



Yale SCHOOL of MANAGEMENT

Celgene Co.



**Recommendation: Sell**

Target Price	\$ 48.62
Current Price	\$ 59.69
Difference	18.5%↓

Market Cap.	\$ 10.01B
52 Wk High	\$ 60.63
52 Wk Low	\$ 24.70

Shrs. Out.	168M
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*As of November 4, 2005*

- Strong revenue and profit growth
- Current revenues come almost entirely from Thalomid
- Revlimid, a safer version of Thalomid, in final stages of approval process
- New indications being sought for both Thalomid and Revlimid
- Rapid rise in stock price not supported by cash flows with moderate assumptions
- Likely FDA approval of Revlimid could produce short-term bump

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Yale School of Management  
MGT 948 - Securities Analysis and Valuation

*Please see Important Disclaimer at the end of this report*

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## Investment Thesis

We are initiating coverage of Celgene Corporation (Celgene) with a Sell recommendation, based on an estimated value of \$48.62 per share, which is 18.5% below the current price of \$59.69. We believe the market is currently overvaluing Celgene because of the positive regulatory responses towards its major cash flow driving products, Thalomid and Revlimid. Although revenues for Thalomid are already strong and projected to increase and revenues for Revlimid are expected to be even higher, there is very little revenue from other drugs in the company's portfolio. Moreover, Revlimid will cannibalize current Thalomid sales.

Celgene first earned a profit in 2003 after seventeen straight years of losses. Profits and free cash flow should continue to increase substantially in the coming years with the introduction of Revlimid and the new applications that should be approved for both Revlimid and Thalomid. Additionally, the combination of an aging population and certain features of the Medicare Modernization Act of 2003 (MMA) should also boost revenues for the flagship drugs in Celgene's portfolio.

The company has proven itself to be very innovative in the search for new treatments for various diseases. It has also endeavored to stay in the forefront of new technologies such as stem cell research. This hints at the potential for additional strong revenue generating drugs in the future, but Celgene has only produced two drugs that look like potential blockbusters, and both of them are based on thalidomide, a drug created in the 1950's in Germany. So while the company prides itself on innovation, the results of that creativity have thus far been less than stellar from a business standpoint.

Celgene is a strong company that should continue to prosper in the coming years. It also has the possibility of becoming a leader in cancer drug research and production because of its novel approach, even if it is only a mid-size firm in the pharmaceutical industry. Yet the current expected revenues are insufficient to support the inflated stock price at its current level. Blockbuster drugs are rare, and it is difficult to imagine that Celgene will continue producing them every three to five years in the future. In short, Celgene is a promising company, but the market is expecting more than the firm can deliver.

## Company Overview

Celgene began in 1980 as a division of the Celanese Corporation, an industrial and specialty chemical manufacturer. In 1986, Celanese Corp. merged with American Hoechst Corporation and decided to spin off Celgene as an independent pharmaceutical company. Celgene is a mid sized pharmaceutical with a market cap that has grown to \$10bn over the last two years. The company has seen spectacular revenue growth in recent years, reaching \$377.5mm in 2004, up from \$271.5mm in 2003 and \$135.7mm in 2002. The company currently estimates sales will be \$535M in 2005, which translates to revenue growth of 29%. Profits have also surged for the company. In 2003 Celgene saw profits – for the first time – of \$25.7mm. That was followed by profits of \$52.8mm in 2004.

Celgene and its 900 employees are primarily focused on discovering, developing and marketing innovative therapies targeted at cancer and immunological diseases through regulation of genomic and proteomic targets.<sup>1</sup> The scope of Celgene's research is much more limited than that of the largest pharmaceuticals. Although some revenues are derived from the treatment of ADD and ADHD in both children and adults, 90% of revenues are generated through the treatment of cancer and cancer-like diseases, especially those involving bones and the blood. Because of the niche markets in which Celgene operates, there has been relatively little competitive pressure on the company. There are multiple cancer drugs in the market place, but Celgene's largest drugs are used to treat types of cancer and other diseases that have not been satisfactorily treated by most other available treatments.

Much of Celgene's research is truly innovative, seeking new ways to treat diseases rather than replicating the process already used by another drug company with a slightly different compound. The company has focused a great deal of attention on remaining state-of-the-art. This can be seen in its acquisitions over the last five years. In 2000, Celgene acquired Signal Pharmaceuticals, a company that developed drugs to regulate genes associated with diseases.<sup>2</sup> In 2002 Celgene acquired Anthrogenesis Corporation, currently a wholly owned subsidiary operating as Celgene Cellular Therapeutics. This subsidiary has pioneered the recovery of stem cells from placental tissue, a much preferred method that avoids the potential political and regulatory difficulties associated with embryonic stem cell research.<sup>3</sup>

Celgene is involved in multiple joint partnership arrangements involving licenses to market drugs in certain parts of the world. Celgene's most notable joint partnership is the Focalin/Ritalin agreement with Novartis, which will bring in approximately \$60mm in royalties and fees in 2005. The company is also flexing its financial muscles and is increasingly looking to market its own portfolio of drugs. In October 2004, Celgene purchased all shares of Penn T, the UK manufacturer of Thalomid, in an attempt to collect more of the upside of the revenues from their flagship drug. In addition, the

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<sup>1</sup> Celgene corporate website. (<http://www.celgene.com/About.aspx>)

<sup>2</sup> *Ibid.*

<sup>3</sup> *Ibid.*

company appears increasingly likely to market and distribute Revlimid worldwide, as opposed to doing so only in the US while licensing out foreign marketing rights to other companies. This again shows Celgene's commitment to become a stronger player in the industry, as well as its belief in the success of the current and future products in its drug portfolio.

Any new drugs Celgene attempts to bring to market must follow an extensive process supervised by governmental agencies. The process in the United States is generally as follows (similar processes are used in other countries):

- Preclinical Trials – These trials evaluate a potential drug's chemistry, its biological activities and the results of animal studies to determine the safety and efficacy of the drug. These results are submitted to the FDA to seek approval to run human tests in the clinical phases.
- Phase I – These are small trials, usually with healthy human volunteers, to determine human safety of the proposed drug.
- Phase II – These are preliminary trials with patients who have the medical condition the drug is being proposed to treat. This phase involves determining the initial effectiveness of the drug and evaluating proper dosages, as well as additional safety tests.
- Phase III – Phase II involves large patient trials that determine the statistical efficacy of the drug compared to the efficacies of existing drugs on the market; this phase also includes further safety studies.
- FDA Approval – After successfully completing Phase III trials, a drug manufacturer submits the drug to the FDA for approval in treating one or more different diseases. The drug maker may submit requests to use the drug to treat additional conditions in the future. The FDA approves 70-90% of all drugs that have successfully completed the Phase III tests.<sup>4</sup>

The FDA continues to monitor approved drugs and requires drug manufacturers to submit regular reports concerning the safety and side effects of drugs on the market. The average length of time needed to bring a drug to market from its preclinical inception is fourteen years.

