

# Biogen Inc.

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# Table of Contents

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Company Overview

Industry Outlook

Investment Thesis

Catalyst & Risks

Valuation

Recommendation

# Company Overview

## Company Overview

- Biogen, Inc. is a biopharmaceutical company headquartered in Massachusetts, United States, the company specializes in hematology, neurology, and immunology.
- Major therapy development for: multiple sclerosis (MS), neuroimmunology movement disorders, including Parkinson's disease, Alzheimer's disease (AD) and dementia, and neuromuscular disorders, including amyotrophic lateral sclerosis (ALS) and spinal muscular atrophy (SMA).
- Biogen markets its products under various names like: Flixabi, Benepali, Imraldi, Spinraza, Tecfidera, Avonex, Tysabri, Fampyra, Plegridy and Fumaderm brand names. The company has a presence in the US, Asia, and Europe.

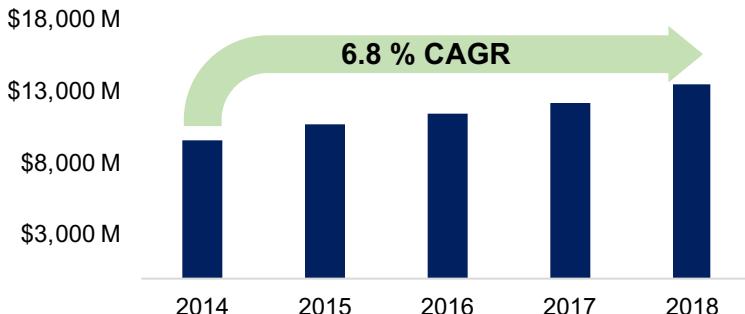
## Investment Outlook

Current Price	\$221.94
Target Price	\$266.24
EPS (TTM)	\$26.83
PE Ratio (TTM)	8.50
Market Capitalization	\$42B

## 2018 Revenue Breakdown



## YoY Revenue Increase



## Executive Team

### Michel Vounatsos, CEO

Joined the firm in 2016 with 20 years of experience from Merck. Mr. Vounatsos holds a C.S.C.T. certificate in Medicine, and his M.B.A. from the HEC School of Management in Paris.



### Jeffrey Capello, CFO

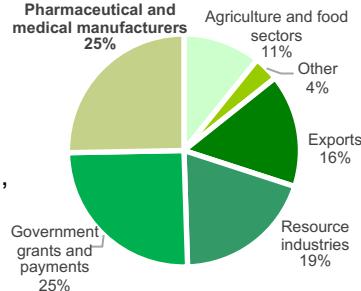
Mr. Capello's has past experience working the pharmaceutical industry and has an accounting MBA from the Harvard Business School.



# Industry Outlook

## Industry Overview

- Industry consists of R&D, marketing, and manufacturing of products in biotech.
- Revenues primarily earned from product sales, licensing fees, royalties, and research funding.



## Industry Trends

- Patent Expirations** — US pharmaceutical companies encountering patent expirations has created opportunities for competitors to enter the market, many of which are being acquired by larger companies.
- Increased M&A Activity** — larger companies turning to M&A to replace product lines and revenues lost from patent expiration.
- Expanding Drug Market** — aging population driving demand for drugs; pharmaceutical segment poised to be largest biotechnology segment over the next 5 years with ACA providing tax breaks for biotech.

## Key External Drivers

### Research and Development Expenditure

- Investment in R&D increases product development and manufacturing processes.
- Approx. 10% of total US R&D business expenditure is concentrated in biotech.

