THE BURRILL REPORT

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Dealmaking

Private Biotech Tug of War: M&A versus IPO

Many promising companies are being sold instead of going public

By Marie Daghlian

Privately held biotechs and their investors face a difficult decision these days: sell themselves for an immediate cash payout at a decent multiple, or shop themselves to public investors, where there has been a widening gulf between the valuation companies think they deserve and the valuation the market is willing to give them. It is a difficult decision for venture capital investors, who face pressure to provide returns to their limited partners.

Amid the pressure and limited success raising new funds, more and more venture capitalists are making the decision to sell their companies to provide immediate returns to their investors rather than risk taking their companies public and waiting for the market to boost their value.

The performance of IPOs in the biotech sector has not helped change VC sentiment. Most of the companies that have gone public since the window opened toward the end of 2009 have had to lower their expectations to get their deals done. Collectively the 2011-

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M&A Activity Heats Up in April

Rift between buyers and sellers on price, but deals are getting done

April proved to be a big month for M&A activity in the life sciences as companies announced more than $29 billion in agreed upon transactions during the month, the bulk of which occurred during the final week. The increased activity stood in stark contrast to the IPO market, which saw no completed life sciences offerings in U.S. markets during the month.

Month In Review

Nestlé's $11.6 billion agreement to acquire Pfizer's nutrition business was the largest transaction of the month.

The Swiss food company fended off rivals Danone and Mead Johnson by pushing the price higher than analysts' estimates of $9 billion to $10 billion. The deal represents the largest acquisition ever for Nestlé, expanding its presence in emerging markets, which is the source of 85 percent of Pfizer Nutrition's sales.

April also saw Watson Pharmaceutical's $5.6 billion agreement to buy the privately-held generics powerhouse.

Actavis Group. Actavis had about $2.5 billion in sales with more than 1,000 products in more than 40 countries. Other transac-

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Life Sciences Scorecard in USD M, April 2012

	2012*	2011*	Change
Global Venture Capital	**3,847**	**3,128**	**23.0%**
U.S. VC	2,679	2,285	17.2%
IPOs (14 in 2012 v. 24 in 2011)	**928**	**2,256**	**-58.9%**
U.S. IPOs (7 in 2012 v. 10 in 2011)	499	684	-27.0%
Global PIPEs	**1,524**	**1,157**	**31.7%**
U.S. PIPEs	564	567	-0.5%
Global Follow-ons	**2,456**	**3,352**	**-26.7%**
U.S. Follow-ons	2,313	1,864	24.1%
Global Other Equity	**817**	**299**	**173.2%**
U.S. Other Equity	744	123	504.9%

	2012*	2011*	Change
Global Debt Offerings	**7,373**	**22,162**	**-66.7%**
U.S. Debt	4,513	8,842	-49.0%
Global Other Debt	**4,793**	**1,783**	**168.8%**
U.S. Other Debt	3,522	222	1486.5%
Total Global Public Financings	**17,891**	**31,009**	**-42.3%**
Total U.S. Public Financings	12,155	12,302	-1.2%
Global Partnering	**12,043**	**13,375**	**-10.0%**
U.S. Partner/Licenser	6,766	9,805	-31.0%
Global M&A	**45,611**	**80,614**	**-43.4%**
M&A, U.S. Target	35,221	47,045	-25.1%

*YTD April 30

Month in Review

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tions in April include Hologic's $3.7 billion agreement to buy the diagnostics company Gen-Probe, AstraZeneca's $1.3 billion agreement to buy Ardea Biosciences, Takeda Pharmaceutical's $800 million agreement to acquire URL Pharma, and Amgen's $700 million deal to acquire Turkish company Mustafa Nevzat Pharmaceuticals, a maker of injectable generic drugs, as the biotech giant continues its push into emerging markets.

The Amgen acquisition not only reflects the strong move into emerging markets for the company, but an initial move into small molecule injectable generics, a first for the industry leader, and a follow-on to the company's earlier push into biosimilars through its deal with Watson Pharmaceuticals.

In April, agreed upon M&As of publicly traded companies commanded an average premium of 44 percent. Typically, however, the purchase price of the companies averaged nearly 19 percent less than the 52-week high on the trading price of the shares of the targets. In the case of GlaxoSmithKline's $3.4 billion bid for Human Genome Sciences, although it represented an 81.3 percent premium to the closing price prior to the offer, it was 56.2 percent below the stock's 52-week high.