Revenues from existing drugs for a typical brand name drug manufacturer are also at risk from potential entrants into the market, both from other brand name manufacturers and from generic competitors. Patent protection is essential for non-generic pharmaceutical companies. Celgene is a relatively young company, so none of its drugs have patents that are close to expiring. An additional protection Celgene enjoys from operating in certain niche markets is the Orphan Drug Act. This act allows the FDA to designate a drug as intended to treat a rare disease affecting less than 200,000 people in the US. This designation allows that company exclusive marketing rights for drugs used to treat that condition for seven years.<sup>5</sup> We discuss this issue further below, regarding current and

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<sup>4</sup> Thomson Centerwatch: Centerwatch Clinical Trials Listing Service.  
(<http://www.centerwatch.com/patient/backgrnd.html>)

<sup>5</sup> Celgene 2004 10-K.

potential blockbuster drugs in Celgene's portfolio. Finally, Celgene has patented drug regimens, protecting, for example, the way Thalomid is administered.

## Thalomid

Thalomid is a compound in the same family as thalidomide, a drug used in the late 1950's and early 1960's to treat insomnia and morning sickness in pregnant women. It was pulled from the shelves in 1961 because it caused horrible birth defects. The FDA in the United States never approved the drug.<sup>6</sup>

Celgene discovered additional applications for the drug. Initially it was proposed as a treatment for erythema nodosum leprosum (ENL), or leprosy. In 1998 the FDA approved the drug for use against ENL. Celgene is also expecting that the FDA will soon approve Thalomid for treatment of multiple myeloma (MM). MM is an incurable, but treatable, cancer of the blood. There are approximately 30,000 new cases each year in Europe and the United States.<sup>7</sup> Celgene is also seeking additional applications for Thalomid.

There are several factors that make Thalomid such a lucrative drug for Celgene. The first is the price this drug commands. As of 2004, the yearly cost for a prescription of Thalomid was over \$42,000. Other cancer drugs are not helpful in treating MM, and there are very few other drugs that are effective for ENL. While Thalomid's cost is higher than that of other oral anti-cancer drugs, it is widely acknowledged to be the most effective in its treatment of MM. Another beneficial aspect to the drug is that it is an oral medication, which makes it significantly easier for doctors to prescribe the medication for immediate use by the patient.

**Table 2**  
**Commonly Prescribed Oral Cancer Drugs not Covered by Medicare**

Generic Name	Trade Name	Number of Capsules <sup>a</sup>	Strength	Retail Price <sup>b</sup>	Minimum Annual Cost <sup>c</sup>
Thalidomide	Thalomid	240	50 mg	\$3,536.57	\$42,438.86
Gleevec	Imatinib Mesylate	120	100 mg	\$2,284.80	\$27,417.60
Nolvadex	Tamoxifen Citrate	60	10 mg	\$132.28	\$1,587.36

### Related Footnotes:

<sup>a</sup> Number of capsules typically required by the average patient each month.

<sup>b</sup> Approximate price charged by Eckerdts, a leading national drugstore, to consumers for a one month supply of the drug.

<sup>c</sup> Retail Cost x 12 months.

Cohen, Steven, "Benefits of Extending Medicare Coverage to All Oral Anti-Cancer Drugs", *Journal of Undergraduate Research – University of Florida*, Volume 5, Issue 6, March 2004.

<sup>6</sup> Source: National Institutes of Health (<http://cerhr.niehs.nih.gov/genpub/topics/thalidomide2-ccae.html>)

<sup>7</sup> Benesh, Peter. *Investor's Business Daily*, 10/31/05. ([www.investors.com](http://www.investors.com))

Although Thalomid has been approved by the FDA to treat ENL, it is primarily used to treat MM through off-label physician prescriptions. Accordingly, FDA approval for MM would add to revenue incrementally, but it would not, in effect, open an entirely new market for the drug. (Yaron Werber, a biotech analyst at Citigroup, suggests that the assumed approval by the FDA of the new application for MM would boost sales by approximately 10%.<sup>8</sup>)

The downside of Thalomid is that it causes birth defects. This causes some doctors to hesitate in prescribing the drug. The extreme birth defects associated with Thalidomide actually provide a competitive advantage for Celgene. Because the birth defect side effect is so pronounced with this drug, Celgene has established a special protocol called STEPS (System for Thalidomide Education and Prescribing Safety). This is a patented distribution method that requires all patients be educated about the use of Thalomid; requires that female patients take a pregnancy test within 24 hours of starting treatment; and requires that they remain on two forms of birth control throughout treatment. The STEPS process has patent protection through 2017. This adds an additional layer of intellectual property protection against competition, because any manufacturer would not only need to get authorization to produce a drug without infringing on Celgene's patents; the competitor would also need to set up a distribution system that is as effective as Celgene's without infringing on the company's patent on the FDA-approved STEPS regimen. The overall effect greatly increases costs to potential competitors and makes entry into the market less attractive.

Thalomid is by far the largest revenue driver for Celgene. In 2003 and 2004 revenues from Thalomid were \$224mm and \$309mm, respectively. In each year, the drug provided Celgene with 82% of its revenues. That has decreased to 76% in 2005 to date, as the partnership with Novartis regarding Ritalin and Focalin has contributed to revenues. Clearly, however, Celgene is absolutely dependent on the revenues from Thalomid. Four things are happening that should boost Thalomid revenues further.

- There is widening acceptance of the drug as an alternative method of treating some forms of cancer.
- As previously discussed, the FDA is expected to officially approve Thalomid for MM.
- Celgene is searching for additional applications for the drug. These include Phase II trials for prostate cancer and inflammation.
- Finally, the Medicare Prescription Drug and Modernization Act of 2003 (MMA) will begin covering costly drugs, including Thalomid, for treatment of various types of disease in 2006 for all Medicare beneficiaries. As of today, only 50,000 out of 500,000 people are covered during a trial stage of this program.<sup>9</sup> Since Thalomid is primarily used to treat cancer, and cancer is most prevalent in the

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<sup>8</sup> Johnson, Linda. "Celgene Grows to No. 9 Biotech Company on Once Loathed Drug"; The Associated Press, 5/23/05.

<sup>9</sup> United States Department of Health & Human Services - News Release, 6/24/04.  
(<http://www.hhs.gov/news/press/2004pres/20040624.html>)

senior population, this extended coverage could provide a substantial lift to Thalomid's sales in 2006.

### **Focalin/Ritalin Partnership with Novartis**

Celgene has entered into a licensing agreement with Novartis regarding Novartis' drug Ritalin and Celgene's drug Focalin. Focalin is a more effective version of Ritalin in treating ADD and ADHD in both children and adults. The ADHD market is estimated to be \$3bn/year worldwide.<sup>10</sup> The advantage Focalin has over Ritalin is the lower level of side effects. In this somewhat unusual agreement between Celgene and Novartis, Celgene licenses Focalin to Novartis to market alongside its Ritalin family of drugs. Novartis has made a few agreed-upon milestone payments to Celgene, totaling around \$30mm. But the primary revenue for Celgene comes from the percentage of revenues agreement. Novartis has agreed to pay Celgene 30% of revenues for Focalin, as well as 30% of revenues from its Ritalin drugs. This arrangement was intended to ensure the Novartis sales and marketing effort did not favor Ritalin over Focalin.

