tables provide a summary of amounts comprising our share of pre-tax profits in the U.S. for RITUXAN and GAZYVA:

	For the Three Months Ended June 30,	
(In millions)	2019	2018
Product revenues, net	$ 1,165.0	$ 1,141.9
Cost and expenses	158.5	189.2
Pre-tax profits in the U.S.	1,006.5	952.7
Biogen's share of pre-tax profits	$ 377.2	$ 359.0

	For the Six Months Ended June 30,	
(In millions)	2019	2018
Product revenues, net	$ 2,391.7	$ 2,238.1
Cost and expenses	331.4	342.9
Pre-tax profits in the U.S.	2,060.3	1,895.2
Biogen's share of pre-tax profits	$ 768.0	$ 708.6

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the increases in U.S. product revenues, net were primarily due to increased net sales of RITUXAN in the U.S. of 1.8% and 6.5%, respectively. These increases in net sales of RITUXAN in the U.S. reflect selling price increases, partially offset by higher discounts and allowances.

Additionally, for the six months ended June 30, 2019, compared to the same period in 2018, the increase in net sales of RITUXAN in the U.S. reflects an increase in unit sales volume of 3%.

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the increases in U.S. product revenues, net also reflects increases in GAZYVA unit sales volume of 7% and 9%, respectively.

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the decreases in collaboration costs and expenses were primarily due to lower selling and marketing costs on RITUXAN and lower Branded Pharmaceutical Drug Fee expenses for RITUXAN and GAZYVA.

We are aware of anti-CD20 molecules, including biosimilar products, in development that if successfully developed and approved, may compete with RITUXAN. In 2018 the FDA approved a rituximab biosimilar in the U.S. A biosimilar of RITUXAN could come to market in the U.S. in the fourth quarter of 2019, which may adversely affect the pre-tax profits of our collaboration arrangements with Genentech, which would, in turn, adversely affect our co-promotion profits in the U.S. in future years.

Other Revenues from Anti-CD20 Therapeutic Programs

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

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the increases in other revenues from anti-CD20 therapeutic programs were primarily due to sales

growth of OCREVUS. Royalty revenues recognized on sales of OCREVUS for the three and six months ended June 30, 2019, totaled $182.7 million and $294.3 million, respectively, compared to $112.9 million and $189.6 million, respectively, in the prior year comparative periods.

OCREVUS royalty revenues are 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. Royalty revenues recognized on sales of OCREVUS for the three months ended June 30, 2019, reflect the favorable impact of an approximately $17 million change in estimate related to sales in the first quarter of 2019.

For additional information on our collaboration arrangements 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 19, *Collaborative and Other Relationships,* to our consolidated financial statements included in our 2018 Form 10-K.

Other Revenues

Other revenues are summarized as follows:

	For the Three Months Ended June 30,				For the Six Months Ended June 30,			
(In millions, except percentages)	2019		2018		2019		2018	
Revenues from collaborative and other relationships	$ 52.1	32.6%	$ 12.2	11.2%	$ 76.5	16.9%	$ 25.4	9.3%
Other royalty and corporate revenues	107.9	67.4%	96.4	88.8%	375.9	83.1%	247.6	90.7%
Total other revenues	$ 160.0	100.0%	$ 108.6	100.0%	$ 452.4	100.0%	$ 273.0	100.0%

Revenues from Collaborative and Other Relationships

Revenues from collaborative and other relationships primarily include revenues from our technical development services and manufacturing agreements with Samsung Bioepis and royalty revenues on biosimilar products from Samsung Bioepis.

Following the closing of the proposed divestiture of our Hillerød, Denmark manufacturing operations, which we expect to occur in the third quarter of 2019, FUJIFILM will assume responsibility for the manufacture of clinical and commercial quantities of bulk drug substance of biosimilar products for Samsung Bioepis; and we will no longer recognize revenues earned under our technical development services and manufacturing agreements with Samsung Bioepis.

For the three and six months ended June 30, 2019, we recognized $52.2 million and $77.0 million, respectively, in revenues related to the services described above provided to Samsung Bioepis, compared to $14.7 million and $32.6 million, respectively, in the prior year comparative periods. Revenue recognized related to these services totaled $96.4 million for the year ended December 31, 2018.

For additional information on our collaborative and other relationships, including revenues recognized under our technical development services and manufacturing agreements with Samsung Bioepis, please read Note 17, *Collaborative and Other Relationships,* to our condensed 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 the three and six months ended June 30, 2019, compared to the same periods in 2018, the increases in other royalty and corporate revenues were primarily due to higher contract manufacturing revenues, partially offset by the reduction in royalty revenues due to the expiration of certain of our patents.

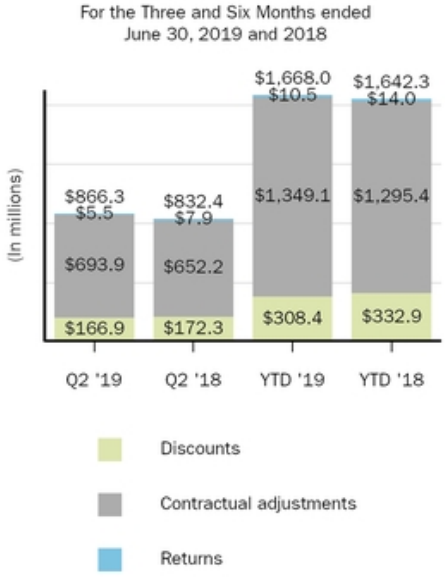
For the six months ended June 30, 2019, compared to the same period in 2018, the increase in other royalty and corporate revenues was also due to $241.3 million in revenues recognized under the manufacturing and supply agreement with Bioverativ Inc. (Bioverativ) entered into in connection with the spin-off of our hemophilia business, compared to $94.6 million recognized in the prior year comparative period. The increase in Bioverativ revenues over the prior year comparative period was due to sales of the remaining hemophilia inventory on hand.

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). These estimates reflect 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.

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



For the three and six months ended June 30, 2019, reserves for discounts and allowances as a percentage of gross product revenues were 23.1% in both periods, compared to 23.2% and 23.7%, respectively, in the prior year comparative periods.

Discounts

Discounts include trade term discounts and wholesaler incentives.

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the decreases in discounts were primarily due to changes in wholesaler invoicing in certain European markets.

Contractual Adjustments

Contractual adjustments primarily relate to Medicaid and managed care rebates, co-payment assistance, Veterans Administration, Public Health Service discounts, specialty pharmacy program fees and other government rebates or applicable allowances.

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the increases in contractual adjustments were primarily due to higher managed care rebates and governmental rebates in the U.S. as well as higher governmental rebates and allowances in the rest of world, due in part to increases in SPINRAZA sales volumes worldwide, partially offset by decreases in Medicaid rebates in the U.S.

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 recognized in the period the related revenues are recognized, resulting in a reduction to product sales.

For the three and six months ended June 30, 2019, compared to the same periods in 2018, return reserves were relatively consistent.

For additional information on our revenue reserves, please read Note 4, *Revenues,* to our condensed consolidated financial statements included in this report.

Cost and Expenses

A summary of total cost and expenses is as follows:

	For the Three Months Ended June 30,			For the Six Months Ended June 30,		
(In millions, except percentages)	2019	2018	Change %	2019	2018	Change %
Cost of sales, excluding amortization and impairment of acquired intangible assets	$ 476.3	$ 421.0	13.1 %	$ 1,078.3	$ 867.0	24.4 %
Research and development	484.8	981.0	(50.6)%	1,048.5	1,477.7	(29.0)%
Selling, general and administrative	587.6	516.2	13.8 %	1,155.3	1,017.5	13.5 %
Amortization and impairment of acquired intangible assets	70.1	107.4	(34.7)%	138.3	211.3	(34.5)%
Collaboration profit (loss) sharing	63.5	39.2	62.0 %	121.6	81.7	48.8 %
Loss on assets and liabilities held for sale	(2.3)	—	**	113.2	—	**
(Gain) loss on fair value remeasurement of contingent consideration	(20.0)	1.9	**	(8.5)	(3.7)	**
Restructuring charges	0.8	1.6	(50.0)%	1.2	3.2	(62.5)%
Acquired in-process research and development	—	75.0	(100.0)%	—	85.0	(100.0)%
Total cost and expenses	$ 1,660.8	$ 2,143.3	(22.5)%	$ 3,647.9	$ 3,739.7	(2.5)%

** Percentage not meaningful.

Cost of Sales, Excluding Amortization and Impairment of Acquired Intangible Assets

Product Cost of Sales

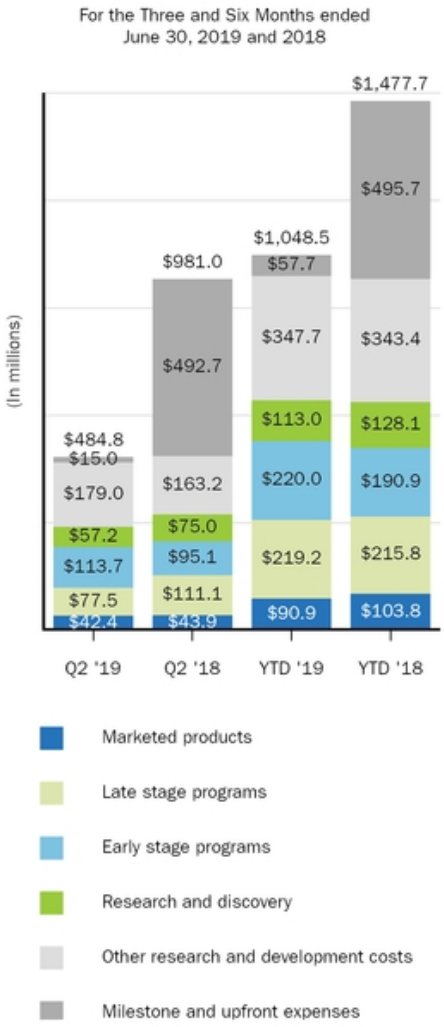
For the three and six months ended June 30, 2019, compared to the same periods in 2018, the increases in product cost of sales were primarily due to higher contract manufacturing shipments, increased sales of our biosimilar products and an increase in inventory amounts written down as a result of excess, obsolescence, unmarketability or other reasons. These increases were partially offset by lower product cost of sales associated with our MS products.

For the six months ended June 30, 2019, compared to the same period in 2018, the increase in product cost of sales was also due to the sale to Bioverativ of most of the remaining hemophilia-related inventory on hand with a cost basis totaling $173.5 million in the first quarter of 2019, pursuant to the terms of the manufacturing and supply agreement with Bioverativ entered into in connection with the spin-off of our hemophilia business.

Royalty Cost of Sales

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the decreases in royalty cost of sales were primarily due to a decrease in royalties payable on sales of TYSABRI resulting from the expiration of certain third party royalties, partially offset by increased royalties payable on higher sales of SPINRAZA and IMRALDI.

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.

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 represent 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 the three and six months ended June 30, 2019, compared to the same periods in 2018, the decreases in research and development expense were primarily due to decreases in milestone and upfront expenses. These decreases were partially offset by increases in costs incurred in connection with our early stage programs. The decrease in milestone and upfront expenses was primarily related to the closing of the 2018 Ionis Agreement, as discussed below.

Additionally, for the three months ended June 30, 2019, compared to the same period in 2018, the decrease in research and development expense was due to a decrease in costs incurred in connection with our late stage 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

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the decreases in milestone and upfront expenses were primarily due to the prior year recognition of a $486.2 million net charge to research and development expense upon the closing of the 2018 Ionis Agreement, which was a new 10-year exclusive agreement with Ionis to develop novel antisense oligonucleotide drug candidates for a broad range of neurological diseases.

Milestone and upfront expenses for the six months ended June 30, 2019, also reflected the recognition of a $38.5 million charge to research and development expense upon entering into our collaboration and research development services agreement with Skyhawk.

Late Stage Programs

For the three months ended June 30, 2019, compared to the same period in 2018, the decrease in spending associated with our late stage programs was primarily due to:

- the discontinuation of the global Phase 3 trials of aducanumab, net of Eisai reimbursement;
- lower spend related to the development of diroximel fumarate (BIIB098) in MS pursuant to our license and collaboration agreement with Alkermes Pharma Ireland Limited, a subsidiary of Alkermes plc; and
- lower spend related to the development of elenbecestat (E2609) in AD pursuant to our collaboration arrangement with Eisai.

