



Pharmaceutical Case Competition 2007

Biogen Idec: Evaluating a Potential Acquisition

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Situation

Biogen Idec, a large biotechnology company, is evaluating offers under pressure from investor Carl Icahn. The activist billionaire got the ball rolling on Oct. 12, 2007 when he made an unsolicited offer, forcing Biogen's board to open an auction. Biogen is a leading maker of multiple-sclerosis drugs and a sale would be one of the biggest in the biotechnology sector.

Mr. Icahn said Biogen "would do better with a synergistic buyer" such as a large pharmaceutical company. "You've got these biotech companies with great pipelines. These compounds would be much better served, for every constituency, merged with a large pharma company," he said, noting that many large drug companies are facing patent expirations on their products.

Pfizer is looking at exploring the option of acquiring Biogen. You are a manager in Pfizer's Strategic Alliances Department and the executive board has asked you to come up with a valuation for Biogen Idec. Specifically, they would like you to address the following questions:

- a. Why might Pfizer want to acquire Biogen Idec? What are the benefits and risks?
- b. Comment on the mechanics of the MS drugs of Biogen. How do they compare with the other drugs used in MS?
- c. If Pfizer makes an offer for Biogen what price should it offer? What is the highest price you can justify?
- d. What do you feel is the best solution for Pfizer – Purchase Biogen, license its products, do nothing or any other solution you propose. Please support your answer with justifications.

Assumptions

- Assume that Pfizer is focusing exclusively on the United States MS market while evaluating Biogen. Thus some of the non-MS products of Biogen have not been listed here.
- You can focus on the US market only for valuation purpose.
- The cost of capital is 13% for all companies involved.
- The complexities evolving from Biogen's partnerships with other companies e.g. Elan and Genetech should be taken into account for qualitative discussion but can be ignored for the valuation part.
- You can refer to any other material for your analysis. However you cannot contact anyone from Roche, Vion, Pfizer, Boehringer Ingelheim or Biogen or talk to other teams.

Biogen Idec

- ***History/ Background***

Biogen Idec engages in the development, manufacture, and commercialization of novel therapies primarily in the areas of oncology, neurology, and immunology in the United States and internationally. The company is headquartered in Cambridge, MA and was formed in 2003 from the merger of two of the world's leading biotechnology companies, Biogen, Inc., founded in 1978, and IDEC Pharmaceuticals Corporation, founded in 1985. Biogen IDEC currently employs approximately 3,900 people worldwide.

- ***Existing and pipeline drugs***

Product	Product Indications	Status
<i>AVONEX</i> Patent expiration 2011	Relapsing forms of MS	Approved — numerous countries worldwide
<i>RITUXAN</i> Patent expiration 2015	Certain B-cell NHLs	Approved — numerous countries worldwide
	Rheumatoid arthritis	Approved — U.S. for anti-TNF-inadequate responders
	MS	Phase II/III
<i>TYSABRI</i> Patent expiration 2015	Relapsing forms of MS	Approved — U.S. and E.U.
<i>ZEVALIN</i>		Certain B-cell NHLs (radioimmunotherapy)
<i>FUMADERM</i>	Severe psoriasis	Approved — Germany
<i>BG-12</i>	MS Psoriasis	Phase III Phase III completed