Revenues from this partnership have been gradually increasing over the last three years. 2005 revenues from fees and royalties are expected to reach \$60mm. As of now, this partnership agreement provides the second largest revenue stream for Celgene behind Thalomid. Celgene expects sales of Focalin to continue growing, as it has sought FDA approval for a once a day Focalin medication. This is seen as extremely beneficial by those using or administering the drug. Children are currently forced to take their medication while at school, and adults must take the medication during the work day. The longer lasting Focalin XR would also eliminate periods of time where the dosage wears off during the day, making the new version much more effective. Celgene is also seeking approval from the FDA to use Focalin as a cancer fatigue medication. It is currently in Phase II trial for this application. Ritalin presently has about a third of the ADHD market. As Focalin is more effective and marketed by the same company, revenues should increase considerably in the coming years.

### **Product Pipeline Overview**

In the last two years, as Thalomid has provided strong cash flows, Celgene has begun spending much more on research and development. The spending on R&D and recent acquisitions have both increased the number of drugs in the pipeline and increased the number of applications being sought for each product. R&D is expected to reach \$200mm in 2005, an increase of \$39mm, or 24%, over 2004. While this is currently approximately 40% of sales, we expect this to decline significantly to a much more moderate level vis-à-vis sales going forward, based on the experience of other maturing pharmaceuticals. In addition, the level of R&D for Celgene is not commensurate with its market cap compared to other major pharmaceuticals. The typical large pharmaceutical spends approximately \$1 on R&D each year for every \$15-\$20 in market cap. Celgene is currently spending \$1 on R&D for every \$50 in market cap. While R&D is reaching

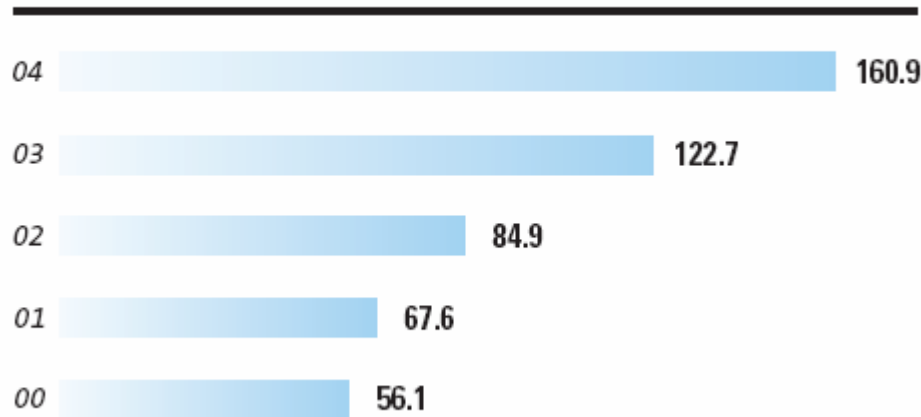
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<sup>10</sup> Johnson, Linda. *Ibid.*



unprecedented levels for the company, Celgene must more than double that level if it is to conduct research on a comparable scale as the major industry players.