Though M&A activity took a sharp jump in April reaching $29.1 billion compared to just $6 billion in announced transactions in March, overall activity since the beginning of the year still lags the pace from a year ago as activity involving U.S. targets fell 25.1 percent and global activity fell 43.4 percent. That's attributable to two outsized acquisitions made during the first four months of 2011: Sanofi's $20.1 billion purchase of Genzyme, and Johnson & Johnson's $21.3 billion acquisition of Synthes.

Despite the appetite acquirers have for products and access to new markets, there is still a gulf between buyers and sellers for some of the higher profile targets. Nevertheless, M&A activity is picking up and this should continue as the pharmaceutical industry seeks to replace revenue lost from products losing patent protection. At the same time, in the absence of a vibrant IPO market, there are willing sellers to be had.

The IPO market in April remained unwelcoming to life sciences companies. Osprey Medical, an Eden Prairie, Minnesota-based medical device company, bypassed U.S. exchanges to go public on the Australian Stock Exchange. The company raised $20.8 million through the sale of Chess Depository Receipts. It's the third U.S. medical device company in the past year to look to the Australian market to go public in part because of a more welcoming regulatory environment for medical devices than in the United States. Life sciences companies that went public since January 2011 are down 10.9 percent as a group through April 30, 2012.

On the venture front, U.S. companies raised a total of $722 million in April with bioindustrial financings leading the way with $260 raised.

On the venture front, U.S. companies raised a total of $722 million in April with bioindustrial financings leading the way with $260 raised. Algae-based biofuels developer Sapphire Energy raised $144 million, the largest venture financing of the month. The therapeutics sector was a close second with $251 million. Argos Therapeutics, which withdrew an $86.3 million IPO in March because of an unwillingness to cut its share price as steeply as public market investors demanded, completed a series D venture financing for $25 million to begin late-stage clinical testing of its personalized immunotherapy to treat kidney cancer.

April also saw the signing of the Jumpstart our Business Startups Act, or JOBS Act, legislation intended to provide easier access to public markets for emerging growth companies. The law lowers the cost and regulatory burdens these companies face in raising capital and being public by providing exemptions to existing securities regulations.

On the partnering side, activity still is off the pace of 2011, but April did see a number of notable transactions including Merck's potential $1 billion deal with Endocyte for its late-stage ovarian cancer therapy. Other transactions reflected the high prices early-stage therapeutic candidates are commanding today. This includes Celgene's potential $250 million deal with Epizyme for its preclinical epigenetic experimental cancer therapy and GSK's $223.5 drug discovery collaboration with FivePrime Therapeutics focused on respiratory diseases.

The M&A activity helped drive stock prices higher with Human Genome Sciences (up 78.5 percent) and Ardea Biosciences (up 46.5 percent) among the sector's biggest movers in April. Aeterna Zentaris (down 70.6 percent) and Keryx Biopharmaceuticals (down 68.1 percent) were among the biggest decliners as a late-stage trial of Keryx's experimental colorectal cancer drug in-licensed from Aeterna Zentaris failed to meet its endpoints. Overall, the Burrill Mid-cap index posted the strongest returns for the month gaining 6.8 percent. The Burrill Biogreentech Index was the biggest decliner as it fell 3.5 percent.

The industry in April also marked the passing of George Rathmann, the first CEO of Amgen and one of the builders of the industry. He was 84. Rathmann helped forge the biotech industry and his legacy extends well beyond the walls of Amgen.

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Private Biotech Tug-of-War

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2012 class of companies that have gone public has raised 24 percent less money than hoped while selling 22 percent more shares at an average 40 percent below their target prices.

Part of the problem, say industry watchers, is that there is no real rational valuation methodology that can be applied to most small- and mid-cap companies across the public and private markets.

"In the trading markets or the private valuation markets there are wildly divergent expectations of value," says Dave Raksin, a partner at Inverness Advisors, a San Francisco-based investment bank. "I think that impinges on the IPO market too because when you do an IPO, you have to peg a valuation [on the company]."