This decrease was partially offset by an increase in spending related to the development of:

- BAN2401 (Aβ mAb) in early AD pursuant to our collaboration arrangement with Eisai, which was advanced to a late stage program in the first quarter of 2019;
- BIIB093 (glibenclamide IV) in large hemispheric infarction (LHI), which was advanced to a late stage program in the third quarter of 2018; and
- BIIB067 (tofersen) in ALS, which was advanced to a late stage program in the first quarter of 2019.

In March 2019 we and Eisai announced the decision to discontinue the global Phase 3 trials, ENGAGE and EMERGE, of aducanumab. As a result of this decision, in the first quarter of 2019, we accrued approximately $45.0 million related to the termination of various clinical trials and research and development contracts net of the expected 45% Eisai reimbursement of development costs incurred by the collaboration for the advancement of aducanumab.

In March 2019 Eisai initiated a global Phase 3 trial for the development of BAN2401 in early AD. Under our collaboration arrangement, Eisai serves as the global operational and regulatory lead for BAN2401 and all costs, including research, development, sales and marketing expenses, are shared equally between us and Eisai.

For additional information on our collaboration arrangements with Eisai, please read Note 17, *Collaborative and Other Relationships*, to our condensed consolidated financial statements included in this report.

Early Stage Programs

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the increases in spending related to our early stage programs were primarily due to the development of:

- BIIB092 (gosuranemab) in PSP pursuant to our license agreement with Bristol-Myers Squibb Company;
- BIIB054 (α-synuclein mAb) in Parkinson's disease; and
- BIIB104 (AMPA) in cognitive impairment associated with schizophrenia (CIAS).

These increases were partially offset by a decrease in costs associated with:

- the development of BIIB074 (vixotrigine) in trigeminal neuralgia (TGN);
- the advancement of BIIB093 in LHI to a late stage program in the third quarter of 2018;
- the advancement of tofersen in ALS to a late stage program in the first quarter of 2019;
- our decision in October 2018 to discontinue development of vixotrigine for the treatment of painful lumbosacral radiculopathy; and
- our decision in December 2018 to discontinue development of BIIB087, an investigational AAV-based gene therapy for the treatment of X-linked retinoschisis, and BIIB088, an investigational AAV-based gene therapy for the treatment of XLRP, upon the termination of our collaboration agreement with Applied Genetic Technologies Corporation.

Selling, General and Administrative

For the three and six months ended June 30, 2019, compared to the same periods in 2018, the increases in selling, general and administrative expense were primarily due to acquisition related charges incurred in connection with our recent acquisition of NST totaling $33.4 million, including $18.4 million of stock-based compensation expense associated with the accelerated vesting of stock options previously granted to NST employees for post-combination services performed, an increase in legal and patent fees and an increase in commercialization costs, primarily related to SPINRAZA, as we continued to expand into new international markets.

Selling, general and administrative expense for the three months ended June 30, 2019, also reflects a decrease in operational spending associated with our pre-commercialization costs related to our AD programs following the discontinuation of the global Phase 3 trials of aducanumab in March 2019.

Selling, general and administrative expense for the six months ended June 30, 2019, also reflects an increase in corporate giving, partially offset by a decrease in operational spend on ZINBRYTA subsequent to the voluntary worldwide withdrawal of ZINBRYTA for RMS, which we and AbbVie Inc. announced in March 2018.

Amortization and Impairment 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 TYSABRI, AVONEX, SPINRAZA and TECFIDERA products and other programs acquired through business combinations.

Annually, during our long-range planning cycle, we perform an analysis of anticipated lifetime revenues of our TYSABRI, AVONEX, SPINRAZA and TECFIDERA products. This analysis is also updated whenever events or changes in circumstances would significantly affect the anticipated lifetime revenues of any of these products. Impairments are recorded in the period in which they are incurred.

Our most recent long-range planning cycle was completed in the second quarter of 2019. The results of our TYSABRI, AVONEX, SPINRAZA and TECFIDERA analyses were impacted by changes in the estimated timing and impact of other alternative MS formulations, including OCREVUS. The outcome of this most recent analysis resulted in a net overall decrease in our expected rate of amortization for acquired intangible assets, which was primarily related to higher expected lifetime revenues of TYSABRI.

Amortization and impairment of acquired intangible assets for the three and six months ended June 30, 2019, compared to the same periods in 2018, decreased primarily due to a net overall decrease in our expected rate of amortization for acquired intangible assets. This decrease was primarily due to lower amortization subsequent to the impairment in the fourth quarter of 2018 of the U.S. license to Forward Pharma A/S' (Forward Pharma) intellectual property, including Forward Pharma's intellectual property related to TECFIDERA, and higher

expected lifetime revenues of TYSABRI. For the three and six months ended June 30, 2019 and 2018, we had no impairment charges.

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 related to 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.

IPR&D related to Business Combinations

IPR&D represents the fair value assigned to research and development assets that we acquired as part of a business combination and had not yet reached technological feasibility at the date of acquisition. We review amounts capitalized as acquired IPR&D for impairment 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.

Overall, the value of our acquired IPR&D assets is dependent upon many variables, including estimates of future revenues and the effects of competition, our ability to secure sufficient pricing in a competitive market, our ability to confirm safety and efficacy based on data from clinical trials and regulatory feedback, the level of anticipated development costs and the probability and timing of successfully advancing a particular research program from one clinical trial phase to the next. We are continually reevaluating our estimates concerning these and other variables, including our life cycle management strategies, research and development priorities and development risk, changes in program and portfolio economics and related impact of foreign currency exchange rates and economic trends and evaluating industry and Company data regarding the productivity of clinical research and the development process. Changes in our estimates and prioritization of these items may result in a significant change to our valuation of our IPR&D assets.

For example, we have an IPR&D asset related to the development of vixotrigine in TGN. The TGN program has experienced numerous delays in development in the periods since we acquired the TGN program and the fair value of this asset is not significantly in excess of carrying value. In addition, we are currently testing vixotrigine in another mid-stage clinical trial, in a different neuropathic pain indication, for which we also have an IPR&D asset. Data from that trial may affect the economic value of vixotrigine and the IPR&D assets for one or both programs could be impaired if assumptions used in determining their fair value change.

For additional information on the amortization and impairment of our acquired intangible assets, please read Note 6, *Intangible Assets and Goodwill,* to our condensed consolidated financial statements included in this report.

Collaboration Profit (Loss) Sharing

Collaboration profit (loss) sharing primarily includes our partner's 50% share of the profit or loss related to our biosimilars commercial agreement with Samsung Bioepis.

For the three and six months ended June 30, 2019, we recognized net profit-sharing expense of $63.4 million and $121.5 million, respectively, to reflect Samsung Bioepis' 50% sharing of the net collaboration profits, compared to $39.7 million and $83.5 million, respectively, in the prior year comparative periods. The increases in profit-sharing expense were primarily due to increased collaboration profits resulting from increased biosimilar sales.

For additional information on our collaboration arrangement with Samsung Bioepis, please read Note 17, *Collaborative and Other Relationships,* to our condensed consolidated financial statements included in this report.

Loss on Assets and Liabilities Held For Sale

Proposed Divestiture of Hillerød, Denmark Manufacturing Operations

In March 2019 we entered into a share purchase agreement with FUJIFILM under which FUJIFILM will acquire all of the outstanding shares of our subsidiary that owns our biologics manufacturing operations in Hillerød, Denmark. Upon closing of the proposed transaction, we expect to receive up to $890.0 million in cash, subject to certain working capital adjustments and other contractual terms.

As part of the proposed transaction, we have provided FUJIFILM with certain minimum batch production commitment guarantees. There is a risk that the minimum batch production commitments will not be met. Based upon current estimates we expect to incur an adverse commitment obligation of approximately $120.0 million associated with such guarantees. We may adjust this estimate based upon changes in business conditions, which may result in the recognition of additional losses. We are also obligated to indemnify FUJIFILM for liabilities that may exist relating to certain business activities incurred prior to the closing of the proposed transaction.

In addition, we may earn certain contingent payments based on future manufacturing activities at the Hillerød facility. For the disposition of a business, our policy is to recognize contingent consideration when the consideration is realizable. We currently believe the probability of earning these payments is remote and therefore we have not included these contingent payments in our estimate of the fair value of the operations.

As part of the proposed transaction, we also expect to enter into certain manufacturing services agreements with FUJIFILM pursuant to which FUJIFILM would use the Hillerød facility to produce commercial products for us, such as TYSABRI, as well as other third-party products.

We determined that the operations to be disposed of in the proposed transaction did not meet the criteria to be classified as discontinued operations under the applicable guidance.

In February 2019 the assets and liabilities related to our Hillerød, Denmark manufacturing operations met the criteria to be classified as held for sale and were reclassified to assets and liabilities held for sale in our condensed consolidated balance sheets.

For the six months ended June 30, 2019, we recorded a loss of approximately $174.5 million in our condensed consolidated statements of income. This estimated loss includes a pre-tax loss of $113.2 million, which reflects a $2.3 million decrease to our original estimate as of March 31, 2019, reflecting our current estimated fair value of the assets and liabilities held for sale, adjusting for our expected costs to sell our Hillerød, Denmark manufacturing operations of approximately $10.0 million and our estimate of the fair value of an adverse commitment of approximately $120.0 million associated with the guarantee of future minimum batch production at the Hillerød facility. The value of this adverse commitment was determined using a probability-weighted estimate of future manufacturing activity. In addition, we recorded a tax expense of $61.3 million related to the proposed transaction. Our total estimated loss is based on current exchange rates and business conditions, and any changes to these factors through the closing date of the transaction will result in adjustments to the carrying values of the related assets and liabilities as well as a corresponding adjustment to the loss amount recognized on the sale.

Following the closing of the proposed transaction, the final purchase price will be adjusted by an amount equal to the difference between our current estimates of working capital and inventory balances that will be transferred to FUJIFILM and the amounts that are ultimately transferred.

In addition, upon closing of the proposed transaction, we expect to separately sell certain raw materials remaining at the Hillerød facility to FUJIFILM at carrying value.

Our estimate of the fair value of assets and liabilities expected to be sold to FUJIFILM is a Level 3 measurement and is based on the expected consideration from the sale, including the valuation of the adverse purchase commitment, as discussed above.

The proposed transaction remains subject to certain closing conditions. We expect to complete the proposed transaction in the third quarter of 2019.

For additional information on the proposed divestiture of our Hillerød, Denmark manufacturing operations, please read Note 3, *Divestitures*, to our condensed consolidated financial statements included in this report.

(Gain) Loss 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 condensed consolidated statements of income.

Changes in the fair value remeasurement of contingent consideration for the three and six months ended June 30, 2019, were primarily due to changes in the probability and expected timing of achieving certain development milestones, partially offset by a decrease in interest rates used to revalue our contingent consideration liabilities and the passage of time.

Acquired In-Process Research and Development

BIIB104 Acquisition

In April 2018 we acquired BIIB104 from Pfizer. BIIB104 is a first-in-class, Phase 2b AMPA receptor potentiator for CIAS. In connection with the closing of this transaction, we made an upfront payment of $75.0 million to Pfizer, which was recorded as acquired IPR&D in our condensed consolidated statements of income as BIIB104 has not yet reached technological feasibility.

BIIB100 Acquisition

In January 2018 we acquired BIIB100 from Kayropharm. BIIB100 is a Phase 1 investigational oral compound for the treatment of certain neurological and neurodegenerative diseases, primarily in ALS. In connection with the closing of this transaction, we made an upfront payment of $10.0 million to Karyopharm, which was recorded as acquired IPR&D in our condensed consolidated statements of income as BIIB100 has not yet reached technological feasibility.

For additional information on our acquisitions of BIIB104 and BIIB100, please read Note 2, *Acquisitions*, to our consolidated financial statements included in our 2018 Form 10-K.