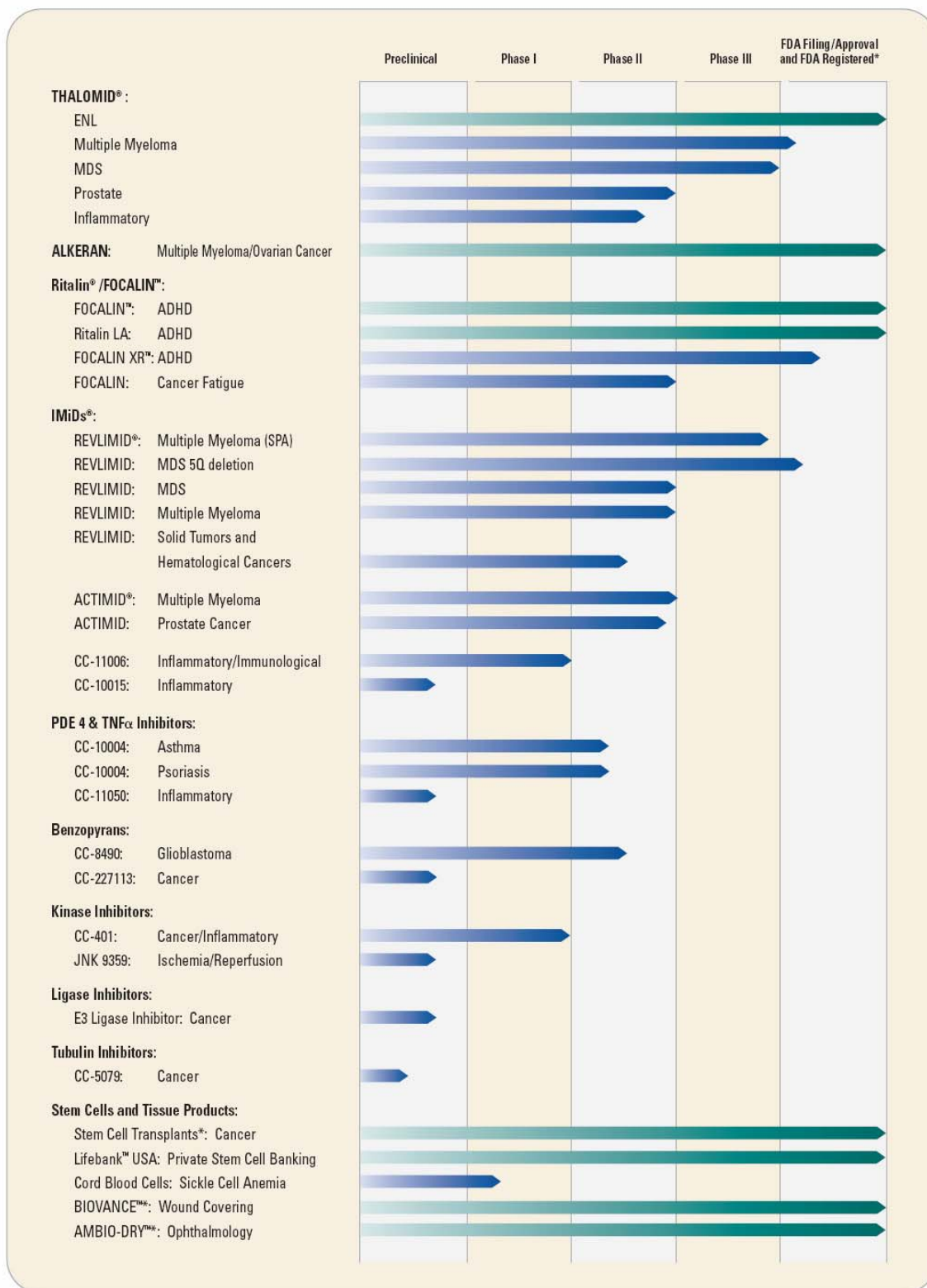
## R&D INVESTMENT *Dollars in Millions*



Celgene 2004 Annual Report

A large part of the increase in R&D spending has been the costs involved with running trials for different applications of existing drugs, or drugs that have nearly completed the regulatory process. As can be seen in the table below showing the different applications for products in Celgene's pipeline, most products nearing approval are in the Thalomid and Revlimid categories. The stem cell and tissue products are already on the market, but provide an inconsequential amount of revenue for the firm. These areas may be capable of generating significant revenue for Celgene in the future if processes are discovered to use these technologies, as many scientists agree about the vast potential stem cell research may have in treating a wide variety of diseases. But it would be premature to assign a value this research brings to Celgene at this early stage.

It is also clear that Celgene is trying to expand its market by moving into treatments for new diseases. These drugs may develop into strong future revenues, but they have so far to go in the approval process that it would be difficult to assign any value to them as individual drugs.

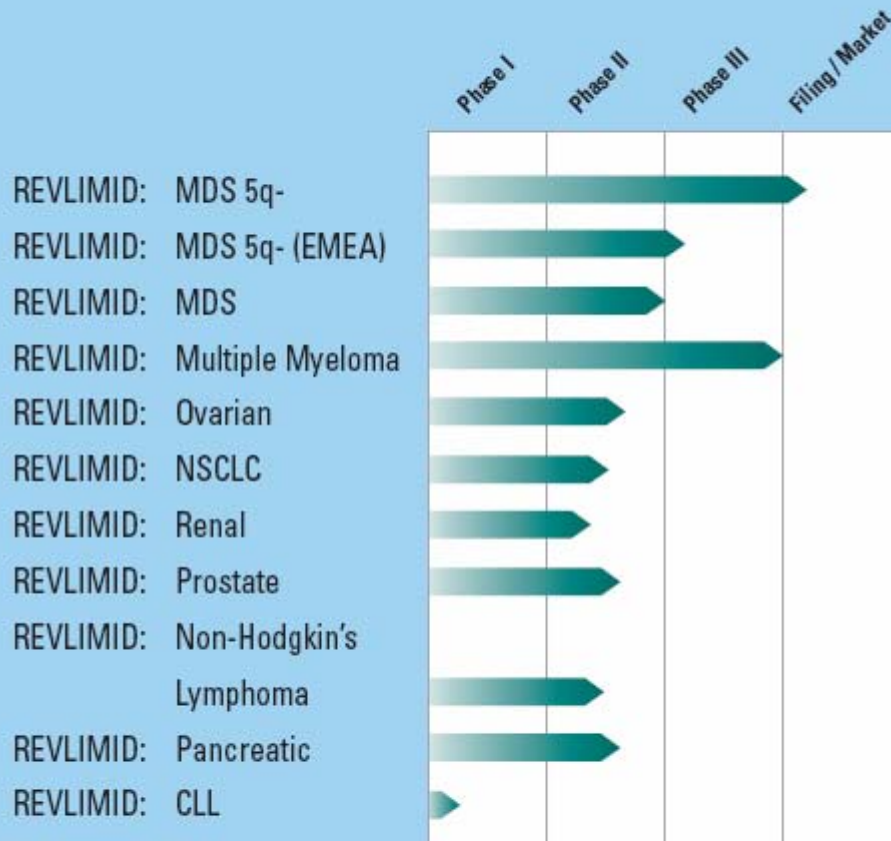


## **Revlimid**

Revlimid is widely considered to be Celgene's next blockbuster drug. It comes from the same basic drug compound as Thalomid, but it does not have the severe birth defects as a side effect. In addition, Thalomid acts as a sedative, while Revlimid does not. Revlimid has begun the FDA approval process for two applications. It has been shown to be effective in treating MM, the disease which Thalomid also treats. But it is also being considered for the treatment of malignant blood cell disorders known as myelodysplastic syndromes (MDS). MDS is a condition where red blood cells are incorrectly formed in the bone marrow. These blast cells remain in the marrow and proceed to block the marrow from producing healthy red blood cells. This condition affects approximately 300,000 people worldwide. The lifespan of the typical person diagnosed with MDS is between 6 months and 6 years depending on the type of MDS. Each year approximately 15,000 Americans and 15,000 Europeans are diagnosed with this disease. Both the FDA in the US and the EMEA in Europe have designated Revlimid a fast track drug to expedite approval for treatment of MDS. In Europe it has also been designated an orphan drug, ensuring that Celgene will have exclusive access to those markets for the next seven years. Regarding the FDA submissions, Revlimid received a vote of full approval from the FDA Oncologic Drugs Advisory Committee. This virtually guarantees that Revlimid will garner FDA approval in the coming months. The only hitch in the process has been a three-month delay in getting full approval. Originally the FDA was supposed to deliver its decision by October 8, 2005, but that date has been pushed back to January 7, 2006. The reason cited for this delay was the desire to proceed with extra caution since Revlimid comes from the same family of drugs as Thalomid. Although there have been no signs of adverse reactions in any of the trials, the FDA wanted additional time to review all possible materials. We still expect the drug to be approved, based on its safety and effectiveness, but we anticipate the onset of earnings to be in the first quarter of 2006, rather than the fourth quarter of 2005.

One of the reasons we expect Revlimid to generate so much revenue is the number of diseases on which Celgene is studying its effectiveness. As of March 2005, the company had over 30 ongoing trials worldwide to determine the drug's effectiveness in treating a wide range of diseases. On the downside, however, Revlimid will likely cannibalize Thalomid revenue in coming years.