- ***Background on marketed drugs and pipeline***

- a. **Avonex** provides most of Biogen's revenue. But some analysts predict sales of the 11-year-old medicine will start to shrink soon. In its just-reported third-quarter results, Biogen reported 2% year-over-year growth in overall Avonex sales, but Avonex's U.S. sales decreased, and the company said growth overseas was due to favorable exchange rates. By 2009 or 2010, rival drugs now in late-stage trials from Novartis AG, Genzyme Corp. and others may be on the market. Biogen says Avonex is just one in a growing portfolio of MS drugs.
- b. **Rituxan**, the company's No. 2 revenue generator, has been approved for cancer and rheumatoid arthritis. Rituxan is shared with Genentech, which helped develop it. Biogen's share of Rituxan's U.S. profits is 40%, or \$156 million in the third quarter. The companies are working to get Rituxan approved to treat lupus and MS, which could provide a boost to sales. But under the agreement between the companies, Biogen's portion of Rituxan profits will shrink by a quarter, to 30%, as soon as the companies launch a successor drug -- something analysts predict will occur in 2010 or 2011. Biogen's share of the new drug's profits would also be 30%.
- c. **Tysabri**, which was discovered and largely developed by Elan Pharmaceuticals, was acquired by Biogen in 2000 and is currently marketed for multiple indications. Elan retains a 50% interest in the Tysabri collaboration. Elan has several options: the right to acquire for fair value the 50% economic interest in TYSABRI currently held by Biogen; under certain circumstances, the ability to sell its 50% economic interest in TYSABRI; or, to continue with the existing agreement. Elan also may consider restructuring the Collaboration Agreement in connection with a third party's acquisition of Biogen.

In 2005, the drug was pulled from the market because some patients using it in clinical trials died of a rare brain infection. It was reintroduced in 2006 and has grown to 17,000 patients. Biogen has predicted that 100,000 patients will be on the drug by 2010, most of whom will be outside the U.S. After 2011, though, that growth is predicted by some analysts to slow to 3% or lower. Other analysts believe that sales of the drug will stop growing altogether in 2011, as rival treatments are expected to enter the market. Tysabri, which is often used as a last resort for MS patients unsatisfied with other drugs, still warns of the potential for deadly brain infections on its label. So far, the condition hasn't appeared in other patients. If it did, "The investment community will run for cover," said Mr. Mullen, Biogen's CEO, in an interview recently, but "the patients are probably the most pragmatic of the whole grouping. They've already been told that's a possibility. They've already had to weigh that."

Analysts are currently debating how to value Biogen's pipeline. All MS drugs are currently administered via injections or infusions. Biogen has an orally administered MS drug, called BG-12, that is in late-stage human trials. In tests with mice, the company has also reported progress

in repairing the kind of nerve cells that MS attacks. Current MS treatments slow down the body's attack on nerve cells, but don't repair those already damaged.

Biogen has forecast 2007 earnings of about \$600 million. Analysts are predicting about \$3.1 billion in revenue. The company has said it expects its profit to double by 2010.