Another problem is that many of the most promising companies—the ones that have an innovative technology platform and have attracted the interest of pharma—are being acquired to avoid public market risk. Matthew Perry, portfolio manager of the Biotechnology Value Fund, which invests mainly in small cap biotechs, has voiced the concern for some time that the best companies in the industry are being sold. He sympathizes with the VC's dilemma of needing exits but he thinks it's a bad position for the industry. "The long term success of our industry is, in part, going to be driven by the great companies going public," says Perry.

Of course, some companies going public have been embraced by investors. Two recent examples include Clovis Oncology and ChemoCentryx. Both companies have a strong pipeline, products that can answer unmet needs, and enough cash that neither had to go public for that reason. ChemoCentryx also has a strong partnership with GlaxoSmithKline.

Perry recommends companies with suitors consider a strong partnership rather than a sale to preserve the back-end economic upside of their other pipeline assets and technology for future success. "These companies will be able to go public from a position of strength and continue to build value in the public arena," says Perry, "potentially giving rise to the next generation of industry leaders."

Thomas Dietz, a veteran biotech investment banker who now invests in private companies as chairman and CEO of Waypoint Holdings, agrees with Perry that the quality of the companies that have gone public are a concern, but cites another reason for the shift away from an IPO. He says the number of public market buyers for IPOs has been cut at least in half during the last decade.

The audience for public market biotech has grown thin, which makes the partnering and M&A alterative more attractive. He notes that when public offerings were in favor, the industry could get 30 to 40 IPOs done a year. That, he says, is not possible today.

He agrees with Perry that acquisitions have deprived the public market of some of the more compelling biotechs as every Big Pharma and Big Biotech is looking for assets to enhance their portfolio. He argues good companies that want to go public have to consider all the variables that affect public performance and whether there are enough buyers for their shares.

"There are plenty that stay private long enough, have managed through the capital issues, and are still strong companies that can get out there and are later stage—and they'll be there," says Dietz.

Below is *The Burrill Report's* list of some private companies with public company potential that were sold since the IPO window opened at the end of 2009.

Private Companies that had Public Company Potential

DATE	TARGET	ACQUIRER	TOTAL VALUE (USD M)	UPFRONT (USD M)	LEAD ASSET STAGE	PRINCIPAL FOCUS
Feb '12	Boston Biomedical	Dainippon Pharmaceuticals	2630	200	Phase 3	Cancer stem cells
Jan '12	Avila Therapeutics	Celgene	925	350	Phase 1	Covalent drugs
Jul '11	Amira Pharmaceuticals	Bristol-Myers Squibb	475	325	Phase 1	Fibrosis
May '11	Advanced BioHealing	Shire	750	750	FDA approved	Wound care
Mar '11	Gemin X Pharma	Cephalon	525	225	Phase 2b	Cancer
Mar '11	Plexxikon	Daiichi Sankyo	935	805	Phase 3	Cancer, co-U.S. rights
Feb '11	Calistoga Pharmaceuticals	Gilead Sciences	600	375	Phase 2	Cancer
Jan '11	BioVex	Amgen	1000	425	Phase 3	Cancer vaccines
Dec '10	Marcadia Biotech	Roche	537	287		Metabolic
Dec '09	Novexel	AstraZeneca	505	350	Phase 2	Antibiotics
Oct '09	Proteolix	Onyx Pharmaceuticals	851	276	Phase 2	Cancer