Other Income (Expense), Net

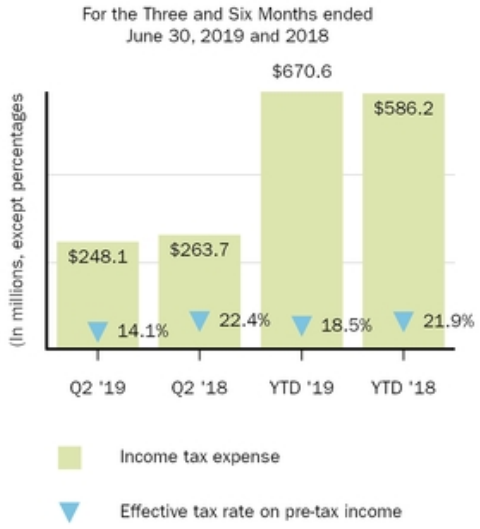
For the three months ended June 30, 2019, compared to the same period in 2018, the change in other income (expense), net primarily reflects net losses totaling $173.4 million recognized on our investments related to our holdings in equity and debt securities, compared to net gains totaling $5.3 million in the prior year comparative period. The net losses recognized during the three months ended June 30, 2019, primarily reflect a decrease in the fair value in our investment in Ionis common stock from March 31, 2019, and a loss recognized on our sale of a portion of our investment in Ionis common stock during the second quarter of 2019 reflecting a decrease in fair value of the shares sold from March 31, 2019.

Proceeds from the sale of a portion of our shares of Ionis common stock in the second quarter of 2019 totaled approximately $213.3 million. The original cost basis of these shares upon acquisition in June 2018 totaled approximately $173.6 million.

For the six months ended June 30, 2019, compared to the same period in 2018, the change in other income (expense), net primarily reflects net gains totaling $203.0 million recognized on our investments related to our holdings in equity and debt securities, compared to net losses totaling $9.1 million in the prior year comparative period. The net gains recognized during the six months ended June 30, 2019, primarily reflect an increase in the fair value in our investment in Ionis common stock from December 31, 2018, partially offset by the loss recognized on our sale of a portion of our investment in Ionis common stock during the second quarter of 2019 reflecting a decrease in fair value of the shares sold from March 31, 2019.

Other income (expense), net for the six months ended June 30, 2019, also reflects an increase in the fair value of an investment in a non-marketable equity security from December 31, 2018, that was realized for a net gain of approximately $87.7 million upon sale in the second quarter of 2019.

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.

For the three months ended June 30, 2019, compared to the same period in 2018, the decrease in our effective tax rate was primarily due to the combination of an internal reorganization of certain intellectual property rights related to the intercompany sale of the intellectual property (the effective tax rate decrease from this internal reorganization is not expected to recur post 2019) and a higher effective tax rate in 2018 resulting from the sale of inventory, the tax effect of which had been included within prepaid taxes at January 1, 2018, at a higher effective tax rate.

For the six months ended June 30, 2019, compared to the same period in 2018, the decrease in our effective tax rate was primarily due to the combination of the internal reorganization of certain intellectual property rights, offset by a $61.3 million tax expense related to the proposed divestiture of our

subsidiary that owns our Hillerød, Denmark manufacturing operations and a higher effective tax rate in 2018 resulting from the sale of inventory, the tax effect of which had been included within prepaid taxes at January 1, 2018, at a higher effective tax rate.

Specifically in regard to the Hillerød, Denmark manufacturing operations, although we are recognizing a loss on the proposed divestiture of such subsidiary, the proposed divestiture requires us to write off certain deferred tax assets upon the classification of the operations as held for sale and results in a taxable gain in certain jurisdictions.

For additional information on the proposed divestiture of our Hillerød, Denmark manufacturing operations, please read Note 3, *Divestitures*, to our condensed consolidated financial statements included in this report.

For additional information on our uncertain tax positions and income tax rate reconciliation for the three and six months ended June 30, 2019 and 2018, please read Note 15, *Income Taxes,* to our condensed consolidated financial statements included in this report.

Equity in Loss of Investee, Net of Tax

In February 2012 we entered into a joint venture agreement with Samsung BioLogics, establishing an entity, Samsung Bioepis, to develop, manufacture and market biosimilar products.

In June 2018 we exercised our option under our joint venture agreement to increase our ownership percentage in Samsung Bioepis from approximately 5% to approximately 49.9%. The share purchase transaction was completed in November 2018 and, upon closing, we paid 759.5 billion South Korean won ($676.6 million) to Samsung BioLogics. As of June 30, 2019, our ownership percentage remained at approximately 49.9%.

We recognize our share of the results of operations related to our investment in Samsung Bioepis under the equity method of accounting one quarter in arrears when the results of the entity become available, which is reflected as equity in income (loss) of investee, net of tax in our condensed consolidated statements of income. During 2015, as our share of losses exceeded the carrying value of our initial investment, we suspended recognizing additional losses. In the first quarter of 2019 we restarted recognizing our share of Samsung Bioepis' income (losses), and we began recognizing amortization on certain basis differences resulting from our November 2018 investment.

Our joint venture partner, Samsung BioLogics, is currently subject to an ongoing criminal investigation that we continue to monitor. While this investigation could impact the operations of Samsung Bioepis and its business, we have assessed the value of our investment in Samsung Bioepis and continue to believe that the fair value of the investment is in excess of its net book value.

For the three and six months ended June 30, 2019, losses reflect our share of income totaling $5.5 million and losses totaling $8.5 million, respectively, and amortization of basis differences totaling $21.8 million and $36.5 million, respectively.

For additional information on our collaboration arrangement with Samsung Bioepis, please read Note 17, *Collaborative and Other Relationships* to our condensed consolidated financial statements included in this report.

Financial Condition, Liquidity and Capital Resources

Our financial condition is summarized as follows:

(In millions, except percentages)	As of June 30, 2019	As of December 31, 2018	Change %
Financial assets:			
Cash and cash equivalents	$ 1,723.4	$ 1,224.6	40.7 %
Marketable securities — current	1,228.8	2,313.4	(46.9)%
Marketable securities — non-current	1,309.3	1,375.9	(4.8)%
Total cash, cash equivalents and marketable securities	$ 4,261.5	$ 4,913.9	(13.3)%
Borrowings:			
Notes payable	5,948.5	5,936.5	0.2 %
Total borrowings	$ 5,948.5	$ 5,936.5	0.2 %
Working capital:			
Current assets	$ 7,909.8	$ 7,640.9	3.5 %
Current liabilities	(3,210.9)	(3,295.2)	(2.6)%
Total working capital	$ 4,698.9	$ 4,345.7	8.1 %

For the six months ended June 30, 2019, certain significant cash flows were as follows:

- $3.4 billion in net cash flows provided by operating activities, net of:
  - $295.1 million in total payments for income taxes;
  - $74.0 million upfront payment made to Skyhawk upon entering into a collaboration and research and development services agreement; and
  - $45.0 million upfront payment made to C4 Therapeutics (C4T) upon entering into a collaborative research and license agreement;
- $3.1 billion used for share repurchases;
- $744.4 million payment made for our acquisition of NST, net of cash acquired;
- $314.0 million used for purchases of property, plant and equipment;
- $309.7 million in proceeds received on sales of strategic investments; and
- $300.0 million for the final contingent payment made to former shareholders of Fumapharm AG and holders of their rights.

For the six months ended June 30, 2018, certain significant cash flows were as follows:

- $2.6 billion in net cash flows provided by operating activities, net of:
  - $375.0 million upfront payment made to Ionis upon the closing of the 2018 Ionis Agreement and a $162.1 million charge reflecting the premium paid for the purchase of Ionis common stock; and
  - $472.0 million in total payments for income taxes;
- $3.0 billion used for share repurchases;
- $900.0 million in contingent payments made to former shareholders of Fumapharm AG and holders of their rights;
- $462.9 million payment made to Ionis reflecting the fair value of the common stock purchased upon the closing of the 2018 Ionis Agreement;
- $381.5 million used for purchases of property, plant and equipment; and
- $85.0 million in upfront payments made for our acquisitions of BIIB100 and BIIB104.

Overview

We have historically financed our operating and capital expenditures primarily through cash flows earned from 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.

For additional information on certain risks that could negatively impact our financial position or future results of operations, please read Item 3. *Quantitative and Qualitative Disclosures About Market Risk* and Item 1A. *Risk Factors* included in this report.

Share Repurchase Programs

In March 2019 our Board of Directors authorized our 2019 Share Repurchase Program, which is a program to repurchase up to $5.0 billion of our common stock. Our 2019 Share Repurchase Program does not have an expiration date. All share repurchases under our 2019 Share Repurchase Program will be retired. Under our 2019 Share Repurchase Program, we repurchased and retired approximately 3.9 million shares of our common stock at a cost of approximately $909.9 million during the three and six months ended June 30, 2019. Approximately $4.1 billion remained available under our 2019 Share Repurchase program as of June 30, 2019.

In August 2018 our Board of Directors authorized our 2018 Share Repurchase Program, which was a program to repurchase up to $3.5 billion of our common stock that was completed as of June 30, 2019. All share repurchases under our 2018 Share Repurchase Program were retired. Under our 2018 Share Repurchase Program, we repurchased and retired approximately 6.5 million and 8.9 million shares of our common stock at a cost of approximately $1.5 billion and $2.1 billion during the three and six months ended June 30, 2019, respectively.

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), which was completed as of June 30, 2018. All share repurchases under our 2016 Share Repurchase Program were retired. Under our 2016 Share Repurchase Program, we repurchased and retired approximately 9.6 million and 10.5 million shares of our common stock at a cost of approximately $2.75 billion and $3.0 billion during the three and six months ended June 30, 2018, respectively.

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, overnight reverse repurchase agreements 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.

As of June 30, 2019, we had cash, cash equivalents and marketable securities totaling approximately $4.3 billion compared to approximately $4.9 billion as of December 31, 2018. The net decrease in cash, cash equivalents and marketable securities at June 30, 2019 from December 31, 2018, was primarily due to cash used for share repurchases, cash used for our acquisition of NST, net purchases of property, plant and equipment, contingent payments made to former shareholders of Fumapharm AG and holders of their rights and upfront payments made to Skyhawk and C4T, partially offset by cash flows from operations.

Investments and other assets in our condensed consolidated balance sheet as of June 30, 2019 and December 31, 2018, includes the carrying value of our investment in Samsung Bioepis of $615.5 million and $680.6 million, respectively. As Samsung Bioepis is a privately-held entity, our ability to liquidate our investment in Samsung Bioepis may be limited and we may realize significantly less than the value of such investment. Investments and other assets, as of June 30, 2019 and December 31, 2018, also includes an asset of $333.4 million and $563.8 million, respectively, reflecting the fair value of the long-term portion of our investment in Ionis common stock, which is subject to certain holding period restrictions.

For additional information on our acquisition of NST, please read Note 2, *Acquisitions*, to our condensed consolidated financial statements included in this report. For additional information on our collaboration arrangements with Skyhawk and Samsung Bioepis, please read Note 17, *Collaborative and Other Relationships*, to our condensed consolidated financial statements included in this report. For additional information on our collaboration arrangements with Ionis and C4T, please read Note 19, *Collaborative and Other Relationships*, to our consolidated financial statements included in our 2018 Form 10-K.

Borrowings

The following is a summary of our principal indebtedness:

- $1.5 billion aggregate principal amount of 2.90% Senior Notes due September 15, 2020;

- $1.0 billion aggregate principal amount of 3.625% Senior Notes due September 15, 2022;
- $1.75 billion aggregate principal amount of 4.05% Senior Notes due September 15, 2025; and
- $1.75 billion aggregate principal amount of 5.20% Senior Notes due September 15, 2045.

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

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 June 30, 2019, we had no outstanding borrowings and were in compliance with all covenants under this facility.

For a summary of the fair and carrying values of our outstanding borrowings as of June 30, 2019 and December 31, 2018, please read Note 7, *Fair Value Measurements,* to our condensed consolidated financial statements included in this report.

Working Capital

Working capital is defined as current assets less current liabilities. The change in working capital at June 30, 2019, from December 31, 2018, reflects an increase in total current assets of approximately $268.9 million and a decrease in total current liabilities of approximately $84.3 million.