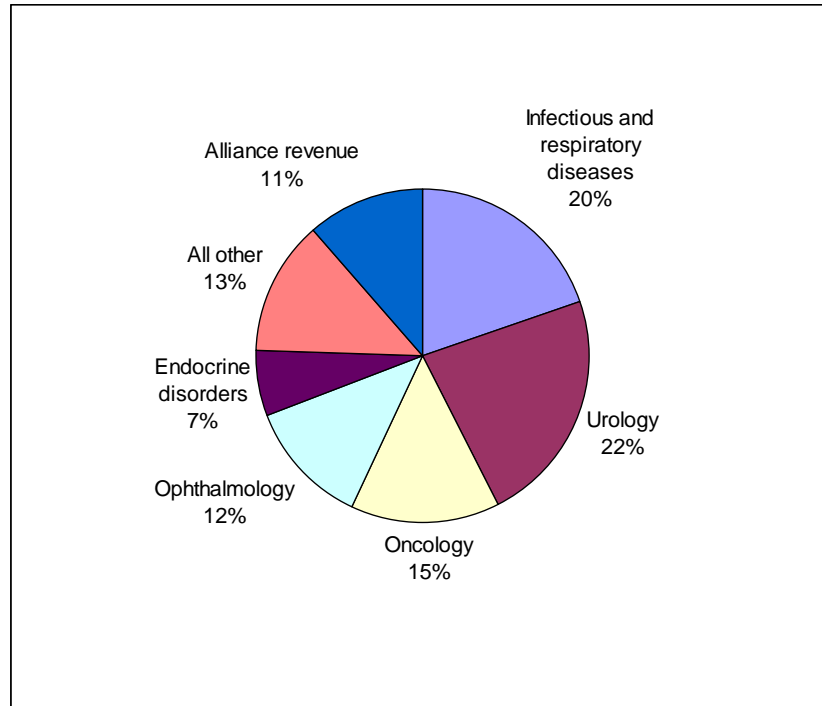
Pfizer

Pfizer is the world's largest research-based biomedical and pharmaceutical company. Its best-known products include erectile dysfunction therapy Viagra, pain management drug Celebrex, antidepressant Zoloft, and cholesterol-lowering Lipitor. Their corporate headquarters are located in New York, with major research and development locations in the United States and England.

Their pharmaceutical business is the largest pharmaceutical business in the world. This segment includes products that treat cardiovascular and metabolic diseases, central nervous system disorders, arthritis and pain, infectious and respiratory diseases, urogenital conditions, cancer, eye disease, endocrine disorders and allergies. Revenues from this segment contributed 93% of their total revenues in 2006. Recent innovations include Sutent®—a novel cancer medicine that both cuts off the blood supply that feeds tumors and destroys cellular reproduction, and Chantix™—a new prescription medicine and accompanying support plan designed specifically to help smokers quit.

In 2006, Pfizer earned \$48.4 billion in revenues and invested \$7.6 billion in research and development. As of October 2006, seven of their pharmaceutical products were number one in their respective therapeutic categories based on revenues.

Product revenues by therapy



Pfizer is interested in diversifying its product line and its increasing its focus on the biotech industry. It thus is evaluating whether Biogen and its strength in the MS market would be a good fit.

Multiple Sclerosis Overview

Multiple sclerosis (MS) is the most common cause of non-traumatic disability in young adults (median age of onset ≈ 24), affecting an estimated 350,000 to 500,000 patients in the U.S. and over 1MM people worldwide. A chronic inflammatory disease of the Central Nervous System (CNS), MS results from the degeneration of the myelin sheath that surrounds neuronal axons. This sheath provides a form of insulation necessary for efficient and rapid “conduction” of electrical impulses along the axons. When it is damaged, neuronal signaling is hindered and disturbances in motor and sensory function result. The disease tends to progress over time; patients typically have periods of good health (remissions) interspersed with periods of debilitating disease flare (exacerbations).

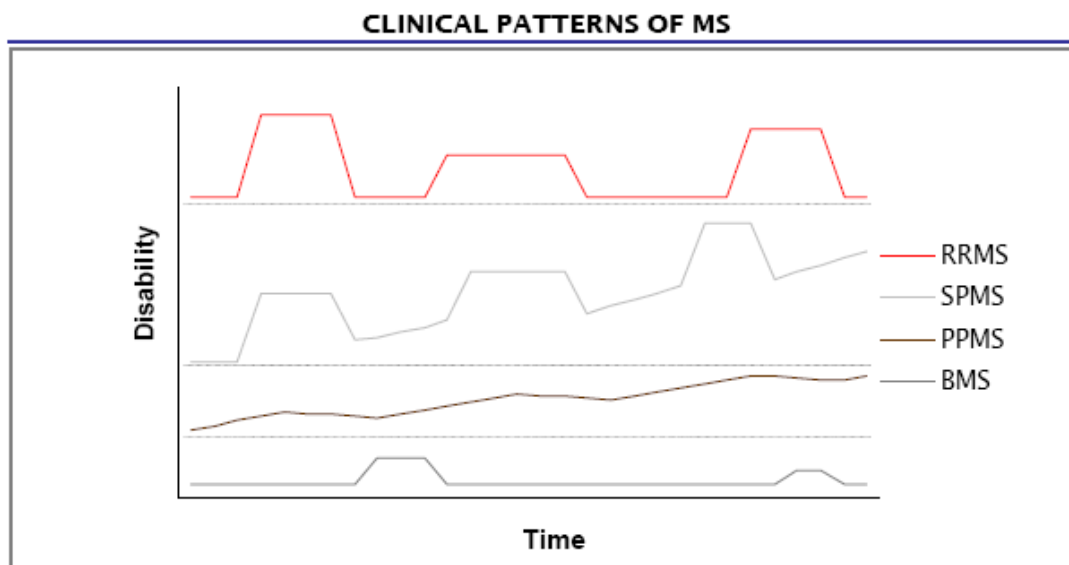
Early symptoms include visual disturbances; paraesthesia (altered sensation in one or more extremities, the trunk, or side of the face); weakness or clumsiness, and difficulty walking. Later in the course of the disease, patients may lose control of their muscles (ataxia), become incontinent, suffer paralysis of their lower extremities (and thus be confined to a wheelchair), and experience mental dysfunction. MS is broadly characterized into the following four disease classifications. However, some patients have symptoms that span multiple forms.