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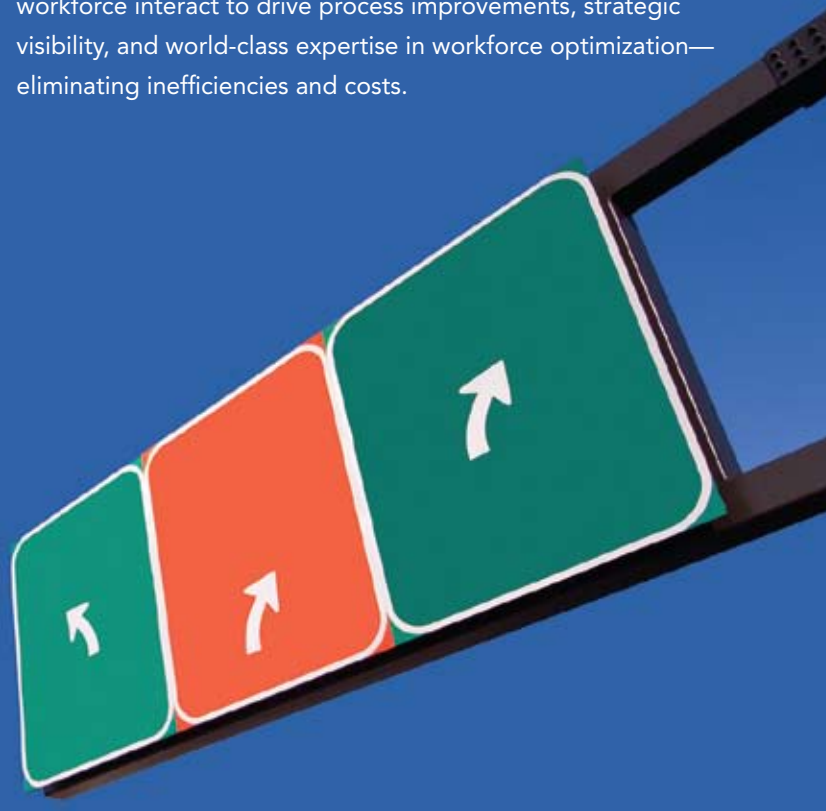

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Tech Transfer Offices Move Beyond Licensing

In search of new sources of revenue, universities become ready partners to industry

By Daniel S. Levine

A parade of top pharmaceutical companies headed back to school in 2011 as they forged alliances with top research universities. The agreements, part of the industry's move to outsource discovery and early-stage research, reflect a new reality for universities as well. As the traditional sources of federal funding for research are becoming less reliable, universities have been transforming themselves as they seek to diversify their revenues and redefine their missions.

Academic- industry agreements, once considered anathema on many campuses, have now become commonplace. In 1998, a $25 million, five-year research agreement between the University of California, Berkeley and Novartis set off a firestorm of controversy on the campus and beyond about the corporatization of university research and academic freedom. Ten years later, when UC Berkeley entered into a $500 million biofuels research agreement with the oil giant BP, the agreement was widely celebrated and faculty and students were muted in their opposition.

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Top University Technology Licensing Activity in 2010 (by Licensing Income)

NAME OF INSTITUTION	2010 RESEARCH EXPENDITURES (USD)	2010 LICENSES AND OPTIONS EXECUTED	2010 STARTUPS	2010 INVESTION DISCLOSURES	2010 U.S. PATENTS ISSUED	2010 NEW PATENT APPLICATIONS	2010 LICENSING INCOME (USD)
Northwestern University	491,628,943	32	6	165	58	223	179,835,148
New York University	365,944,000	40	6	134	58	71	178,389,513
Columbia University	662,048,550	61	12	333	66	177	147,237,631
University of California System	5,171,519,289	252	75	1,565	297	915	104,434,511
Wake Forest University	227,597,563	14	3	72	12	40	85,991,743
University of Minnesota	653,616,819	73	8	255	46	80	83,905,660
Massachusetts Institute of Technology (MIT)	1,400,945,000	96	17	521	172	535	69,200,000
University of Washington/ Wash. Res. Foundation	887,329,593	196	7	354	69	125	69,032,163
Stanford University	805,973,770	90		467	180	376	65,466,286
UW-Madison/WARF	1,029,000,000	62	5	356	133	109	54,300,000
California Institute of Technology	504,476,128	47	10	573	138	415	51,582,149
University of Rochester	460,522,000	19	5	123	21	46	41,664,036
University of Massachusetts	563,998,898	42	2	169	44	77	40,019,174
University of Michigan	1,139,493,986	97	10	290	82	153	39,822,113
University of Texas System	2,346,099,522	175	33	713	150	368	38,309,487
University of Utah	450,488,999	68	18	208	41	90	37,547,208
University of Florida	535,877,029	92	9	295	59	171	29,235,006
University of Iowa Research Foundation	444,034,000	21	3	70	32	23	26,991,145
Duke University	826,993,375	99	5	214	43	125	25,733,526
University of South Florida	390,850,000	37	5	161	67	84	17,411,625
Mount Sinai School of Medicine of NYU	371,088,109	24	1	72	11	34	15,381,631
Emory University	450,204,168	36	4	212	17	58	14,383,542
Case Western Reserve University	334,993,000	38	5	216	28	54	14,333,273
Indiana University (ARTI)	432,026,862	27	4	154	8	92	14,126,964
University of Illinois, Chicago, Urbana	878,072,000	61	8	327	94	164	13,471,311

Academic-Industry Partnering

(continued from previous page)

Todd Sherer, president of the Association of University Technology Managers and executive director of the office of technology transfer at Emory University, says there are a number of forces at work including pressure on universities to diversify revenue, cultural changes as universities see a greater role for themselves in conducting translational research, and the pharmaceutical industry knocking on their doors. With all of that has come an evolution of the tech transfer office as well.