### 65+ Adult Population

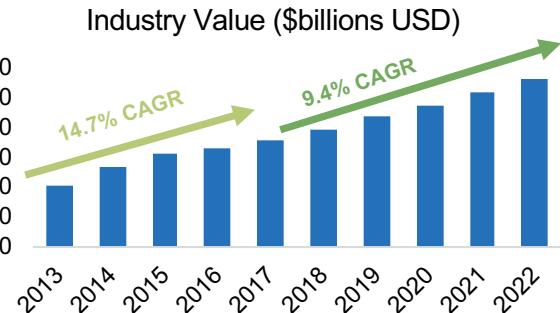
- Increased life expectancy in the US has increased the incidence of age-related illness, increasing the demand for medical treatments.

### Funding and Investor Sentiment

- Capital-intensive industry that requires heavy investment to use for R&D and other functions.

## Industry Performance

- From 2013-2017, US Biotechnology industry grew at a CAGR of 14.7%
  - US Biotechnology industry forecasted to grow at a 9.4% CAGR from 2017-2022.
- Represents a 56.8% increase in industry value.

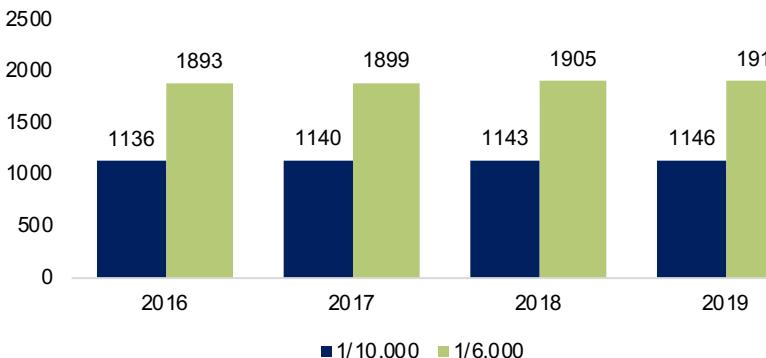


# Investment Thesis I – Spinraza Growth

## Spinal Muscular Atrophy (SMA)

- Spinal Muscular Atrophy (SMA) is a genetic neuromuscular disease characterized by muscle atrophy and weakness.
- The disease generally manifests early in life and is the leading genetic cause of death in infants and toddlers.
- SMA affects as many as 10,000 to 25,000 children and adults in the United States, and therefore it is one of the most common rare diseases.
- One in 6,000 to one in 10,000 children are born with the disease.
- Constant and growing base of people who need Spinraza.

## Estimated Births With SCA 2016 – 2019



## Spinraza

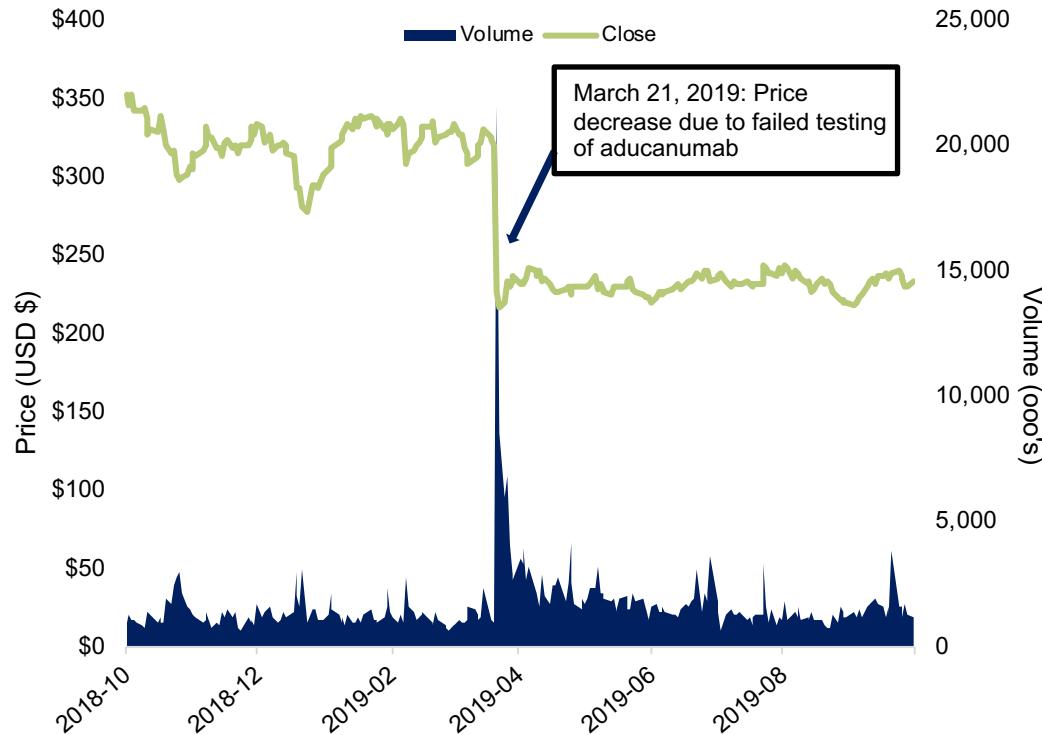
- Spinraza is the only approved treatment for SMA.
- Wall Street's focus has shifted to Biogen's newer growth driver Spinraza, a treatment for SMA.
- Biogen said it sees ample opportunity for growth as Spinraza has only reached 20% of adults in the United States.
- "We believe Spinraza will remain a foundation of care in SMA for years to come," – Michael Ehlers Biogen's research chief.