## REVLIMID® Clinical Pipeline



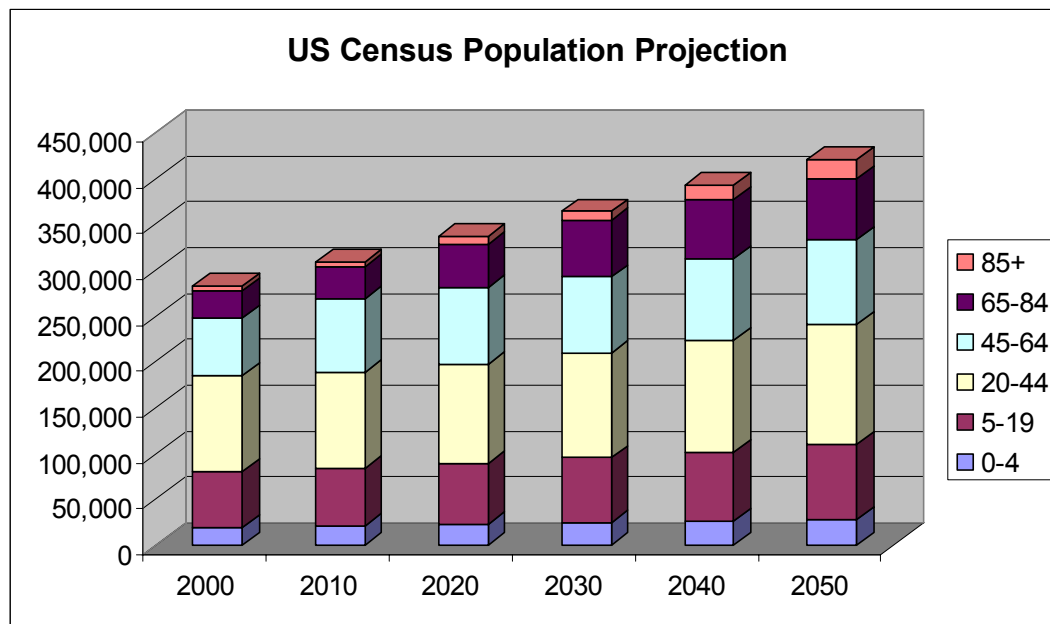
**More than 30 clinical trials worldwide are currently evaluating REVLIMID® for use in treating a wide range of diseases, from malignant blood disorders to solid tumor cancers.**

Celgene 2004 Annual Report

If Revlimid is proven effective in treating any of these diseases, its revenue potential will increase greatly.

## Demographics

Ultimately, revenues for Celgene come from individual patients buying its drugs. The bigger the population, the more people there are to buy Celgene's products. The vast majority of Celgene's sales are in the US and Europe. The company is planning on submitting Thalomid and Revlimid for approval in Japan in 2007, but as of now it has a very small presence outside of the US and Europe. The US is expected to grow at around 0.9% for the next decade, slowing somewhat after that to 0.7% or 0.8% through 2050.<sup>11</sup> Japan and Europe are expected to grow even more slowly, if at all.<sup>12</sup> It would be fair to assume very limited total population growth, which by itself would therefore have little to no impact on earnings for Celgene. Other areas of the world are growing at a much greater pace, but they represent such a small portion of Celgene's sales that the growth is inconsequential.



Source: U.S. Census Bureau, 2004, "U.S. Interim Projections by Age, Sex, Race, and Hispanic Origin," <http://www.census.gov/ipc/www/usinterimproj/> (population in thousands)

The changing demographics of the population, however, provide a much bigger boost for Celgene. From 2000 to 2010 in the US, the population 45 years old and older was forecast to increase by nearly 24 million, from 97 million to 121 million, while the population under 45 was expected to increase by only 3 million.<sup>13</sup> As of 2000, the amount people spent on prescription drugs per capita when over 65 was over \$1,100. For those under 65 it was only \$500. The difference will only have increased as life expectancy continues to increase and people need to take a larger number of drugs as

<sup>11</sup> U.S. Census Bureau, 2004, "U.S. Interim Projections by Age, Sex, Race, and Hispanic Origin," (<http://www.census.gov/ipc/www/usinterimproj/>)

<sup>12</sup> "Economic Intelligence Unit – Country Data", (<http://countrydata.bvdep.com/cgi/template.dll?product=101&user=ipaddress>)

<sup>13</sup> U.S. Census Bureau, 2004.

they age.<sup>14</sup> For Celgene, this trend is even more pronounced as the older people become, the more likely they will be to have cancer (see chart below<sup>15</sup>). Since nearly all of its current and projected revenues come from cancer treatments or other similar diseases, Celgene's revenues should receive a boost from aging populations.

TABLE 7 Reported Deaths for the Five Leading Cancer Sites by Age and Sex, US, 2001

All Ages	<20	20 to 39	40 to 59	60 to 79	≥ 80
Male					
All Sites	All Sites	All Sites	All Sites	All Sites	All Sites
287,075	1,240	4,768	51,427	157,504	72,129
Lung & Bronchus 90,367	Leukemia 410	Leukemia 654	Lung & Bronchus 15,886	Lung & Bronchus 56,981	Lung & Bronchus 17,088
Prostate 30,719	Brain & ONS 268	Brain & ONS 573	Colon & Rectum 5,078	Colon & Rectum 14,903	Prostate 15,706
Colon & Rectum 28,229	Bones & Joints 114	Colon & Rectum 454	Pancreas 2,958	Prostate 13,922	Colon & Rectum 7,787
Pancreas 14,467	Endocrine System 96	Non-Hodgkin Lymphoma 425	Liver 2,472	Pancreas 8,180	Urinary Bladder 3,313
Leukemia 11,894	Soft Tissue 87	Lung & Bronchus 401	Esophagus 2,347	Leukemia 5,924	Leukemia 3,210
Female					
All Sites	All Sites	All Sites	All Sites	All Sites	All Sites
266,693	986	5,664	49,065	129,877	81,100
Lung & Bronchus 65,606	Leukemia 318	Breast 1,424	Breast 12,212	Lung & Bronchus 39,099	Lung & Bronchus 15,206
Breast 41,394	Brain & ONS 252	Uterine Cervix 512	Lung & Bronchus 10,886	Breast 17,405	Colon & Rectum 12,064
Colon & Rectum 28,579	Endocrine System 79	Leukemia 465	Colon & Rectum 3,891	Colon & Rectum 12,255	Breast 10,352
Pancreas 15,336	Bones & Joints 75	Lung & Bronchus 409	Ovary 3,117	Pancreas 7,722	Pancreas 5,549
Ovary 14,414	Soft Tissue 60	Colon & Rectum 364	Pancreas 1,970	Ovary 7,353	Non-Hodgkin Lymphoma 4,029

\*ONS = Other nervous system.

Note: Others and Unspecified Primary are excluded from cause of death ranking order.

Source: US Mortality Public Use Data Tapes, 2001, National Center for Health Statistics, Centers for Disease Control and Prevention, 2003.

<sup>14</sup> Source: Center for Financing, Access, and Cost Trends, AHRQ, Medical Expenditure Panel Survey - Household Component, 1997-2000 (US Dept. of Health and Human Services)

<sup>15</sup> Source: American Cancer Society (<http://caonline.amcancersoc.org/cgi/content-nw/full/54/1/8/TBL7>)

## Discounted Cash Flow Analysis

We performed a valuation on the company using a discounted cash-flow analysis. Because our valuation indicates that, to justify the company's currently lofty share price, we have to assume at least two blockbuster drugs in the billion-dollar range, which are few and far between in the industry, we rate Celgene as a Sell.