Relapsing-remitting (RRMS): Recurring attacks, neurological dysfunction, periods of recovery and stability between episodes. Roughly 80% of MS patients present with this form of disease.

Secondary progressive (SPMS): Slow neurological deterioration, typically with acute relapses in a patient who previously had relapsing-remitting disease (more than 50% progress to this stage). A goal of therapy is to prevent or delay progression to secondary progressive disease.

Primary progressive (PPMS): Gradual and nearly constant neurological degeneration from the onset of symptoms affecting approximately 10-15% of patients.

Progressive relapsing (PRMS/BMS): Also referred to as benign MS, is a slow neurological deterioration from onset but with subsequent superimposed relapses. This is the least frequent type of MS disease progression affecting less than 5% of patients.



Source: Cowen and Company

Epidemiology

MS is the most common debilitating illness among young adults in the United States. The incidence is 0.5-1 per 1000 people, and the general population has a 0.2% lifetime risk of acquiring MS. Approximately 25,000 new cases are diagnosed each year.

Age/Gender

MS rarely occurs in those younger than 20 years or those older than 50 years. The occurrence of MS is even rarer in those younger than 15 years and in those older than 60 years. Throughout adulthood, the female-to-male ratio is 2:1. The sex ratio is more pronounced in those younger than 16 years (ie, approaches 3:1), but it is less pronounced in those older than the fifth decade. On average, men present 1-2 years later than women, and men have a greater tendency for having the progressive disease at onset.

Mortality/Morbidity

MS affects quality of life rather than duration of life. Worsening disability from any cause is strongly associated with increased mortality rate. Deaths attributable to MS are the result of

fulminant MS, which is rare; complications from chronic disability (eg, pneumonia, pulmonary embolism, infected decubiti); and suicide.

Current Therapies

There is no known definitive cure for multiple sclerosis. However, several types of therapy have proven to be helpful. Different therapies are used for patients experiencing acute attacks, for patients who have the relapsing-remitting subtype, for patients who have the progressive subtypes, for patients without a diagnosis of MS who have a demyelinating event, and for managing the various consequences of MS attacks. Treatment is aimed at returning function after an attack, preventing new attacks, and preventing disability. Given the current belief that MS is an autoimmune disease, many of the therapies are aimed at regulating CNS damage caused by immune mediators.

Interferons

These are medications derived from human cytokines which help regulate the immune system. Since the approval in July 1993 of Bayer/Novartis's Betaseron (interferon beta-1b), various formulations of beta interferon have dominated the disease-modifying drug (DMDs) landscape. Beta-interferons are said to have multiple mechanisms of activity in MS, although the primary mechanism of action is believed to be regulation of T cell function and modulation of cytokine release (IL-2, gamma-interferon, and TNF- α).

- Interferon beta-1a: (*Avonex, Rebif*)
- Interferon beta-1b: (Betaseron)

Betaseron has received FDA approval for relapsing forms of secondary progressive MS.

Glatiramer acetate (*Copaxone*)

The most widely prescribed non-interferon DMD is Teva/Sanofi-Aventis's Copaxone, an amino acid polymer, which was approved in the U.S. in December 1996 and in the E.U. following mutual recognition in 2001. This drug stimulates T cells in the body's immune system to change from harmful, pro-inflammatory agents to beneficial, anti-inflammatory agents that work to reduce inflammation at lesion sites.