The net increase in total current assets was primarily driven by the reclassification of assets associated with the proposed divestiture of our Hillerød, Denmark manufacturing operations, a reclassification of a portion of our investment in Ionis common stock and an increase in prepaid taxes, partially offset by a decrease in net cash, cash equivalents and marketable securities, as described above, and a decrease in inventory resulting from the sale of hemophilia-related inventory to Bioverativ.

The net decrease in current liabilities was primarily due to a reduction in accrued expenses and other, partially offset by an increase in income taxes payable and a reclassification of deferred tax liabilities to liabilities held for sale in relation to our proposed divestiture of our Hillerød, Denmark manufacturing operations. The net decrease in accrued expenses and other was primarily related to a decrease in the accrual of contingent payments related to FUMADERM and TECFIDERA, a decrease in the accrual for employee compensation and benefits and the $45.0 million upfront payment made to C4T, which was accrued as of December 31, 2018.

Cash Flows

The following table summarizes our cash flow activity:

	For the Six Months Ended June 30,		
(In millions, except percentages)	**2019**	**2018**	**% Change**
Net cash flows provided by operating activities	$ 3,423.5	$ 2,556.4	33.9 %
Net cash flows provided by investing activities	$ 128.0	$ 198.1	(35.4)%
Net cash flows used in financing activities	$ (3,055.0)	$ (3,060.1)	(0.2)%

Operating Activities

Cash flows from operating activities represent the cash receipts and disbursements related to all 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, unrealized gain (loss) on strategic investments, acquired IPR&D 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 in the fair value of contingent payments associated with our acquisitions of businesses and payments related to collaborations.

For the six months ended June 30, 2019, compared to the same period in 2018, net cash flows provided by operating activities increased primarily due to higher net income and the $375.0 million upfront payment made to Ionis upon the closing of the 2018 Ionis Agreement and a $162.1 million charge reflecting the premium paid for the purchase of Ionis common stock in the prior year comparative period, partially offset by the changes in working capital, as discussed above.

Investing Activities

For the six months ended June 30, 2019, compared to the same period in 2018, the decrease in net cash flows provided by investing activities was primarily due to a decrease in net proceeds related to marketable securities and the cash used for our acquisition of NST. These amounts were partially offset by a decrease in contingent payments made to former shareholders of Fumapharm AG and holders of their rights, the $462.9 million payment made to Ionis reflecting the fair value of the common stock purchased upon the closing of the 2018 Ionis Agreement in the prior year comparative period and the proceeds received in the second quarter of 2019 on sales of strategic investments.

Financing Activities

For the six months ended June 30, 2019, compared to the same period in 2018, the decrease in net cash flows used in financing activities was primarily due to the net distribution to noncontrolling interests reflecting the payment made to Neurimmune SubOne AG in 2018 in exchange for a 5% reduction in royalty rates payable, offset by an increase in cash used for share repurchases.

Contractual Obligations and Off-Balance Sheet Arrangements

Contractual Obligations

Our contractual obligations primarily consist of our obligations under non-cancellable operating leases, long-term debt obligations and defined benefit and other purchase obligations, excluding amounts related to uncertain tax positions, funding commitments, contingent development, regulatory and commercial milestone payments, contingent payments and contingent consideration related to our business combinations, as described below.

There have been no material changes in our contractual obligations since December 31, 2018.

Contingent Payments

TYSABRI

In 2013 we acquired from Elan Pharma International Ltd. (Elan), an affiliate of Elan Corporation plc, 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 condensed 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.

SPINRAZA

In 2016 we exercised our option to develop and commercialize SPINRAZA from Ionis. 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 as cost of sales in our condensed consolidated statements of income. For additional information on our collaboration arrangements with Ionis, please read Note 19, *Collaborative and Other Relationships*, to our consolidated financial statements included in our 2018 Form 10-K.

Contingent Consideration related to Business Combinations

In connection with our acquisitions of Convergence Pharmaceuticals Ltd. (Convergence), Stromedix, Inc. (Stromedix) and Biogen International Neuroscience GmbH (BIN) in 2015, 2012 and 2010, respectively, 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 recognized 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 $1.0 billion in remaining milestones related to these acquisitions.

Contingent Development, Regulatory and Commercial Milestone Payments

Based on our development plans as of June 30, 2019, we could make potential future milestone payments to third parties of up to approximately $6.7 billion, including approximately $1.0 billion in

development milestones, approximately $1.5 billion in regulatory milestones and approximately $4.2 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 June 30, 2019, 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 or commercial milestones.

Provided various development, regulatory or commercial milestones are achieved, we anticipate that we may pay approximately $198.0 million of milestone payments during the remainder of 2019.

Other Funding Commitments

As of June 30, 2019, we have several ongoing clinical studies in various clinical trial stages. Our most significant clinical trial expenditures are to contract research organizations (CROs). The contracts with CROs are generally cancellable, with notice, at our option. We recorded accrued expenses of approximately $45.0 million in our condensed consolidated balance sheet for expenditures incurred by CROs as of June 30, 2019. We have approximately $474.0 million in cancellable future commitments based on existing CRO contracts as of June 30, 2019.

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 June 30, 2019, we have approximately $122.4 million of liabilities associated with uncertain tax positions.

As of both June 30, 2019 and December 31, 2018, we have accrued income tax liabilities of $697.0 million under a one-time mandatory deemed repatriation tax on accumulated foreign subsidiaries' previously untaxed foreign earnings (the Transition Toll Tax). Of the amounts accrued as of June 30, 2019, no amounts are expected to be paid within one year due to a $87.0 million carryforward of taxes paid in relation to the company's 2017 tax return. The Transition Toll Tax will be paid in installments over an eight-year period, which started 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.

New Accounting Standards

For a discussion of new accounting standards please read Note 1, *Summary of Significant Accounting Policies - New Accounting Pronouncements,* to our condensed consolidated financial statements included in this report.

Critical Accounting Estimates

The preparation of our condensed consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the U.S., 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 ongoing 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.

Assets and Liabilities Held For Sale

Upon determining that a long-lived asset or disposal group meets the criteria to be classified as held for sale, we cease depreciation and separately present such assets and liabilities of the disposal group in our condensed consolidated balance sheet. We initially measure a long-lived asset or disposal group that is classified as held for sale at the lower of its carrying value or fair value less any costs to sell. Any loss resulting from this measurement is recognized in the period in which the held for sale criteria are met. Conversely, gains are not recognized on the sale of a long-lived asset or disposal group until the date of sale. We assess the fair value of a long-lived asset or disposal group less any costs to sell each reporting period it remains classified as held for sale and recognize any subsequent changes as an adjustment to the carrying value of the asset or disposal group, as long as the remeasured carrying value does not exceed the carrying value less costs to sell of the asset or disposal group at the time it was initially classified as held for sale.

For a discussion of our critical accounting estimates, please read Part II, Item 7. *Management's Discussion and Analysis of Financial Condition and Results of Operations* in our 2018 Form 10-K. Except as discussed above, there have been no material changes to these critical accounting estimates since our 2018 Form 10-K.

Item 3. Quantitative and Qualitative Disclosures About 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 condensed 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, Japanese yen and South Korean won.

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.

During the second quarter of 2018 the International Practices Task Force of the Center for Audit Quality categorized Argentina as a country with a projected three-year cumulative inflation rate greater than 100%, which indicated that Argentina's economy is highly inflationary. This categorization did not have a material impact on our results of operations or financial position as of June 30, 2019, and is not expected to have a material impact on our results of operations or financial position in the future.

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 18 months. We do not engage in currency speculation. For a more detailed disclosure of our revenue and operating expense hedging program, please read Note 9, *Derivative Instruments,* to our condensed consolidated financial statements included in this report.

Our ability to mitigate the impact of foreign currency exchange rate changes on revenues and net income diminishes as significant foreign currency 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 condensed 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 condensed 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 June 30, 2019 and December 31, 2018, a hypothetical adverse 10% movement in foreign currency exchange 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 $330.0 million and $290.0 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.

Net Investment Hedge Program

Our net investment hedging program is designed to mitigate currency fluctuations between the U.S. dollar and the South Korean won as a result of exercising our option to increase our ownership percentage in Samsung Bioepis to approximately 49.9%. We entered into foreign currency forward contracts to manage the foreign currency risk with our forward contracts used to hedge changes in the spot rate over the next four months. As of June 30, 2019 and December 31, 2018, a hypothetical adverse 10% movement would result in a hypothetical decrease in fair value of approximately $62.0 million and $64.0 million, respectively. The estimated fair value was determined by measuring the impact of the hypothetical spot rate movement on outstanding forward contracts.

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 June 30, 2019 and December 31, 2018, we estimate that such hypothetical 100 basis point adverse movement would result in a hypothetical loss in fair value of approximately $18.0 million and $19.0 million, respectively, 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 June 30, 2019 and December 31, 2018, a 100 basis-point adverse movement (increase in LIBOR) would increase annual interest expense by approximately $6.8 million.

Pricing Pressure

Governments in certain international markets in which we operate have implemented measures, and may in the future implement new or additional measures, to reduce health care 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 possible 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 obtain and maintain adequate prices in a particular country may adversely affect our ability to secure 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 way 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 financial position or results of operations. There is also significant economic pressure on state budgets that may result 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 certain drugs.

Our products are also susceptible to increasing competition in many markets from generics, biosimilars, prodrugs and other products approved under abbreviated regulatory pathways. Generic versions of drugs, biosimilars and other products approved under abbreviated regulatory pathways are likely to be sold at substantially lower prices than branded products. Accordingly, the introduction of such products, as well as other lower-priced competing products, may significantly reduce both the price that we receive for branded products and the volume of branded products that we sell, which will negatively impact our revenues.

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 and other third-party distributors, public hospitals, pharmacies 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 June 30, 2019 and December 31, 2018. 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 4. 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 June 30, 2019. 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 U.S. Securities and Exchange Commission'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 June 30, 2019, that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Part II — OTHER INFORMATION

Item 1. Legal Proceedings

For a discussion of legal proceedings as of June 30, 2019, please read Note 19, *Litigation,* to our unaudited condensed consolidated financial statements included in this report, which is incorporated into this item by reference.

Item 1A. Risk Factors

We are substantially dependent on revenues from our products.

Our revenues depend upon continued sales of our products, as well as the financial rights we have in our anti-CD20 therapeutic programs, and, unless we develop, acquire rights to and/or commercialize new products and technologies, we will be substantially dependent on sales from our products and our financial rights in our anti-CD20 therapeutic programs for many years. Additionally, a significant portion of our revenues are concentrated on sales of our products in increasingly competitive markets. Any of the following negative developments relating to any of our products or any of our anti-CD20 therapeutic programs 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 generics, biosimilars, prodrugs and other products approved under abbreviated regulatory pathways;
- limitations 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 European Commission and the Japanese Ministry of Health, Labor and Welfare, and is in the early stages of commercial launch in certain 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 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;
- the introduction of a new gene therapy product that was approved in the U.S. in May 2019 for the treatment of SMA, and other products in development that, if successfully developed and approved, may compete with SPINRAZA in the SMA market, including potential oral products;
- our limited marketing experience within certain SMA markets, which may impact our ability to develop additional relationships with the associated medical and scientific community; and
- the lack of readiness of healthcare providers to treat patients with SMA.

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 obtain and maintain adequate coverage, or a reduction in pricing or reimbursement, could have an adverse effect on our business, reputation, revenues and results of operations or could cause a decline or volatility in our stock price.

Sales of our products depend, to a significant extent, on the availability and extent of adequate 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 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 obtain and maintain adequate 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 secure acceptable prices in existing and potential new 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.

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.

Payors, including managed care organizations, health insurers, pharmacy benefit managers, government health administration authorities, private health insurers and other organizations, increasingly seek ways to reduce their costs. Many payors continue to adopt benefit plan changes that shift a greater portion of prescription costs to patients. Such measures include more limited benefit plan designs, higher patient co-pay or co-insurance obligations and limitations on patients' use of commercial manufacturer co-pay payment assistance programs (including through co-pay accumulator adjustment or maximization programs). Payors also increasingly seek price discounts or rebates in connection with the placement of our products on their formularies or those they manage and control costs by imposing restrictions on access to or usage of our products, such as by requiring prior authorization or step therapy. Significant consolidation in the health insurance industry has resulted in a few large insurers and pharmacy benefit managers exerting greater pressure in pricing and usage negotiations with drug manufacturers, significantly increasing discounts and rebates required of manufacturers and limiting patient access and usage. Further consolidation among insurers, pharmacy benefit managers and other payors would increase the negotiating leverage such entities have over us and other drug manufacturers. Ultimately, additional discounts, rebates, coverage or plan changes, restrictions or exclusions as described above could have a material adverse effect on sales of our affected products.