### Assumptions

#### *Debt*

Celgene's long-term debt consists of \$400 million in convertible notes. The notes bear a coupon rate of 1.75% and can be converted into a total of 16,511,840 shares at a conversion price of \$24.225 per share. Because the notes are considerably "in the money" – that is, they can be converted for less than half the current stock price – and because they bear such a low interest rate, we assume that all of the notes will be converted into shares this year. (We note that convertible-bond arbitrage might affect how Celgene's debt trades, but an analysis of arbitrage activities is beyond the scope of this report.)

As a result, in our pro forma projections, the company receives just under \$400 million in additional paid-in capital in fiscal 2005. The company already has a significant cash-and-equivalents position, so this \$400 million passes through to shareholders as free cash flow.

On the other hand, to account for the impact of the conversion on current shareholders, we subtract an amount equivalent to the ratio of new (conversion) to existing shares from the total value, to reflect the claim on free cash flow that will belong to the new shareholders.

#### *Beta*

We estimated Beta utilizing a regression of excess Celgene returns and excess market returns for the 60 months ended December 2004. We calculated Beta to be negligibly above 1, which, when unlevered, translated to a Beta of 0.95. (This compares to an industry unlevered Beta of 1.21.<sup>16</sup>) As noted above, we anticipate the elimination of the convertible notes, and, based on industry practice and the company's cash position and profitability, we do not expect Celgene to issue material long-term debt. We therefore use 0.95 as our Beta in calculating WACC.

#### *Tax Rate*

Celgene only became profitable on a pre-tax basis in 2003. It has significant tax-loss carry-forwards. The company did, however, pay taxes to state, federal and, most

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<sup>16</sup> Source: Prof. Damodaran, NYU Stern School of Business  
([http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/Betas.html](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html))



meaningfully, foreign governments in 2003 and 2004. Because of the complexity of the company's international tax liabilities, it is difficult to estimate the impact of Celgene's tax-loss carry-forwards (which expire from 2005 to 2023). As a reasonable simplifying assumption, therefore, we started with the firm's effective tax rate in 2004 and gradually increased it to a standard taxation rate of 38% as of 2012 in our valuation model.

### *Operating Expenses*

We took operating expenses, as a percentage of revenue, from the current high level of 84% and trended it over several years toward the industry average. We went a few percentage points beyond the industry average, both to give the company the benefit of the doubt and to reflect the percentages prevalent in the industry's more mature companies, as Celgene transitions toward that segment over time.

### *Growth Rates*

We looked to recent growth trends and company estimates to project revenue growth from Celgene's current and pipeline products. Because our initial analysis indicated that the company is overvalued, we erred on the side of giving the company the benefit of the doubt in projecting revenues. In particular, we considered the valuation impact of not just one but two blockbuster drug releases by Celgene in the near future.

In estimating future Thalomid revenue, we started with company forecasts for fiscal year 2005, which are consistent with revenue reported to date. We continued this growth for two years and then began to taper it down. Eventually, as Revlimid gains traction, our model projects Revlimid cannibalizing Thalomid revenue, replacing it completely by 2019. For Revlimid, we used past growth for Thalomid as a guide, adjusted for the fact that it shares the market with Thalomid and for the cannibalization effect over time.

We estimate that Ritalin revenue will continue its past trend of doubling through 2006 and then grow by 50% as growth inevitably slows. After 2007, our model reduces Ritalin revenue by the growing sales of replacement medication Focalin. Focalin estimates follow the Ritalin trend of doubling for several years. Focalin revenue growth then tapers off over several years toward the terminal growth rate.

Our projection of revenues from "Blockbuster 1" and "Blockbuster 2" follow the pattern of Revlimid revenue growth. This is consistent with the general definition of a blockbuster as a drug that reaches revenues of at least \$1bn per year.<sup>17</sup>

Our projections trend toward and ultimately arrive at a terminal growth rate of 3%, based on historical GDP growth rates.

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<sup>17</sup> See, e.g., "The Pharma Market: A Glimpse at What the Future Holds," *Drug Discovery & Development*, April 2003 (Interview with Ajit Baid, Industry Manager for Pharmaceutical Subscriptions, Frost & Sullivan, Toronto, Canada: "Today, the threshold for a blockbuster product within the pharmaceutical industry stands at \$1 billion.")



### *Market Risk Premium*

We used a traditional MRP of 7%, although we also performed a sensitivity analysis to evaluate the effect of adjusting this rate.

### *Basis for Recommendation*

The starting point of our recommendation is the recent closing price of \$59.69, which we compared to the results of our discounted cash flow analysis. Because the current valuation can only be sustained if we assume the company introduces two new billion-dollar-drugs (in addition to Revlimid) within ten years, we consider Celgene overvalued.