Mitoxantrone: (trade name *Novantrone*)

This medication is effective, but is limited by cardiotoxicity. Novantrone has been approved by the USA's FDA for secondary progressive, progressive-relapsing, and worsening relapsing-remitting MS.

Natalizumab: (trade name *Tysabri*).

This medication is effective and safe alone, but in combination with other immunotherapies can lead to PML. There are no approved treatments for primary progressive multiple sclerosis, though several medications are being studied. Tysabri was reintroduced into the U.S. market and launched in Europe in mid-2006 as monotherapy for relapsing forms of multiple sclerosis.

Exhibit 1

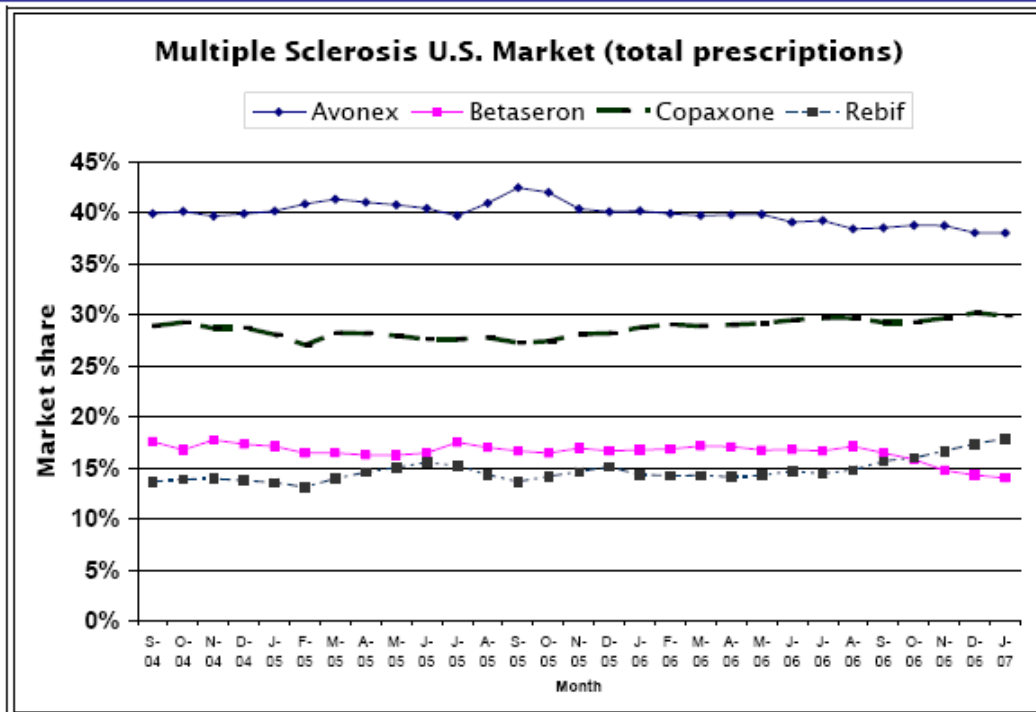
DISEASE MODIFYING MS AGENTS APPROVED AND IN DEVELOPMENT

Drug	Rebif	Avonex	Betaseron	Copaxone	Tysabri
Active agent	β -interferon (1a)	β -interferon (1a)	β -interferon (1b)	Glatiramer acetate	alpha-4 integrin
Company	Merck Serono	Biogen Idec	Berlex	Teva/Aventis	Biogen Idec/Elan
Indication	Relapsing MS	Relapsing MS	Relapsing remitting MS	Relapsing remitting MS	Relapsing MS
Approved for:					
Reduction in exacerbations	✓	✓	✓	✓	✓
Slowing of disability	✓	✓	X	X	✓
ROW approval	1997	1997	1993	1997-2001	2006
US approval	March 2002	May 1996	July 1993	Dec 1996	June '06
Administration	22-44 mcg injected sub-q 3x week	30 mcg injected intramuscularly once per week	0.25mg injected subcutaneously every other day	20 mg injected subcutaneously daily	3 mg/kg IV infusion once every 4 weeks