Our failure to obtain or maintain adequate coverage, pricing or reimbursement for our products could have an adverse effect on our business, reputation, 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 or could cause a decline or volatility in our stock price.

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 may fail to successfully obtain or preserve patent protection for the technologies incorporated into our products and processes, or the protection we obtain may not be of sufficient breadth and degree to protect our commercial interests in all countries where we conduct business. Under the Drug Price

Competition and Patent Term Restoration Act of 1984, commonly known as the Hatch-Waxman Act, a manufacturer may file an Abbreviated New Drug Application, seeking approval of a generic copy of an approved innovator product, or a NDA under Section 505(b)(2) of the Federal Food, Drug and Cosmetic Act, which may be for a new or improved version of the original innovator product. The manufacturers are allowed to rely on the safety and efficacy data of the innovator's product, may not need to conduct clinical trials, can market a competing version of a product after the expiration or loss of patent exclusivity or the expiration or loss of regulatory exclusivity and often charge significantly lower prices. Upon the expiration or loss of patent protection or the expiration or loss of regulatory exclusivity for a product, especially a small molecule product, the major portion of revenues for that product may be dramatically reduced in a very short period of time. If we cannot prevent others from exploiting our inventions, we will not derive the expected benefit from them. Furthermore, our products may be determined to infringe patents or other intellectual property rights held by third parties, which could result in financial, legal, business or reputational harm to us.

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. Any of these circumstances could result in financial, business or reputational harm to us or could cause a decline or volatility in our stock price.

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 the successful development of additional indications for our existing products as well as the 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 uncertainty and risk. Only a small number of research and development programs result in the commercialization of a product. Furthermore, the development of novel approaches for the treatment of diseases, including development efforts in new modalities such as those based on the antisense oligonucleotide platform and gene therapy, may present additional challenges and risks, including obtaining regulatory approval from the FDA and other regulatory agencies that have limited experience with the development of such therapies. In addition, clinical trial data are subject to differing interpretations and, even if we view data as sufficient to support the safety, effectiveness and/or approval of an investigational therapy, regulatory authorities may disagree and may require additional data, may limit the scope of the approval or may deny approval altogether. Consequently, it may be difficult to predict the time and cost of product development of novel approaches for the treatment of diseases.

In addition, success in preclinical work or early stage clinical trials does not ensure that later stage or larger scale clinical trials will be successful. 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.

Even if we are able to successfully develop new products or indications, we may make a strategic decision to discontinue development of a product candidate or indication if, for example, we believe commercialization will be difficult relative to other opportunities in our pipeline.

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, substantially greater financial, marketing and research and development 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 in many markets from generics, biosimilars, prodrugs and other products approved under abbreviated regulatory pathways. Generic versions of drugs, biosimilars, prodrugs and other products approved under abbreviated regulatory pathways are likely to be sold at substantially lower prices than branded products. Accordingly, the introduction of such products, as well as other lower-priced competing products, may significantly reduce both the price that we receive for branded products and the volume of branded products that we sell, which will negatively impact our revenues.

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, including TECFIDERA, 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 biosimilars, follow-on products, generic versions of branded MS products, prodrugs or products approved under other abbreviated regulatory pathways, which would be significantly less costly than our products to bring to market and would be offered for sale at lower prices, and could result in a significant percentage of the sales of our products being lost to such biosimilars, follow-on products, generic versions of branded MS products, prodrugs or products approved under other abbreviated regulatory pathways;
- the 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 and maintain new and current patients to our therapies;
- damage to physician and patient confidence in any of our MS products or generic or biosimilars 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 or generic or biosimilars of 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.

In the SMA market, we face competition from a gene therapy product that was approved in the U.S. in May 2019 for the treatment of SMA. Future sales of SPINRAZA may be adversely affected by the commercialization of this competing product.

Our business may be adversely affected if we do not successfully execute or realize the anticipated benefits of our strategic and growth initiatives.

The successful execution of our strategic and growth initiatives may depend upon internal development projects, commercial initiatives, external opportunities, which may include the acquisition, partnering and in-licensing

of products, technologies and companies or the entry into strategic alliances and collaborations, or the disposition of certain of our assets or operations.

While we believe we have a number of promising programs in our pipeline, failure or delay 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. Supporting 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.

The availability of high quality, fairly valued external product development is limited and the opportunity for their acquisition is highly competitive. As such, we are not certain that we will be able to identify suitable candidates for acquisition or if we will be able to reach agreement. Furthermore, if we decide to dispose of certain of our assets or operations, we are not certain that we will be able to identify a suitable counterparty or if we will be able to reach agreement.

We may fail to initiate or complete transactions for many reasons and we may not be able to achieve the full strategic and financial benefits expected to result from transactions, or the benefits may be delayed or not occur at all. We may also face additional costs or liabilities in completed transactions that were not contemplated prior to completion.

Any failure in the execution of a transaction, in the integration of an acquired asset or business or in achieving expected synergies could result in slower growth, higher than expected costs, the recording of asset impairment charges and other actions which could adversely affect our business, financial condition and results of operations.

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 to operate our business. Our ability to effectively manage our business depends on the security, reliability and adequacy of our technology systems and data. A breakdown, invasion, corruption, destruction or breach of our technology systems and/or unauthorized access to our data and information could subject us to liability or negatively impact the operation of our business. Our technology systems continue to increase in multitude and complexity, 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. Cyber-attacks could also include supply chain attacks, which could cause a delay in the manufacturing of our products or products produced for contract manufacturing. 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, including our business continuity plans, 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, operational or reputational harm to us, loss of competitive advantage or loss of consumer confidence. 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.

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 clinical 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 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 on a number of key factors. These factors include protocol design, regulatory and institutional review board approval, patient enrollment rates and compliance with current Good Clinical Practices. 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 trial 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 activities and reporting related to our clinical trials. 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.

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, or generic or biosimilar versions of 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 or 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 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.

We depend on relationships with collaborators, joint venture partners 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, including joint venture partners, 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, including joint venture partners, subjects us to a number of risks, including:

- we may be unable to control the resources our collaborators, joint venture partners or third parties devote to our programs, products or product candidates;
- disputes may arise under an agreement, including with respect to the achievement and payment of milestones or ownership of rights to technology developed with our collaborators, joint venture partners or other third parties, and the underlying agreement with our collaborators, joint venture partners or other third parties may fail to provide us with significant protection or may fail to be effectively enforced if the collaborators, joint ventures partners or third parties fail to perform;
- the interests of our collaborators, joint venture partners 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, joint ventures 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, could result in termination of the research, development or commercialization of product candidates or could result in litigation or arbitration;
- any failure on the part of our collaborators, joint venture partners 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, joint venture partners 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; and
- any improper conduct or actions on the part of our collaborators, joint venture partners or other third parties could subject us to civil or criminal investigations and monetary and injunctive penalties, and could adversely impact our ability to conduct business, our operating results and our reputation.

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 and/or we may not realize the anticipated benefits of the collaboration arrangements and/or joint ventures.

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 Patient Protection and Affordable Care Act (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 Public Health Service Act. 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 may result 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 limitation 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, and may in the future implement new or additional measures, to reduce health care 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 possible 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.

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 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.

Conditions and regulations governing the health care industry are subject to change, with possible 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;
- government shutdowns or relocations may result in delays to the review and approval process, slowing the time necessary for new drug candidates to be reviewed and/or approved, which may adversely affect our business;

- requirements that provide for increased transparency of clinical trial results and quality data, such as the European Medicines Agency'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 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 adversely affect our business.

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. There is no guarantee that our efforts and strategies to expand sales in international markets will succeed. Emerging market countries may be especially vulnerable to periods of global and local political, legal, regulatory and financial instability and may have a higher incidence of corruption and fraudulent business practices. Further, certain countries may require local clinical trial data as part of the drug registration process in addition to global clinical trials, which can add to overall drug development and registration timelines. We may also be required to increase our reliance on third-party agents and unfamiliar operations and arrangements previously utilized by companies we partner or collaborate with or acquire in emerging markets.

Our sales and operations are subject to the risks of doing business internationally, including:

- less favorable intellectual property or other applicable laws;
- the introduction or greater acceptance of competing products, including generics, biosimilars, prodrugs and other products approved under abbreviated regulatory pathways;
- the inability to obtain necessary foreign regulatory or pricing approvals of products in a timely manner;
- limitations and additional pressures on our ability to obtain and maintain product pricing or receive price increases, including those resulting from governmental or regulatory requirements;
- the inability to successfully complete subsequent or confirmatory clinical trials in countries where our experience is limited;
- longer payment and reimbursement cycles and uncertainties regarding the collectability of accounts receivable;
- fluctuations in foreign currency exchange rates that may adversely impact our revenues, net income and value of certain of our investments;
- difficulties in staffing and managing international operations;
- the imposition of governmental controls;
- diverse data privacy and protection requirements;
- increasingly complex standards for complying with foreign laws and regulations that may differ substantially from country to country and may conflict with corresponding U.S. laws and regulations;

- the far-reaching anti-bribery and anti-corruption legislation in the U.K., including the U.K. Bribery Act 2010, and elsewhere and escalation of investigations and prosecutions pursuant to such laws;
- 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;
- changes in tax laws; and
- the imposition of tariffs or embargoes and other trade restrictions, including the recent tariffs imposed by the U.S. and China and the possibility of additional tariffs or other trade restrictions relating to trade between the two countries.

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

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 in recent years. 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 or 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, including management changes, the underperformance or discontinuation of one or more late stage programs or recruitment by competitors. We cannot ensure 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 building a large-scale biologics manufacturing facility, which will result in the incurrence of significant investment with no assurance that such investment will be recouped.

We believe we currently have sufficient large-scale manufacturing capacity to meet our near-term manufacturing requirements. However, due to the long lead times necessary for the expansion of manufacturing capacity, in 2015 we made the decision to expand our large molecule production capacity by building a large-scale biologics manufacturing facility in Solothurn, Switzerland with no assurance that the additional capacity will be required. In addition, we have made and expect to make significant investments in connection with the building of this manufacturing facility 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. Charges resulting from excess capacity would have a negative effect on our financial condition and results of operations.

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:

- *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.

- *Risks Relating to Compliance with current Good Manufacturing Practices (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.

- *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, cyber-attacks and numerous other factors.

- *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.

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.

In addition, although we have business continuity plans to reduce the potential for manufacturing disruptions or delays and reduce the severity of a disruptive event, there is no guarantee that these plans will be adequate, which could adversely affect our business and operations.

Our success in commercializing biosimilars developed by Samsung Bioepis is subject to risks and uncertainties inherent in the development, manufacture and commercialization of biosimilars. If Samsung Bioepis is unsuccessful in the development, manufacture and commercialization of biosimilars, we may not realize the anticipated benefits of our investment in Samsung Bioepis.

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. In addition, if the proposed divestiture of our Hillerød, Denmark manufacturing operations is completed, we will be dependent on FUJIFILM for the manufacture of biosimilar products. If Samsung Bioepis, FUJIFILM or 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 or result in imposition of monetary damages, penalties or other civil sanctions and damage our reputation;
- *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. In addition, if the proposed divestiture of our Hillerød, Denmark manufacturing operations is completed, we will be dependent on FUJIFILM for the manufacture of biosimilar products. FUJIFILM may not perform their obligations in a timely and cost-effective manner or in compliance with applicable regulations and may be unable or unwilling to increase production capacity commensurate with demand for our existing or future biosimilar products;
- *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 manner are additional factors that may impact our success and/or the success of Samsung Bioepis in this business area; and
- *Legal and Regulatory Requirements*. Any improper conduct or actions on the part of Samsung Bioepis or our joint venture partner, Samsung BioLogics, could damage our reputation and be distracting to management. In particular, Samsung BioLogics is currently subject to an ongoing criminal investigation, which may impact the operations of Samsung Bioepis and its business or divert the attention of the Samsung Bioepis management team from its ongoing operations and business.