## Case 1: Two Blockbuster Drugs

Y/end 31 Dec (US\$m)	2004	Adj. 2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
THALOMID Revenue	309	309	389	490	617	763	922	1,082	1,222	1,313	1,200	1,000	800	700	500	200	0
% change			26.0%	26.0%	26.0%	23.6%	20.8%	17.3%	13.0%	7.4%	-8.6%	-16.7%	-20.0%	-12.5%	-28.6%	0.0%	0.0%
REVLIMID Revenue	0	0	0	253	540	800	1,000	1,100	1,210	1,319	1,438	1,553	1,677	1,794	1,920	2,016	2,076
% change				113.3%	48.2%	25.0%	10.0%	10.0%	9.0%	9.0%	8.0%	8.0%	8.0%	7.0%	7.0%	5.0%	3.0%
Blockbuster 1						253	540	800	1,000	1,100	1,210	1,319	1,438	1,553	1,677	1,794	1,920
Blockbuster 2									253	540	800	1,000	1,100	1,210	1,319	1,438	1,553
RITALIN Revenue	27	27	52	103	155	122	55	0	0	0	0	0	0	0	0	0	0
FOCALIN Revenue	4	4	8	17	33	67	134	227	364	545	709	780	850	918	982	1,012	1,042
ALKERAN Revenue	17	18	24	25	27	28	30	32	34	36	38	40	42	45	48	51	52
Other Revenue	21	21	21	23	24	26	27	29	30	32	34	36	39	41	43	46	47
Total Revenue	378	378	494	911	1,397	2,059	2,707	3,270	4,113	4,885	5,429	5,728	5,945	6,261	6,489	6,556	6,690
% change			30.6%	84.3%	53.4%	47.3%	31.5%	20.8%	25.8%	18.8%	11.1%	5.5%	3.8%	5.3%	3.6%	1.0%	2.0%
Op. Expenses	319	319	395	683	978	1,400	1,841	2,223	2,797	3,322	3,691	3,895	4,043	4,257	4,412	4,458	4,549
% change			23.9%	72.8%	43.2%	43.1%	31.5%	20.8%	25.8%	18.8%	11.1%	5.5%	3.8%	5.3%	3.6%	1.0%	2.0%
% of Sales	84.5%	84.3%	80.0%	75.0%	70.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%
Interest Income (Expense)	(10)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Income	30	30	424	30	30	30	30	30	30	30	30	30	30	30	30	30	30
WC	709	709	600	400	200	206	271	327	411	489	543	573	595	626	649	656	669
EBIT (operating inc)	58	89	523	258	449	689	896	1,076	1,346	1,593	1,767	1,863	1,932	2,033	2,106	2,128	2,171
Taxes	10.42	(21.27)	(189.34)	(64.75)	(119.81)	(197.70)	(277.91)	(359.55)	(481.68)	(616.84)	(682.92)	(719.28)	(745.75)	(784.09)	(811.81)	(819.99)	(836.32)
Tax Rate	17.8%	17.8%	20.0%	22.5%	25.0%	27.5%	30.0%	32.5%	35.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%
after-tax EBIT or NOPAT	98.83	68.02	333.44	193.02	329.43	491.21	618.47	716.76	864.56	976.42	1,084.24	1,143.57	1,186.75	1,249.30	1,294.53	1,307.88	1,334.52
Adjustments																	
+ Depreciation & amort.	10	10	24.00	31.82	58.65	89.96	132.55	174.29	210.49	264.79	314.48	349.47	368.72	382.73	403.02	417.70	422.03
- Changes in WC	(51.00)	(51.00)	109.00	200.00	200.00	(5.91)	(64.84)	(56.23)	(84.35)	(77.19)	(54.34)	(29.90)	(21.76)	(31.53)	(22.80)	(6.73)	(13.43)
- Capex	(24.00)	(24.00)	(31.82)	(58.65)	(89.96)	(132.55)	(174.29)	(210.49)	(264.79)	(314.48)	(349.47)	(368.72)	(382.73)	(403.02)	(417.70)	(422.03)	(430.67)
FCF			434.63	366.19	498.12	442.71	511.89	624.34	725.90	849.53	994.91	1,094.41	1,150.97	1,197.48	1,257.06	1,296.82	1,312.44
Present value factor			1.10	1.21	1.34	1.47	1.62	1.79	1.97	2.17	2.39	2.63	2.90	3.19	3.52	3.88	4.27
Present value of FCF			394.54	301.75	372.60	300.61	315.53	349.34	368.70	391.70	416.42	415.81	396.97	374.91	357.26	334.57	307.37
																	next year's FCF
																	terminal value
																	PV of terminal value
																	4,420.92
																	PV of D+E as of beginning of 2005 (=sum of PV of annual FCF + terminal value)
																	9,809.29
																	Share of value going to new shareholders (convertible debtholders)
																	(964.74)
																	PV of E
																	8,844.55
																	# of shares
																	167.890
																	Price per share as of beginning of 2005
																	52.68
																	Price per share as of 11/01/05
																	57.14

## Case 2: One Blockbuster Drug

Y/end 31 Dec (US\$m)	2004	Adj. 2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
THALOMID Revenue	309	309	389	490	617	763	922	1,082	1,222	1,313	1,200	1,000	800	700	500	200	0
% change			26.0%	26.0%	26.0%	23.6%	20.8%	17.3%	13.0%	7.4%	-8.6%	-16.7%	-20.0%	-12.5%	-28.6%	0.0%	0.0%
REVLIMID Revenue	0	0	0	253	540	800	1,000	1,100	1,210	1,319	1,438	1,553	1,677	1,794	1,920	2,016	2,076
% change					113.3%	48.2%	25.0%	10.0%	10.0%	9.0%	8.0%	8.0%	8.0%	7.0%	7.0%	5.0%	3.0%
Blockbuster 1					253	540	800	1,000	1,100	1,210	1,319	1,438	1,553	1,677	1,794	1,920	2,076
RITALIN Revenue	27	27	52	103	155	122	55	0	0	0	0	0	0	0	0	0	0
FOCALIN Revenue	4	4	8	17	33	67	134	227	364	545	709	780	850	918	982	1,012	1,042
ALKERAN Revenue	17	18	24	25	27	28	30	32	34	36	38	40	42	45	48	51	52
Other Revenue	21	21	21	23	24	26	27	29	30	32	34	36	39	41	43	46	47
Total Revenue	378	378	494	911	1,397	2,059	2,707	3,270	3,860	4,346	4,629	4,728	4,845	5,051	5,170	5,118	5,138
% change			30.6%	84.3%	53.4%	47.3%	31.5%	20.8%	18.1%	12.6%	6.5%	2.1%	2.5%	4.2%	2.4%	-1.0%	0.4%
Op. Expenses	319	319	395	683	978	1,400	1,841	2,223	2,625	2,955	3,147	3,215	3,295	3,434	3,515	3,480	3,494
% change			23.9%	72.8%	43.2%	43.1%	31.5%	20.8%	18.1%	12.6%	6.5%	2.1%	2.5%	4.2%	2.4%	-1.0%	0.4%
% of Sales	84.5%	84.3%	80.0%	75.0%	70.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%
Interest Income (Expense)	(10)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Income	30	30	424	30	30	30	30	30	30	30	30	30	30	30	30	30	30
WC	709	709	600	400	200	206	271	327	386	435	463	473	485	505	517	512	514
EBIT (operating inc)	58	89	523	258	449	689	896	1,076	1,265	1,421	1,511	1,543	1,580	1,646	1,684	1,668	1,674
Taxes	10.42	(21.27)	(189.34)	(64.75)	(119.81)	(197.70)	(277.91)	(359.55)	(453.35)	(551.22)	(585.64)	(597.68)	(611.99)	(636.95)	(651.43)	(645.18)	(647.52)
Tax Rate	17.8%	17.8%	20.0%	22.5%	25.0%	27.5%	30.0%	32.5%	35.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%
after-tax EBIT or NOPAT	98.83	68.02	333.44	193.02	329.43	491.21	618.47	716.76	811.93	869.35	925.52	945.17	968.51	1,009.24	1,032.86	1,022.66	1,026.48
Adjustments																	
+ Depreciation & amort.	10	10	24.00	31.82	58.65	89.96	132.55	174.29	210.49	248.50	279.74	297.97	304.34	311.91	325.13	332.80	329.48
- Changes in WC	(51.00)	(51.00)	109.00	200.00	200.00	(5.91)	(64.84)	(56.23)	(59.05)	(48.53)	(28.31)	(9.90)	(11.76)	(20.53)	(11.91)	5.14	(1.93)
- Capex	(24.00)	(24.00)	(31.82)	(58.65)	(89.96)	(132.55)	(174.29)	(210.49)	(248.50)	(279.74)	(297.97)	(304.34)	(311.91)	(325.13)	(332.80)	(329.48)	(330.73)
FCF			434.63	366.19	498.12	442.71	511.89	624.34	714.86	789.59	878.98	928.89	949.17	975.49	1,013.29	1,031.11	1,023.31
Present value factor			1.10	1.21	1.34	1.47	1.62	1.79	1.97	2.17	2.39	2.63	2.90	3.19	3.52	3.88	4.27
Present value of FCF			394.54	301.75	372.60	300.61	315.53	349.34	363.10	364.06	367.90	352.92	327.36	305.41	287.98	266.02	239.65
																	next year's FCF
																	terminal value
																	14,718.53
																	PV of terminal value
																	3,446.99
																	PV of D+E as of beginning of 2005 (=sum of PV of annual FCF + terminal value)
																	8,346.06
																	Share of value going to new shareholders (convertible debtholders)
																	(820.83)
																	PV of E
																	7,525.23
																	# of shares
																	167.890
																	Price per share as of beginning of 2005
																	44.82
																	Price per share as of 11/01/05
																	48.62