## Spinraza Quarterly Sales (in millions)



# Investment Thesis II – Significant Reduction In Price

- On March 21 of 2019, Biogen's stock dropped roughly 29%.
- This is due to their Alzheimer drug, aducanumab, was not going to meet it's "primary endpoint".
- Goldman Sachs projected that one-time sales of the Alzheimer drug to reach \$21 billion.
- Historically most Alzheimer drugs haven't made it to the end consumer.
- Common for healthcare companies' stock to decline after these events (play for traders).
- Since fundamentally the stock is still sound; it's new and reduced price brings up a buying opportunity.



# Investment Thesis III – Well-Positioned in Growing Industry



## Growing Industry

- According to 2018 census, by 2035 the 65-year-old and over population will outnumber the amount of children under 18.
- Aging population in the US has driven demand due to increased medical needs.
- Greater life expectancy in the US increasing the incidence of age-related diseases, thereby increasing the demand for drugs to treat them.
- Biotech industry is expected to grow at a 9.6% CAGR over the next 3 years.
- Innovations in biotech R&D are creating opportunities for new drugs and manufacturing efficiencies.

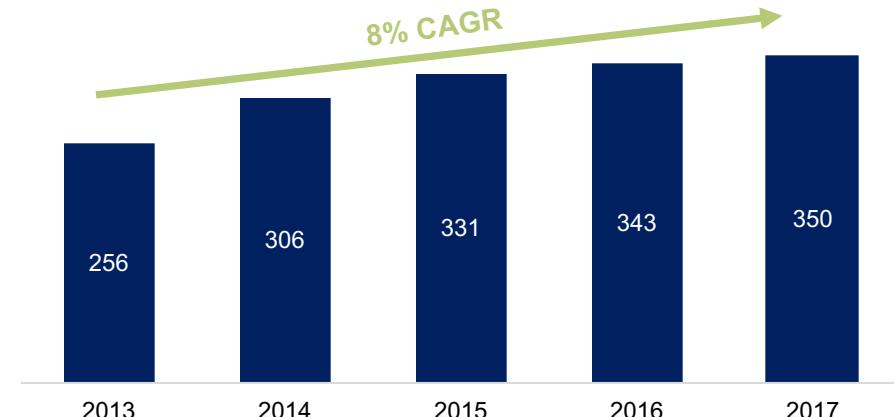
## Acquisition Opportunities

- Patent expires in the market are leading new, smaller firms to enter the market in hopes of being acquired (taking market share away from larger competitors whose patents expired).
- In 2018, Biogen had \$3.9 billion USD of free cash flow which would allow it to take advantage of attractive acquisition opportunities.
- Biogen can use M&A activity to supplement strong organic growth and stable recurring revenue.