If Samsung Bioepis is unsuccessful in the development, manufacture and commercialization of biosimilar products, we may not realize the anticipated benefits of our investment in Samsung Bioepis.

In addition, as Samsung Bioepis is a privately-held entity, our ability to liquidate our investment in Samsung Bioepis may be limited and we may realize significantly less than the value of such investment.

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 IPR&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;
- payments in connection with acquisitions and other business development activities; and
- failure to meet certain contractual commitments, including, for example, the minimum batch production commitment guarantees we have provided as part of the proposed transaction with FUJIFILM.

Our revenues and certain assets and liabilities 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 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 early termination of a hedge relationship.

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

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 Tax Cuts and Jobs Act of 2017 (2017 Tax Act) and the Swiss Federal Act on Tax Reform and AHV Financing (TRAF). 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 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, which has the effect of subjecting certain earnings of our foreign subsidiaries to U.S. taxation as global intangible low-taxed income and includes base erosion prevention measures on non-U.S. earnings. These changes became effective 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 in installments over an eight-year period, which started in 2018, and will not accrue interest.

Our estimates concerning the impact of the 2017 Tax Act on our accounting and on our business remain subject to developing interpretations of the provisions of the 2017 Tax Act. 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 condition.

The TRAF will result in significant changes to the Swiss cantonal income tax system. These changes include the elimination of historic favorable cantonal tax regimes, the introduction of a patent box regime and the introduction of a research and development super deduction. The TRAF also provides for transitional rules to lessen the immediate impact of the elimination of the favorable cantonal tax regimes. These changes will become effective on January 1, 2020. In response to the TRAF, each canton must enact cantonal tax reform to comply with the framework provided by the TRAF and are also expected to lower the statutory tax rate to compensate for the elimination of the historic favorable cantonal tax regimes. We will account for the impact of the TRAF and the specific cantonal tax reform changes in the period in which Zug, the canton in which we operate, enacts the cantonal tax reform, which we expect to occur in the second half of 2019. Upon the enactment, we will be required to remeasure our Swiss deferred tax

assets and liabilities, to account for the elimination of the historic favorable cantonal tax regimes, the impact of the transitional rules and the change in the statutory cantonal tax rate. This remeasurement of our Swiss deferred tax assets and liabilities could have a significant impact on our income tax provision in the period of enactment.

In addition, the adoption of some or all of the recommendations set forth in the Organization for Economic Cooperation 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 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 an owned or 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 shares or that we will repurchase shares at favorable prices.

From time to time our Board of Directors authorizes share repurchase programs, including, most recently, our 2019 Share Repurchase Program. The amount and timing of share repurchases are subject to capital availability and our determination that share 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 shares. Our ability to repurchase shares 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 repurchases under, or the completion of, our 2019 Share Repurchase Program could have a negative effect on our stock price. We can provide no assurance that we will repurchase shares 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 or unfit 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. 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.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds

Issuer Purchases of Equity Securities

The following table summarizes our common stock repurchase activity under our 2018 Share Repurchase Program during the second quarter of 2019:

Period	Total Number of Shares Purchased (#)	Average Price Paid per Share ($)	Total Number of Shares Purchased as Part of Publicly Announced Programs (#)	Maximum Approximate Dollar Value of Shares That May Yet Be Purchased Under Our Programs ($ in millions)
April 2019	2,083,096	$ 235.99	2,083,096	$ 1,000.0
May 2019	4,300,000	$ 229.57	4,300,000	$ 12.9
June 2019	57,582	$ 223.42	57,582	$ —
Total	6,440,678	$ 231.59		

The following table summarizes our common stock repurchase activity under our 2019 Share Repurchase Program during the second quarter of 2019:

Period	Total Number of Shares Purchased (#)	Average Price Paid per Share ($)	Total Number of Shares Purchased as Part of Publicly Announced Programs (#)	Maximum Approximate Dollar Value of Shares That May Yet Be Purchased Under Our Programs ($ in millions)
April 2019	—	$ —	—	$ 5,000.0
May 2019	—	$ —	—	$ 5,000.0
June 2019	3,942,418	$ 230.81	3,942,418	$ 4,090.1
Total	3,942,418	$ 230.81		

In March 2019 our Board of Directors authorized our 2019 Share Repurchase Program, which is a program to repurchase up to $5.0 billion of our common stock. Our 2019 Share Repurchase Program does not have an expiration date. All share repurchases under our 2019 Share Repurchase Program will be retired. Under our 2019 Share Repurchase Program, we repurchased and retired approximately 3.9 million shares of our common stock at a cost of approximately $909.9 million during the three and six months ended June 30, 2019. Approximately $4.1 billion remained available under our 2019 Share Repurchase program as of June 30, 2019.

In August 2018 our Board of Directors authorized our 2018 Share Repurchase Program, which was a program to repurchase up to $3.5 billion of our common stock that was completed as of June 30, 2019. All share repurchases under our 2018 Share Repurchase Program were retired. Under our 2018 Share Repurchase Program, we repurchased and retired approximately 6.5 million and 8.9 million shares of our common stock at a cost of approximately $1.5 billion and $2.1 billion during the three and six months ended June 30, 2019, respectively.

Item 6. Exhibits

The exhibits listed below are filed or furnished as part of this Quarterly Report on Form 10-Q.

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
10.1*+	Form of market stock unit award agreement under the Biogen Inc. 2017 Omnibus Equity Plan (for grants commencing in July 2019).
10.2*+	Form of performance stock units award agreement under the Biogen Inc. 2017 Omnibus Equity Plan (for grants commencing in July 2019).
10.3*+	Form of performance stock units award agreement (cash settled) under the Biogen Inc. 2017 Omnibus Equity Plan (for grants commencing in July 2019).
10.4*+	Biogen Inc. Executive Severance Policy - U.S. Executive Vice President, as amended effective June 19, 2019.
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 Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101++	The following materials from Biogen Inc.'s Quarterly Report on Form 10-Q for the quarter ended June 30, 2019, formatted in XBRL (Extensible Business Reporting Language): (i) the Condensed Consolidated Statements of Income, (ii) the Condensed Consolidated Statements of Comprehensive Income, (iii) the Condensed Consolidated Balance Sheets, (iv) the Condensed Consolidated Statements of Cash Flows, (v) the Condensed Consolidated Statements of Equity and (vi) Notes to Condensed Consolidated Financial Statements.

* Management contract or compensatory plan or arrangement

\+ Filed herewith

++ Furnished herewith

SIGNATURES

Pursuant to the requirements 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.

/s/ Jeffrey D. Capello

Jeffrey D. Capello

Executive Vice President, and

Chief Financial Officer

(principal financial officer)

July 23, 2019

Exhibit 10.1

MARKET STOCK UNIT AWARD AGREEMENT

GRANTED UNDER

BIOGEN INC. 2017 OMNIBUS EQUITY PLAN

1. Grant of Market Stock

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 market stock units (the "Granted MSUs" 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 MSU shall be paid unless vested in accordance with this Agreement. The Participant's rights to the Granted MSUs 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. Except as provided in Section 2.C. or 2.D. below, no portion of any Award shall become eligible to vest 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. (i) The Award will become eligible to vest in in three equal installments on each of the first, second and third anniversaries of the Grant Date (each a "Vesting Date" and collectively, the "Vesting Period").

(i) On each Vesting Date, the number of MSUs that become eligible to vest on such Vesting Date will vest based upon the change in the Company's share price between the Vesting Date and the Grant Date. The calculation of the number of Granted MSUs 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. In the event and to the extent that a number of the Granted MSUs then eligible to vest do not vest on the applicable Vesting Date in accordance with this Agreement and the LTI Overview, such Granted MSUs shall be immediately forfeited. In the event and to the extent that the target is exceeded based on the calculation described in the LTI Overview, an additional number of Granted MSUs will vest. In no event shall the number of Granted MSUs that vest on the applicable Vesting Date exceed 200% of the Granted MSUs that became eligible to vest on such Vesting Date.

C. In the event of a Corporate Change in Control, subject to the Participant's continued employment with the Company and its Affiliates through the date of such Corporate Change in Control:

(i) the Committee shall determine the extent to which all then outstanding and unvested Granted MSUs would vest based solely on the Company's share price in connection with the Corporate Change in Control (determined as if the date of the Corporate Change in Control were the Vesting Date for such Granted MSUs, and not, for the avoidance of doubt, taking into account the Company's share price during any trailing thirty (30)-day period) and, that number of the

Granted MSUs that does not vest based on such share price in accordance with this Agreement and the LTI Overview shall be immediately forfeited;

(ii) to the extent the acquiring or surviving entity assumes, continues or substitutes for any then outstanding Granted MSUs (determined after giving effect to clause (i) above) in connection with the Corporate Change in Control, the Granted MSUs (including any Granted MSUs that had become vested by their terms on Vesting Dates prior to the Corporate Change of Control and that remain outstanding) shall remain outstanding and shall vest, subject to the Participant's continued employment with the acquiring or surviving entity, on the applicable Vesting Date or, if earlier, upon an Involuntary Employment Action as described in Section 10.C. of the Plan or the Participant's termination of employment on account of death or Disability;

(iii) to the extent the acquiring or surviving entity does not assume, continue or substitute for any then outstanding Granted MSUs (determined after giving effect to clause (i) above) in connection with the Corporate Change in Control, the Granted MSUs (including any Granted MSUs that had become vested by their terms on Vesting Dates prior to the Corporate Change of Control and that remain outstanding) shall vest in full as of immediately prior to the Corporate Change in Control; and

(iv) notwithstanding clause (iii) or (iv) above, with respect to a Participant who is or becomes eligible for Retirement at any time after the Grant Date and on or before the latest Vesting Date described in Section 2.B. above, to the extent required to avoid adverse tax results under Section 409A, all then outstanding and unvested Granted MSUs (determined after giving effect to clause (i) above) (including any Granted MSUs that had become vested by their terms on Vesting Dates prior to the Corporate Change of Control and that remain outstanding) shall vest in full as of immediately prior to the Corporate Change in Control.

D. Except as otherwise provided in the Plan or Section 2.C. above, 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 eligible to vest as of the date of such termination of employment, and such Granted MSUs then eligible to vest will vest in accordance with Section 2.B.(ii) with the date of the termination of employment serving as the applicable Vesting Date; 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 remain outstanding and will remain eligible to vest over the remainder of the Vesting Period as set forth in Section 2.B.(i) without regard to the service requirement specified in Section 2.A., with respect to fifty percent (50%) of the number of Granted MSUs covered by such unvested portion and with respect to an additional ten percent (10%) of the number of Granted MSUs 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 Granted MSUs, and such Granted MSUs that become eligible to vest will vest in accordance with Section 2.B.(ii). 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.

E. 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 and does not prior to the latest Vesting Date described in Section 2.A. above become eligible for Retirement, within 30 days following the date on which a Granted MSU becomes vested, the Company shall issue 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") (or, in the case of an assumption or substitution described in Section 2.C.(ii) above, common stock of the acquiring or surviving entity or such other cash or property payable under the assumed or substituted award) in satisfaction of each vested MSU.