### ***Case 3: No New Blockbuster Drugs in Near Term***

Yend 31 Dec (US\$m)	2004	Adj. 2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	0		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
THALOMID Revenue	309	309	389	490	617	763	922	1,082	1,222	1,313	1,200	1,000	800	700	500	200	0
% change			26.0%	26.0%	26.0%	23.6%	20.8%	17.3%	13.0%	7.4%	-8.6%	-16.7%	-20.0%	-12.5%	-28.6%	0.0%	0.0%
REVLIMID Revenue	0	0	0	253	540	800	1,000	1,100	1,210	1,319	1,438	1,553	1,677	1,794	1,920	2,016	2,076
% change				113.3%	113.3%	48.2%	25.0%	10.0%	10.0%	9.0%	9.0%	8.0%	8.0%	7.0%	7.0%	5.0%	3.0%
RITALIN Revenue	27	27	52	103	155	122	55	0	0	0	0	0	0	0	0	0	0
FOCALIN Revenue	4	4	8	17	33	67	134	227	364	545	709	780	850	918	982	1,012	1,042
ALKERAN Revenue	17	18	24	25	27	28	30	32	34	36	38	40	42	45	48	51	52
Other Revenue	21	21	21	23	24	26	27	29	30	32	34	36	39	41	43	46	47
Total Revenue	378	378	494	911	1,397	1,806	2,168	2,470	2,860	3,246	3,419	3,409	3,408	3,498	3,493	3,324	3,218
% change			30.6%	84.3%	53.4%	29.2%	20.0%	13.9%	15.8%	13.5%	5.3%	-0.3%	0.0%	2.6%	-0.1%	-4.8%	-3.2%
Op. Expenses	319	319	395	683	978	1,228	1,474	1,679	1,945	2,207	2,325	2,318	2,317	2,379	2,375	2,260	2,188
% change			23.9%	72.8%	43.2%	25.5%	20.0%	13.9%	15.8%	13.5%	5.3%	-0.3%	0.0%	2.6%	-0.1%	-4.8%	-3.2%
% of Sales	84.5%	84.3%	80.0%	75.0%	70.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%	68.0%
Interest Income (Expense)	(10)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Income	30	30	424	30	30	30	30	30	30	30	30	30	30	30	30	30	30
WC	709	709	600	400	200	181	217	247	286	325	342	341	341	350	349	332	322
EBIT (operating inc)	58	89	523	258	449	608	724	820	945	1,069	1,124	1,121	1,120	1,149	1,148	1,094	1,060
Taxes	10.42	(21.27)	(189.34)	(64.75)	(119.81)	(175.44)	(226.11)	(276.35)	(341.35)	(417.46)	(438.50)	(437.30)	(437.18)	(448.16)	(447.53)	(427.00)	(414.08)
Tax Rate	17.8%	17.8%	20.0%	22.5%	25.0%	27.5%	30.0%	32.5%	35.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%	38.0%
after-tax EBIT or NOPAT	98.83	68.02	333.44	193.02	329.43	432.51	497.59	543.96	603.93	651.11	685.45	683.50	683.29	701.20	700.18	666.69	645.60
Adjustments																	
+ Depreciation & amort.	10	10	24.00	31.82	58.65	89.96	116.27	139.55	158.99	184.13	208.93	220.07	219.44	219.37	225.18	224.85	213.98
- Changes in WC	(51.00)	(51.00)	109.00	200.00	200.00	19.39	(36.17)	(30.19)	(39.05)	(38.53)	(17.31)	0.99	0.11	(9.03)	0.52	16.88	10.63
- Capex	(24.00)	(24.00)	(31.82)	(58.65)	(89.96)	(116.27)	(139.55)	(158.99)	(184.13)	(208.93)	(220.07)	(219.44)	(219.37)	(225.18)	(224.85)	(213.98)	(207.14)
FCF			434.63	366.19	498.12	425.60	438.13	494.33	539.74	587.78	657.00	685.12	683.46	686.36	701.03	694.44	663.07
Present value factor			1.10	1.21	1.34	1.47	1.62	1.79	1.97	2.17	2.39	2.63	2.90	3.19	3.52	3.88	4.27
Present value of FCF			394.54	301.75	372.60	288.99	270.06	276.60	274.15	271.01	274.99	260.30	235.72	214.89	199.24	179.16	155.29
															next year's FCF		682.96
															terminal value		9,537.09
															PV of terminal value		2,233.53
															PV of D+E as of beginning of 2005 (=sum of PV of annual FCF + terminal value)		6,193.10
															Share of value going to new shareholders (convertible debtholders)		(609.09)
															PV of E		5,584.02
															# of shares		167.890
															Price per share as of beginning of 2005		33.26
															Price per share as of 11/01/05		36.00

*One Blockbuster Drug Scenario – Sensitivities*

<b>Beta Sensitivity</b>	
	\$48.62
0.65	70.13
0.70	65.39
0.75	61.23
0.80	57.55
0.85	54.28
0.90	51.35
0.95	48.70
1.00	46.31
1.05	44.13
1.10	42.15
1.15	40.32
1.20	38.65

<b>MRP Sensitivity</b>	
	\$48.62
4.0%	82.78
4.5%	74.23
5.0%	67.24
5.5%	61.41
6.0%	56.49
6.5%	52.27
7.0%	48.62
7.5%	45.44
8.0%	42.63
8.5%	40.13
9.0%	37.91
9.5%	35.91

### *Industry Ratio Comparisons*

We do not believe ratios are particularly insightful in analyzing this industry, given the uncertainties of revenue streams and the diversity of company maturities, but the following information<sup>18</sup> is provided for sector context.

PEG Ratio	
Industry Average	4326
Industry Average (ex-CELG)	4604
KERX	-22
SPPI	-19
KAL	-13
<b>CELG</b>	<b>144</b>
APPX	198
SGP	664
LLY	4012
BMY	4294
WYE	4850
MRK	5001
ABT	5147
GSK	6268

P/E Ratio	
Industry Average	32
Industry Average (ex-CELG)	32
KERX	NA
SPPI	NA
KAL	NA
MRK	14
BMY	16
ABT	20
SGP	29
APPX	41
LLY	43
WYE	52
GSK	53
<b>CELG</b>	<b>106</b>

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<sup>18</sup> Source: I/B/E/S and Yahoo Finance.

*Stock Performance (3-year)*



## Important Disclaimer

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