## Stable Recurring Revenue

- Approximately 35% of global MS patients treated with Biogen's drugs.
- Diverse MS portfolio addressing broad scope of MS patient needs.
- MS patient sector (core business) continuing to grow; very little buyer power thus once patients find success with a drug, they're unlikely to switch providers.

### Biogen MS Patients (Thousands)



# Valuation - DCF

## DCF Unlevered Cash Flow Summary

(US\$ millions)	Historical												Forecast					
	2017A	2018A	2019A	2020E	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E				
<b>Revenue</b>	<b>11,449</b>	<b>12,275</b>	<b>13,453</b>	<b>14,058</b>	<b>14,691</b>	<b>15,352</b>	<b>16,043</b>	<b>16,765</b>	<b>17,519</b>	<b>18,308</b>	<b>19,131</b>	<b>19,992</b>	<b>20,892</b>	<b>21,832</b>				
Operating expenses, excl. D&A	5,826	6,196	6,580	6,909	7,254	7,617	7,998	8,398	8,818	9,259	9,722	10,208	10,718	11,254				
<b>EBITDA</b>	<b>5,623</b>	<b>6,079</b>	<b>6,873</b>	<b>7,149</b>	<b>7,437</b>	<b>7,735</b>	<b>8,045</b>	<b>8,367</b>	<b>8,701</b>	<b>9,049</b>	<b>9,410</b>	<b>9,785</b>	<b>10,174</b>	<b>10,578</b>				
D&A	-385	-814	-747	-649	-737	-711	-699	-715	-708	-707	-710	-709	-709	-709				
<b>EBIT</b>	<b>5,238</b>	<b>5,265</b>	<b>6,126</b>	<b>6,501</b>	<b>6,700</b>	<b>7,024</b>	<b>7,346</b>	<b>7,652</b>	<b>7,993</b>	<b>8,342</b>	<b>8,700</b>	<b>9,076</b>	<b>9,465</b>	<b>9,869</b>				
Income tax expense	-1,237	-1,285	-1,401	-1,308	-1,331	-1,347	-1,329	-1,335	-1,337	-1,334	-1,335	-1,335	-1,335	-1,335				
<b>EBIAT</b>	<b>4,001</b>	<b>3,980</b>	<b>4,725</b>	<b>5,193</b>	<b>5,369</b>	<b>5,678</b>	<b>6,018</b>	<b>6,316</b>	<b>6,656</b>	<b>7,008</b>	<b>7,364</b>	<b>7,741</b>	<b>8,130</b>	<b>8,534</b>				
Add: D&A	385	814	747	649	737	711	699	715	708	707	710	709	709	709				
Less: CapEx	-2,321	-2,398	-2,984	-3,118	-3,259	-3,405	-3,558	-3,719	-3,886	-4,061	-4,244	-4,435	-4,634	-4,843				
Less: Change in Net Working Capital	-494	-511	-538	-562	-588	-614	-642	-670	-701	-732	-765	-800	-835	-873				
<b>Unlevered Free Cash Flows</b>	<b>1,571</b>	<b>1,885</b>	<b>1,950</b>	<b>2,161</b>	<b>2,259</b>	<b>2,369</b>	<b>2,516</b>	<b>2,642</b>	<b>2,778</b>	<b>2,922</b>	<b>3,066</b>	<b>3,215</b>	<b>3,370</b>	<b>3,527</b>				