"Government-supported programs are not going to be as robust as they have been during this baby boom time in the workforce… The universities that want to continue to grow and be robust are going to have to develop stronger ties with industry."

David Day,

Assistant vice president and director of the office of Technology Licensing, University of Florida

"Tech transfer offices all over the country have expanded their offerings," says Sherer. "We used to be transactional support people and in today's world we are viewed as value creators." In part, this is seen by tech transfer offices becoming involved in entrepreneurship training and incubating companies; but beyond that, Sherer says corporate partners no longer want to hear just about patents, but such things as research assets at universities that may make a university attractive as a partner.

For David Day, assistant vice president and director of the office of Technology Licensing University of Florida, it's a matter of demographics. He says the tax base of the country is changing as the Baby Boom generation begins to exit the earning and tax paying portion of the population.

"Government-supported programs are not going to be as robust as they have been during this baby boom time in the workforce," he says. "If you look back before World War II, there was no such thing as NIH and NSF and those large agencies—not like they exist today. To me it looks plain that the universities that want to continue to grow and be robust are going to have to develop stronger ties with industry."

Universities have become more sophisticated about their roles in the entire ecosystem of innovation. At places such as the University of Florida, there's not only been an active effort to educate faculty about the tech licensing process, running entrepreneurial and Small Business Innovation Research funding workshops, but also about how to improve the chances for success when they license university technology.

For instance, the University of Florida will not license technology to a startup company that is led by a professor, according to Patti Breedlove, associate director, of the University of Florida's Sid Martin Biotechnology Incubator. Instead, the university insists that an investable management team be recruited before they would be willing to issue a license. "We know historically the chances of a company run by a researcher being successful is almost nil. That was a fundamental change that allowed our incubator program to be successful."

At other universities, there's been a heightened push to enter into research alliances with industry. At the Oregon Health & Science University, Jit Banerjee, a pharmaceutical industry veteran, took the position of director of business development, a process that involved taking inventory of what the university was good at doing and then determining what companies to target in its outreach. Rather than try to license technology, Banerjee says the university has emphasized a consultative approach, trying to let scientists speak to scientists at Big Pharma companies about problems and seeing if they can help them solve them. That too has entailed getting faculty members to think differently about their roles.

"The organization is actively taking a role in reaching out to faculty and telling them things are changing as the environment is changing. NIH dollars are shrinking," he says. "They have to get out from their mode of being just an academic faculty. They have to be much more active in reaching out to the industry, which means they have to train their minds differently, deliver results differently and I think overall there's been a major shift in the thought process with the faculty of being much more adaptable to industry partnership."

The reality for most universities, though, is that the tech transfer office is unlikely to become a source of windfall payouts. At the Georgia Institute of Technology, which had 2010 licensing revenue of about $2.3 million, Stephen Fleming, vice president of the university's Enterprise Innovation Institute, says revenue from direct licensing is a relatively small number. The institute is Georgia Tech's primary business outreach organization, and provides a comprehensive program of assistance to business, industry, entrepreneurs, and economic developers. He said while sponsored research activities represent a much bigger number, the real payoff comes from alumni who found the university helpful, saw it as a partner rather than an adversary, and once they've made a lot of money, show their appreciation by giving a building.

"That turns out to be where the real payoff is—gifts from grateful and wealthy alumni," he says. "That's not measured in the traditional tech transfer metrics, but we've got a couple of nice buildings on campus that came from those gifts, and I'd much rather have those buildings than another quarter percent on a royalty statement somewhere."

THE BURRILL PAN-ASIA LIFE SCIENCES MEETING

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G. Steven Burrill, CEO of Burrill & Company, will deliver a brief overview of the state of the biotechnology world in the Pan-Asia region to open the meeting. This will be followed by two panels and an active question and answer session for the audience.