Source: Cowen and Company

Exhibit 2

Market for MS Therapies: U.S. Total Prescription Trends



Source: IMS Monthly Prescriptions, Cowen and Company

Future Outlook

The following exhibits will help shed light on the future of the market:

Exhibit 3

2006 US MS MARKET DATA	
US Population (MM)	293.1
Disease Incidence (per thousand)	1.5
US MS Affected Population (000's)	439.6
Breakdown:	
Relapsing/Remitting (RRMS)	197.8
Secondary Progressive (SPMS)	175.8
Primary Progressive (PPMS)	44
Benign (BMS)	22
Penetration of RRMS/SPMS	47%
Patients Treated (000's)	175

Source: Cowen and Company estimates

Exhibit 4

2006 US SALES DATA FOR MS DRUGS					
	Avonex	Copaxone	Betaseron	Rebif	Tysabri
Patient Share	37%	32%	14%	16%	1%
Rx's (MM)	0.41	0.35	0.17	0.16	0.01
Months of Treatment per Rx	1.33	1.35	1.28	1.50	1.00
Patients Treated (000's)	65.4	55.7	24.5	27.9	1.0
Price Per Patient/Month	\$ 1,395	\$ 1,370	\$ 1,489	\$ 1,470	\$ 2,225
Sales (\$MM)	\$ 1,022	\$ 916	\$ 420	\$ 493	\$ 28

Source: Cowen and Company estimates

Exhibit 5

BIAGEN IDEC INC. AND SUBSIDIARIES SELECTED FINANCIAL DATA

	For the Years Ended December 31,		
	<u>2006</u>	<u>2005</u>	<u>2004</u>
(In thousands, except per share amounts)			
Revenues:			
Product	\$ 1,781,313	\$ 1,617,004	\$ 1,486,344
Unconsolidated joint business	810,864	708,881	615,743
Other revenues	90,872	96,615	109,475
Total revenues	<u>2,683,049</u>	<u>2,422,500</u>	<u>2,211,562</u>
Total costs and expenses	<u>2,243,029</u>	<u>2,186,460</u>	<u>2,168,146</u>
Income from operations	<u>440,020</u>	<u>236,040</u>	<u>43,416</u>

Exhibit 6

Product Revenues

Revenues by product for the years ended December 31, 2006, 2005, and 2004 were as follows (in thousands):

	<u>2006</u>		<u>2005</u>		<u>2004</u>	
AVONEX	\$ 1,706,719	95.9 %	\$ 1,543,085	95.4 %	\$ 1,417,157	95.3 %
TYSABRI	35,831	2.0 %	4,656	0.3 %	3,121	0.2 %
AMEVIVE	11,524	0.6 %	48,457	3.0 %	43,030	3.0 %
ZEVALIN	17,767	1.0 %	20,806	1.3 %	23,036	1.5 %
FUMADERM	9,472	0.5 %	—	0.0 %	—	0.0 %
Total product revenues	<u>\$ 1,781,313</u>	100.0 %	<u>\$ 1,617,004</u>	100.0 %	<u>\$ 1,486,344</u>	100.0 %

Exhibit 7

AVONEX

Revenues from AVONEX for the years ended December 31, 2006, 2005, and 2004 were as follows(in thousands):

	<u>2006</u>		<u>2005</u>		<u>2004</u>	
AVONEX						
U.S.	\$ 1,022,210	59.9 %	\$ 938,672	60.8 %	\$ 922,572	65.1 %
Rest of world	684,509	40.1 %	604,413	39.2 %	494,585	34.9 %
Total AVONEX revenues	\$ 1,706,719	100.0 %	\$ 1,543,085	100.0 %	\$ 1,417,157	100.0 %

All the best!!!