## DCF Valuation Results

	Forecast											
	2025E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E		
<b>EBIAT</b>	5,369	5,678	6,018	6,316	6,656	7,008	7,364	7,741	8,130	8,534		
Add: Depreciation & Amortization	737	711	699	715	708	707	710	709	709	709		
Less: CapEx	(3,259)	(3,405)	(3,558)	(3,719)	(3,886)	(4,061)	(4,244)	(4,435)	(4,634)	(4,843)		
Less: Change in Net Working Capital	(588)	(614)	(642)	(670)	(701)	(732)	(765)	(800)	(835)	(873)		
<b>Unlevered Free Cash Flows</b>	<b>2,259</b>	<b>2,369</b>	<b>2,516</b>	<b>2,642</b>	<b>2,778</b>	<b>2,922</b>	<b>3,066</b>	<b>3,215</b>	<b>3,370</b>	<b>3,527</b>		
<i>Discount Period</i>	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0		
WACC	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%		
<i>Discount Factor</i>	0.93	0.86	0.79	0.74	0.68	0.63	0.58	0.54	0.50	0.46		
<b>PV of Unlevered Free Cash Flows</b>	<b>2,092</b>	<b>2,031</b>	<b>1,997</b>	<b>1,942</b>	<b>1,891</b>	<b>1,841</b>	<b>1,789</b>	<b>1,737</b>	<b>1,686</b>	<b>1,634</b>		

# Valuation - DCF

## DCF Valuation Results

Gordon Growth Method	
PV of Forecast Period	18,639
% of Enterprise Value	37.3%
<u>Terminal Value</u>	
Terminal Year UFCF	2,922
Perpetuity Growth Rate	2.0%
<b>Terminal Value</b>	<b>49,674</b>
<b>PV of Terminal Value</b>	<b>31,303</b>
% of Enterprise Value	62.7%
<b>Enterprise Value</b>	<b>49,942</b>
Less: Net Debt	2,400
<b>Equity Value</b>	<b>52,342</b>
Fully Diluted Shares Outstanding	205
<b>Implied Share Price</b>	<b>\$255.33</b>
Current Share Price	\$222.97
<b>Implied Margin of Safety</b>	<b>14.5%</b>

Terminal Multiple Method	
Cumulative PV of Free Cash Flow	11,794
% of Enterprise Value	23.7%
<u>Terminal Value</u>	
Terminal Year EBITDA	10,578
EBITDA Multiple	5.7x
<b>Terminal Value</b>	<b>60,295</b>
<b>PV of Terminal Value</b>	<b>37,996</b>
% of Enterprise Value	76.3%
<b>Enterprise Value</b>	<b>49,790</b>
Less: Net Debt	2,400
<b>Equity Value</b>	<b>52,190</b>
Fully Diluted Shares Outstanding	205
<b>Implied Share Price</b>	<b>\$254.58</b>
Current Share Price	\$222.97
<b>Implied Margin of Safety</b>	<b>14.2%</b>

## Sensitivity Analysis

Terminal Growth	WACC				
	7.0%	7.5%	8.0%	8.5%	9.0%
1.0%	253.93	242.25	232.23	223.54	215.94
1.5%	268.49	254.63	242.89	232.83	224.10
<b>2.0%</b>	<b>285.96</b>	<b>269.26</b>	<b>255.33</b>	<b>243.54</b>	<b>233.42</b>
2.5%	307.32	286.81	270.03	256.03	244.18
3.0%	334.02	308.27	287.67	270.80	256.73

Exit Multiple	WACC				
	7.0%	7.5%	8.0%	8.5%	9.0%
4.7x	222.16	222.11	222.07	222.02	221.97
5.2x	238.42	238.37	238.33	238.28	238.23
<b>5.7x</b>	<b>254.68</b>	<b>254.63</b>	<b>254.58</b>	<b>254.54</b>	<b>254.49</b>
6.2x	270.94	270.89	270.84	270.80	270.75
6.7x	287.20	287.15	287.10	287.05	287.01