B. With respect to a Participant who is or becomes eligible for Retirement at any time during the Vesting Period, to the extent required to avoid adverse tax results under Section 409A and notwithstanding anything to the contrary in this Agreement, the Company shall issue to the Participant, subject to applicable withholding as described in Section 7 of this Agreement, one share of Common Stock (or, in the case of an assumption or substitution described in Section 2.C.(ii) above, common stock of the acquiring or surviving entity or such other cash or property payable under the assumed or substituted award) in satisfaction of each vested MSU (determined in accordance with Section 2 of this Agreement and Section 10 of the Plan) within 30 days of the earliest of (i) the applicable Vesting Date or (ii) the date on which a Corporate Change in Control 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.(ii) 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.(ii), 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 by reason of the granting of the Award 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 a number of shares of Common Stock 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 number of shares to be withheld will be calculated using the closing sales price of a share of Common Stock (or, in the case of an assumption or substitution described in Section 2.C.(ii) above, common stock of the acquiring or surviving entity or such other cash or property payable under the assumed or substituted award) on the applicable Vesting Date. Shares (net of the number 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

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. Except as provided in Section 2.C. or 2.D. below, 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 upon the achievement of the Performance Goals 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 upon the Committee's determination that such Performance Goals have not been satisfied (or deemed satisfied). 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 (i) 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 (which shall occur not later than March 1 immediately following the end of the year to which the Annual Performance Goals relate), (ii) in the event of a

Corporation Change in Control, the date or dates described in Section 2.C. below, or (iii) in the event of a termination of the Participant's employment with the Company and its Affiliates on account of death, Disability or Retirement, the date or dates described in Section 2.D below (the "Vesting Date").

C. In the event of a Corporate Change in Control, subject to the Participant's continued employment with the Company and its Affiliates through the date of such Corporate Change in Control:

(i) if the applicable performance period relating to the Performance Goals has ended prior to the date of such Corporate Change in Control, the Committee shall determine the extent to which the Performance Goals were achieved, if not yet determined, and the Granted PSUs that are eligible to vest based on the achievement of such Performance Goals shall become Eligible PSUs as of immediately prior to such Corporate Change in Control based on the level of achievement so determined;

(ii) if the applicable performance period relating to the Performance Goals has not ended prior to the date of such Corporate Change in Control, any outstanding Granted PSUs shall become Eligible PSUs as of immediately prior to such Corporate Change in Control assuming that the Performance Goals are achieved at target;

(iii) to the extent the acquiring or surviving entity assumes, continues or substitutes for Eligible PSUs (determined after giving effect to clauses (i) and (ii) above) in connection with the Corporate Change in Control, the Eligible PSUs shall remain outstanding and, subject to the Participant's continued employment with the acquiring or surviving entity, shall vest in full upon the third anniversary of the Grant Date or, if earlier, upon an Involuntary Employment Action as described in Section 10.C. of the Plan or the Participant's termination of employment on account of death or Disability;

(iv) to the extent the acquiring or surviving entity does not assume, continue or substitute for the Eligible PSUs (determined after giving effect to clauses (i) and (ii) above) in connection with the Corporate Change in Control, the Eligible PSUs shall vest in full as of immediately prior to the Corporate Change in Control; and

(v) notwithstanding clause (iii) or (iv) above, with respect to a Participant who is or becomes eligible for Retirement at any time after the Grant Date and on or before the latest Vesting Date described in Section 2.B.(i) above, to the extent required to avoid adverse tax results under Section 409A, the Eligible PSUs (determined after giving effect to clauses (i) and (ii) above) shall vest in full as of immediately prior to the Corporate Change in Control.

D. Except as otherwise provided in the Plan or Section 2.C. above, 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 date of the determination of the Eligible PSUs based on the achievement of the Performance Goals and the Committee's determination

thereof (including under Section 2.C. above, in which case the Eligible PSUs (determined after giving effect to Section 2.C. above) will vest as of immediately prior to the Corporate Change in Control), 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 (a) the date of Retirement or (b) the date of the determination of the Eligible PSUs based on the achievement of the Performance Goals and the Committee's determination thereof (including under Section 2.C. above, and with the Eligible PSUs determined after giving effect to Section 2.C. above), and in either case, with respect to 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 and does not prior to the latest Vesting Date described in Section 2.B.(i) above become eligible for Retirement, within 30 days following the date on which Eligible PSUs become 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 (or, in the case of an assumption or substitution described in Section 2.C.(iii) above, of the common stock of the acquiring or surviving entity or such other cash or property payable under the assumed or substituted award).

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 latest Vesting Date described in Section 2.B.(i) above, to the extent required to avoid adverse tax results under Section 409A, the Company shall pay to the Participant, subject to applicable withholding as described in Section 7 of this Agreement, one share of Common Stock (or, in the case of an assumption or substitution described in Section 2.C.(iii) above, of the common stock of the acquiring or surviving entity or such other cash or property payable under the assumed or substituted award) 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.(i) of this Agreement, (ii) the date on which the Participant experiences a separation from service (within the meaning of Section 409A) and/or the date the Eligible PSU vests under

Section 2.B.(iii) of this Agreement, subject to Section 3.C. of this Agreement or (iii) the date on which a Corporate Change in Control occurs.

C. If you are a "specified employee" (as defined in Section 409A), to the extent required to avoid adverse tax results under 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 (or, in the case of an assumption or substitution described in Section 2.C.(iii) above, of the common stock of the acquiring or surviving entity or such other cash or property payable under the assumed or substituted award) on the applicable vesting date. 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 10.3

PERFORMANCE STOCK UNITS AWARD AGREEMENT (CASH SETTLED)

GRANTED UNDER

BIOGEN INC. 2017 OMNIBUS EQUIT 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 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. Except as provided in Section 2.C. or 2.D. below, 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 (or deemed satisfied in accordance with Section 2.C. below), such Granted PSUs connected to such unachieved Annual Performance Goals shall not become eligible to vest and shall be immediately forfeited upon the Committee's determination that such Annual Performance Goals have not been satisfied (or deemed satisfied). 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 shall vest on (i) 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 (which shall occur not later than March 1 immediately following the end of the year to which the Annual Performance Goals relate)**,** (ii) in the event of a Corporate Change in Control, the date or dates described in Section 2.C. below, or (iii) in the event of a termination of the Participant's employment with the Company and its Affiliates on account of death, Disability or Retirement, the date or dates described in Section 2.D. below (the "Vesting Date").

C. In the event of a Corporate Change in Control, subject to the Participant's continued employment with the Company and its Affiliates through the date of such Corporate Change in Control:

(i) the Committee shall determine the extent to which the Annual Performance Goals relating to the year prior to the year in which the Corporate Change in Control occurs are achieved, if not yet determined, and the Granted PSUs that are eligible to vest based on the achievement of such Annual Performance Goals shall become Eligible PSUs based on the level of achievement so determined as of immediately prior to such Corporate Change in Control;

(ii) any outstanding Granted PSUs that are eligible to vest based on the achievement of Annual Performance Goals relating to a year in which the Corporate Change in Control occurs or a year after the Corporate Change in Control occurs shall become Eligible PSUs as of immediately prior to such Corporate Change in Control assuming that the Annual Performance Goals are achieved at target;

(iii) to the extent the acquiring or surviving entity assumes, continues or substitutes for Eligible PSUs (determined after giving effect to clauses (i) and (ii) above) in connection with the Corporate Change in Control, the Eligible PSUs (including any Granted PSUs that had become Eligible PSUs by their terms prior to the Corporate Change in Control) shall remain outstanding and, subject to the Participant's continued employment with the acquiring or surviving entity, shall vest in full upon the third anniversary of the Grant Date or, if earlier, upon an Involuntary Employment Action as described in Section 10.C. of the Plan or the Participant's termination of employment on account of death or Disability;

(iv) to the extent the acquiring or surviving entity does not assume, continue or substitute for the Eligible PSUs (determined after giving effect to clauses (i) and (ii) above) in connection with the Corporate Change in Control, the Eligible PSUs (including any Granted PSUs that had become Eligible PSUs by their terms prior to the Corporate Change in Control) shall vest in full as of immediately prior to the Corporate Change in Control; and

(v) notwithstanding clause (iii) or (iv) above, with respect to a Participant who is or becomes eligible for Retirement at any time after the Grant Date and on or before the latest Vesting Date described in Section 2.B. above, to the extent required to avoid adverse tax results under Section 409A, the Eligible PSUs (determined after giving effect to clauses (i) and (ii) above) shall vest in full as of immediately prior to the Corporate Change in Control.

D. Except as otherwise provided in the Plan or Section 2.C. above, 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, to the extent not vested previously, will become fully vested as follows: (1) with respect to any Eligible PSUs for which the achievement of Annual Performance Goals has been determined as of the date of such termination on account of death or Disability, upon the date of such termination; and (2) with respect to any Eligible PSUs for which the achievement of Annual Performance Goals has not been determined on the date of such termination, upon the date of the determination of the Eligible PSUs based on the achievement of the applicable Annual Performance Goals and the Committee's determination thereof (including under Section 2.C. above, in which case the Eligible PSUs (determined after giving effect to Section 2.C. above) will vest as of immediately prior to the Corporate Change in Control), 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 as follows: (1) with respect to any Eligible PSUs for which the achievement of Annual Performance Goals has been determined as of the date of such Retirement, upon the date of Retirement and, (2) with respect to any Eligible PSUs for which the achievement of Annual Performance Goals has not been determined on the date of such Retirement, upon the date of the determination of the Eligible PSUs based on the achievement of the applicable Annual Performance Goals and the Committee determination thereof (including under Section 2.C. above, and with the Eligible PSUs determined after giving effect to Section 2.C. above), in each case, with respect to 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.

E. 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 and does not prior to the latest Vesting Date described in Section 2.B. above become eligible for Retirement, within 30 days following the date on which an Eligible PSU becomes vested, 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 BIIB closing stock price ending on the applicable Vesting Date (or, in the case of an assumption or substitution described in Section 2.C.(iii) above, common stock of the acquiring or surviving entity).

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 latest Vesting Date described in Section 2.B. above, to the extent required to avoid adverse tax results under Section 409A and notwithstanding anything to the contrary in this Agreement, 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.(i) of this Agreement, (ii) the date on which the Participant experiences a separation from service (within the meaning of Section 409A) and/or the date the Eligible PSU vests under Section 2.B(iii) of this Agreement, subject to Section 3.C. of this Agreement or (iii) the date on which a Corporate Change in Control occurs.

C. If you are a "specified employee" (as defined in Section 409A), to the extent required to avoid adverse tax results under 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 10.4

Severance Plan for U.S. Executive Vice Presidents

As an Executive Vice President, you are entitled to severance benefits in the event your employment is terminated by Biogen other than For Cause or for reason of death or Disability (as these terms are defined in the Biogen Inc. 2017 Omnibus Equity Plan, as amended from time to time, or any successor plan there to ("OEP").

Benefits

Your severance benefits are comprised of (i) a lump sum payment (as calculated below), (ii) upon completion of the appropriate forms, continuation of your participation in Biogen's group medical and dental insurance plans, to the same extent permitted by COBRA and to the same extent such insurance is then provided to regular employees of Biogen, including payment by you of a portion of the insurance premiums (i.e., the "Insurance Benefit") and (iii) the reasonable cost of up to 12 months of executive-level outplacement services from a recognized provider of such services selected by Biogen, at the expense of Biogen (upon receipt of appropriate documentation).

The lump sum severance payment is calculated as follows:

[12 + (A x 2)] x B = lump sum payment

where: A is the number of full years of service with Biogen (but A x 2 may not exceed 9), and B is the monthly equivalent of your target annual cash compensation at the time of your termination (i.e., one-twelfth of the sum of your then annual base salary plus target annual bonus).

The following are examples of how the lump sum payment and Insurance Benefit Period are determined:

If your employment with Biogen is terminated after 10 months of employment, you will receive a lump sum payment equal to 12 months of your target annual cash compensation and continue to participate in Biogen's group medical and dental plans for 12 months, unless you become eligible to participate in another employer's medical and dental plans before that date. COBRA continuation of medical and dental benefits is available, at your own expense, for an additional six months after this 12-month Insurance Benefit Period.

If your employment with Biogen is terminated after five years, you will receive a lump sum payment equal to 21 months [12+9] of your target annual cash compensation and continue to participate in Biogen's group medical and dental plans for 18 months, unless you become eligible to participate in another employer's medical and dental plans before that date.