# Valuation - Comparable Multiples

<b>Company</b>	<b>Ticker Symbol</b>	<b>Price (USD/Share)</b>	<b>Market Cap (MM USD)</b>	<b>EV (MM USD)</b>	<b>Sales (MM USD)</b>	<b>EBITDA (MM USD)</b>	<b>EBIT (MM USD)</b>	<b>EPS \$</b>	<b>P/E (x)</b>	<b>EV/EBITDA (x)</b>	<b>EV/Sales (x)</b>	<b>P/FCF (x)</b>	<b>PEG Ratio (x)</b>
Biogen Inc.	NASDAQ: BIIB	\$222.13	\$40,970.00	\$44,386.00	\$14,070.00	\$7,770.00	\$6,600.00	\$26.82	8.3	5.83	3.23	6.88	2.08
Celgene	NASDAQ: CELG	\$99.63	\$70,610.00	\$81,079.00	\$16,350.00	\$8,020.00	\$7,310.00	\$7.37	11.1	7.3	3.67	10.77	1.01
Gilead Sciences	NASDAQ:GILD	\$61.98	\$78,490.00	\$77,530.00	\$22,360.00	\$11,170.00	\$8,430.00	\$5.63	13.9	9.44	4.66	9.19	0.59
Amgen Inc	NASDAQ: AMGN	\$196.69	\$15,580.00	\$126,811.00	\$23,560.00	\$12,280.00	\$9,860.00	\$13.22	14.99	9.73	5.11	13.7	1.81
<b>Mean</b>									12.07	8.08	4.17	10.14	1.37
<b>Median</b>									12.50	8.37	4.17	9.98	1.41

Metric	Multiple		Implied Price	
	Mean (x)	Median (x)	Mean (\$/Share)	Median (\$/Share)
EV/Sales	4.17	4.17	286.20	286.20
EV/EBITDA	8.08	8.37	260.13	269.47
P/E	12.07	12.5	260.83	270.12

# Catalysts & Risks

## Catalysts

### IV Glibenclamide

- This drug will be used in the prevention and treatment of severe cerebral edema in large hemispheric infarction (LHI), one of the most severe types of ischemic stroke where brain swelling.
- It has demonstrated positive effects on mortality and other functional outcomes with high significance.

### Diroximel fumarate

- This new and improved MS treatment addresses the issue of gastrointestinal distress in Tecfidera patients.
- The drug maintains bioequivalence and overall effect of Tecfidera. It has exhibited very encouraging results in trials thus far.
- Biogen boasts a wealth of promising drugs in the late stages of Phase 3 trials.

## Risks

### Novartis' New SMA Treatment

- In May 2019, the FDA announced the approval of Novartis' gene therapy treatment of Spinal Muscular Atrophy (SMA). The drug, Zolgensma, carries a price tag of approximately \$2.1 million.
- CIGNA has announced they will be covering Zolgensma at no 'out-of-pocket' costs for its patients.
- While Spinraza is still expected to be a major growth driver for Biogen, the entrance of this single-use treatment is a risk to be considered.

### Growing Pressure on Tecfidera Sales

- Mylan has filed a suit against Biogen's Tecfidera patent protection. The patent comes due 2020, and this suit is what stands between its renewal through 2028 or the generic erosion of Tecfidera sales – if unsuccessful, any company will be able produce and sell the product which will drastically decrease the drug's (and Biogen's) price.
- In addition to this, there are growing concerns that new drugs from rivals Novartis and Roche's will gain considerable amounts of market share in the Multiple Sclerosis space.

# Recommendation

Analysis	Price Target	Weight	Current Share Price: \$222.97
Gordan Growth	\$255.33	40%	
Exit Multiple Method	\$254.58	40%	
Comparable Companies	\$260.13	20%	
Final Recommendation: Buy BIIB: Biogen Inc.			

# Sources

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CNBC

Biogen's 10-K and 10-Q Reports

Thomson Reuters

Bloomberg

U.S. National Library of Medicine

Yahoo

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