If at any time within two years following a Corporate Transaction or Corporate Change in Control (as these terms are defined in Biogen's OEP) your employment is terminated by Biogen or the succeeding corporate entity, other than For Cause or for reason of death or Disability (as these terms are defined in Biogen's OEP), or you experience an Involuntary Employment Action (defined below) and as a result you terminate your employment with Biogen or the succeeding corporate entity, then, regardless of the length of your service with Biogen and the succeeding corporate entity, and in lieu of the formula set forth above, you will receive a lump sum payment equivalent to 24 months of your target annual cash compensation at the time of your termination or at the time of a Corporate Transaction or Corporate Change in Control, whichever is higher. In addition, you will be entitled to continue participating in Biogen's group medical and dental plans for 24 months, unless you become eligible to participate in another employer's medical and dental plans before that date. The term "Involuntary Employment Action" shall have the definition set forth in Biogen's OEP, provided, however, that the term "Corporate Transaction" used in that definition shall be deemed to mean either a Corporate Transaction or Change in Control, as the case may be, and provided also that prior to your termination of employment you have notified the Chief Legal Counsel or the Head of Human Resources of Biogen in writing of the basis for your Involuntary Employment Action, you have given such notice within one year of the circumstances giving rise to your Involuntary Employment Action and Biogen does not cure such circumstances within 30 days after the date of your notice.

Delivery of Benefits

Payment and provision of all the benefits provided under this arrangement are conditioned on your execution and delivery of all necessary forms and an irrevocable general release in favor of Biogen, in form and substance reasonably acceptable to Biogen, with respect to any and all claims relating to your employment and the termination of your employment with Biogen. If you retire or voluntarily terminate your employment with Biogen, or Biogen terminates your employment For Cause or for reason of death or Disability (as these terms are defined in Biogen's OEP), or you do not provide the requisite general release, you will not be eligible to receive the severance benefits described above.

If all other conditions of this arrangement are met, a lump sum payment (less applicable taxes and other mandatory deductions as required by law) will be paid to you following the termination of your employment, no later than the first to occur of: a) 90 days following your termination of your employment with Biogen and b) March 15 of the year following the calendar year in which termination of employment occurs, unless you are a "specified employee" as defined in Section 409A of the Internal Revenue Code of 1986, as amended (i.e., "Section 409A"). (If all preconditions to payment, including the delivery of an irrevocable general release, are not satisfied prior to the earlier of these two dates, payment to you may be delayed and you may incur additional tax liabilities under Section 409A.) If you are a "specified employee", to the extent required by Section 409A, payment will not be made to you before the date which is six months after you "separate from service" (or, if earlier, your date of death or Disability) unless the payment qualifies as excepted welfare benefits under Section 409A, does not constitute a "deferral of compensation" under Section 409A or is otherwise not subject to the requirements of Section 409A. Each payment made under this arrangement shall be treated as a

separate payment and the right to receive a series of installment payments under this arrangement shall be treated as a right to a series of separate payments.

The Insurance Benefit will be paid on a monthly basis and will continue until the earlier of (i) the date you become eligible to participate in the medical and dental insurance plan of another employer or (ii) the date that is [12 + (A x 2)] months, but not more than 21 months (or 24 months in the case of a Corporate Transaction or Change in Control), following the termination of your employment with Biogen (the "Insurance Benefit Period"). You will have the right, at your own expense, to continue your participation in Biogen's group medical and dental insurance plans at the expiration of the Insurance Benefit Period, pursuant to the provisions of COBRA, but only for an 18-month period that will be deemed to have commenced at the start of your severance. You will only be entitled to receive the Insurance Benefit if you timely and properly elect continuation coverage under COBRA. If Biogen determines in its sole discretion that it cannot provide the Insurance Benefit without the possibility of violating applicable law (including, without limitation, the Patient Protection and Affordable Care Act) or it or you incurring additional taxes, including but not limited to under Section 105(h) of the Internal Revenue Code, Biogen will in lieu thereof provide to you a taxable monthly payment in an amount equal to the monthly COBRA premium that Biogen Idec would have otherwise paid under this arrangement in respect of the Insurance Benefit (which amount will be based on the premium for the first month of COBRA coverage) for the Insurance Benefit Period in equal installments in accordance with Biogen's normal payroll practices.

General

Biogen shall administer and shall have the discretionary authority to adopt rules for the management and operation of this arrangement, to interpret the provisions of the arrangement and to construe the terms of the severance arrangement in its sole discretion. The decision of Biogen, or the duly authorized delegate, is final and conclusive for all purposes.

The severance arrangement may be amended, modified, suspended or terminated by Biogen at any time; provided that the severance arrangement may not be amended or terminated without your written consent for a period of two years following a Corporate Transaction or a Change in Control.

This arrangement is unfunded. This arrangement will benefit and bind Biogen and its successors and permitted assigns and you and your heirs, executors and legal representatives. You do not have any right to transfer or assign your benefits under this arrangement.

This arrangement shall be construed, administered and enforced according to the laws of the State of Delaware, except to the extent that such laws are preempted by the federal laws of the United States of America.

Additional Summary Plan Description Information

Description	This document describes 3 Plan which is subject to the Employee Retirement Income Security Act of 1974 (ERISA). This document constitutes the Summary Plan Description (SPD) and Plan Document. Benefit determinations are controlled exclusively by this SPD and Plan Document.
Name of Plan	Severance Plan for U. S. Executive Vice Presidents
Name and Address of Employer	Biogen Inc. 225 Binney Street, Cambridge Massachusetts 02142
Plan Identification Number	Employer IRS Identification #: 04-3002117 Plan #: 523
Type of Welfare Plan	Severance
ERISA Plan Year Ends	December 31
Type of Administration	The Plan is administered by the Plan Administrator
Plan Administrator, Name, Address, and Telephone Number	Biogen Inc. is the Plan Administrator and named fiduciary of the Plan, with authority to delegate its duties. Biogen Inc. 225 Binney Street Cambridge, Massachusetts 02142 (617) 679-3400
Agent for Service of Legal Process on the Plan	Biogen Inc. 225 Binney Street Cambridge, Massachusetts 02142
Funding	This Plan is unfunded
Appeal Procedures	You have 180 days from your effective date of termination to file an appeal. Requests for appeals should be sent to the address specified in the claim denial. A decision on review will be made not later than 45 days following receipt of the written request for review. If the Plan Administrator determines that special circumstances require an extension of time for a decision on review, the review period may be extended by an additional 45 days (90 days in total). The Plan Administrator will notify you in writing if an additional 45 day extension is needed. If an extension is necessary due to your failure to submit the information necessary to decide the appeal, the notice of extension will specifically describe the required information, and you will be afforded at least 45 days to provide the specified information. If you deliver the requested

	information within the time specified, the 45 day extension of the appeal period will begin after you have provided that information. If you fail to deliver the requested information within the time specified, the Plan Administrator may decide your appeal without that information. You will have the opportunity to submit written comments, documents, or other information in support of your appeal. You will have access to all relevant documents as defined by applicable U.S. Department of Labor regulations. The review of the adverse benefit determination will take into account all new information, whether or not presented or available at the initial determination. No deference will be afforded to the initial determination. The review will be conducted by the Plan Administrator and will be made by a person different from the person who made the initial determination and such person will not be the original decision maker's subordinate. A notice that your request on appeal is denied will contain the following information: l The specific reason(s) for the determination; l A reference to the specific Plan provision(s) on which the determination is based; l A statement disclosing any internal rule, guidelines, protocol or similar criterion relied on in making the adverse determination (or a statement that such information will be provided free of charge upon request); l A statement describing your right to bring a lawsuit under Section 502(a) of ERISA if you disagree with the decision; l The statement that you are entitled to receive upon request, and without charge, reasonable access to or copies of all documents, records or other information relevant to the determination; and l The statement that "You or your plan may have other voluntary alternative dispute resolution options, such as mediation. One way to find out what may be available is to contact your local U.S. Department of Labor Office and your State insurance regulatory agency". Notice of the determination may be provided in written or electronic form. Electronic notices will be provided in a form that complies with any applicable legal requirements. Unless there are special circumstances, this administrative appeal process must be completed before you begin any legal action regarding your claim.
Your Rights Under ERISA	As a participant in this Plan, you are entitled to certain rights and protections under the Employee Retirement Income Security Act of 1974 (ERISA). ERISA provides that all Plan participants shall be entitled to: l Receive Information About Your Plan and Benefits

- ¡ Examine, without charge, at the Plan Administrator's office and at other specified locations, all documents governing the Plan, including a copy of the latest annual report (Form 5500 Series), if any, filed by the Plan with the U.S. Department of Labor and available at the Public Disclosure Room of the Employee Benefits Security Administration.
- ¡ Obtain, upon written request to the Plan Administrator, copies of documents governing the operation of the Plan, including copies of the latest annual report (Form 5500 Series), if any, and updated Summary Plan Description.
- ¡ The Plan Administrator may make a reasonable charge for the copies.
- ¡ Receive a summary of the Plan's annual financial report, if any. The Plan Administrator is required by law to furnish each participant with a copy of this summary annual report.

l Prudent Actions by Plan Fiduciaries

- ¡ In addition to creating rights for Plan participants, ERISA imposes duties upon the people who are responsible for the operation of the employee benefit plan. The people who operate your Plan, called "fiduciaries" of the Plan, have a duty to do so prudently and in the interest of you and other Plan participants and beneficiaries. No one, including your Employer or any other person, may fire you or otherwise discriminate against you in any way to prevent you from obtaining a benefit or exercising your rights under ERISA.

l Enforce Your Rights

- ¡ If your claim for a benefit is denied or ignored, in whole or in part, you have a right to know why this was done, to obtain copies of documents relating to the decision without charge, and to appeal any denial, all within certain time schedules.
- ¡ Under ERISA, there are steps you can take to enforce the above rights. For instance, if you request a copy of Plan documents or the latest annual report from the Plan and do not receive them within 30 days, you may file suit in a federal court. In such a case, the court may require the Plan Administrator to provide the materials and pay you up to $110 a day until you receive the materials, unless the materials were not sent because of reasons beyond the control of the Plan Administrator.

	¡ If you have a claim for benefits that is denied or ignored, in whole or in part, you may file suit in a state or federal court. If it should happen that Plan fiduciaries misuse the Plan's money, or if you are discriminated against for asserting your rights, you may seek assistance from the U.S. Department of Labor, or you may file suit in a federal court. The court will decide who should pay court costs and legal fees. If you are successful, the court may order the person you have sued to pay these costs and fees. If you lose, the court may order you to pay these costs and fees, if, for example, it finds your claim is frivolous. l Assistance with Your Questions ¡ If you have any questions about your Plan, you should contact the Plan Administrator. If you have any questions about this statement or about your rights under ERISA, or if you need assistance in obtaining documents from the Plan Administrator, you should contact the nearest office of the Employee Benefits Security Administration, U.S. Department of Labor, listed in your telephone directory or the Division of Technical Assistance and Inquiries, Employee Benefits Security Administration, U.S. Department of Labor, 200 Constitution Avenue N.W., Washington, D.C. 20210. You may also obtain certain publications about your rights and responsibilities under ERISA by calling the publications hotline of the Employee Benefits Security Administration.
Other Rights	The Plan Administrator, as fiduciary for the Plan, is entitled to legal and equitable relief to enforce its right to recover any overpayments to you under this Plan. This right of recovery is enforceable but will not exceed the benefits paid you. You agree that the Plan Administrator has a lien over such sources of income until any overpayments have been recovered in full.
Discretionary Acts	The Plan Administrator has discretionary authority to interpret the Plan and to make benefit determinations under the Plan. The Plan Administrator may act directly or through its employees and agents or further delegate their authority through contracts, letters or other documentation or procedures to other affiliates, persons or entities. Once you are deemed to have exhausted your appeal rights under the Plan, you have the right to seek court review under Section 502(a) of ERISA of any benefit determinations with which you disagree. The court will determine the standard of review it will apply in evaluating those decisions.

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 quarterly 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: July 23, 2019

/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 D. Capello, certify that:

1. I have reviewed this quarterly 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: July 23, 2019

/s/ Jeffrey D. Capello

Jeffrey D. Capello

Executive Vice President,

Chief Financial Officer and Chief Accounting 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 Quarterly Report on Form 10-Q for the quarter ended June 30, 2019 (the "Form 10-Q") 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-Q fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: July 23, 2019

/s/ Michel Vounatsos

Michel Vounatsos
Chief Executive Officer
[principal executive officer]

Dated: July 23, 2019

/s/ Jeffrey D. Capello

Jeffrey D. Capello
Executive Vice President,
Chief Financial Officer and Chief Accounting 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.