This meeting is for CEOs, industry managers working in Asia and Australia or seeking to do business there, entrepreneurs interested in opportunities to build businesses in the region, and scientific and academic leaders interested in regional developments in biotechnology.

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Generics, Biosimilars Draw the Big Drugmakers

Despite demand, the risks differ substantially

By Michael Fitzhugh

With many of the best-selling drugs falling off patent and into competition with generics, some of the world's most profitable drug companies are pursuing generic drugs. In a flurry of deals, they're leaping in to produce branded generics and biosimilars, copycat versions of biologics, in an effort to position their businesses to meet both emerging market demand and increased penny-pinching among payers. But while the incentives to enter both markets are clear, the risks involved may prove to be quite different.

Big biopharmaceutical companies are not waiting for biosimilars to become a big business without them.

As Pfizer prepared for a wave of generic competition for its blockbuster statin Lipitor, it entered a joint venture in February with China's Zhejiang Hisun Pharma to develop and commercialize branded generics for global markets. Though the deal has yet to be finalized, the current agreement would give Pfizer a 49 percent stake in a $545 million investment.

Despite the revenue losses companies such as Pfizer face as their best-selling drugs lose patent protection, keeping branded generics in their portfolios can generate a steady cash flow in emerging markets, and innovator companies often retain an edge, in manufacturing, marketing and other operational expertise.

Merck has unveiled a new joint venture with Supera Farma Laboratorios in Brazil to distribute and sell a portfolio of innovative pharmaceutical and branded generic products from Merck, Cristália and Eurofarma.

Novartis, which has long been active in the generics space through its Sandoz division, has remained engaged too. In May, the company announced a $1.5 billion acquisition of the specialty dermatology generics company Fougera Pharmaceuticals, a leading player in the $2.1 billion U.S. dermatology generics sector.

Abbott, which moved into the generics space in 2010 through acquisitions of India's Piramal Healthcare Solutions and Belgium-based Solvay Pharmaceuticals, has already seen a payback on the deals. Emerging markets, where many of the drug companies' sales are growing at a strong double-digit pace, according to Abbott's estimates, now represent nearly 60 percent of sales in its established pharmaceuticals business.

Though demand for generic medicines around the world could grow to $221 billion by 2016, according to market analysis by Espicom, the demand for biosimilars is less clear. Still, there has been a surge in dealmaking in 2011 and 2012 around their development and production as the big biopharmaceutical companies are not waiting for biosimilars to become a big business without them.

One recent high profile tie-up in the space is Amgen's $400 million partnership with the generic drugmaker Watson Pharmaceuticals to develop and commercialize biosimilar oncology antibody drugs. In December 2011, Baxter and Momenta Pharmaceuticals agreed on a biosimilars deal that could net Momenta more than $500 million if it reaches certain milestones, while more recently, in May, Daiichi Sankyo struck a deal with Coherus BioSciences to develop and commercialize biosimilar forms of etanercept and rituximab in certain Asian countries including Japan.

Biogen Idec and Samsung formed a biosimilars-based joint venture in December. Samsung will contribute $255 million to own 85 percent of the joint venture while Biogen will contribute $45 million, for a 15 percent stake. Even though Biogen has reserved an option to increase its stake in the venture to nearly 50 percent, there remain plenty reasons why the biosimilars market may prove more risky than investing in generics. For one thing, there are many unknowns.

"Conceptually and strategically, we really have no idea how this whole marketplace is going to play out. And it's not our core business," said Steven Holtzman, Biogen Idec's Executive Vice President, Corporate Development, at May's Deloitte Recap Allicense conference in San Francisco.

Pfizer scrapped a $350 million deal to market biosimilar insulin with Biocon in March before the partnership had even hit its two year mark. Pfizer said the pact never met either company's expectations.

Biosimilars are more complex than generics, entailing higher clinical development costs, higher manufacturing costs, and the potential for more complex patent issues. Not long after Merck announced a deal to market biosimilar Enbrel with Korea's Hanwha Chemical, Amgen said it had received a new composition of matter patent extending patent protection in the United States for Enbrel for 17 years. If such extensions of intellectual property protection on innovator biologics were to become commonplace, the threat of such disruptions alone could turn some would-be biosimilars competitors off.

Biosimilars makers could also find themselves trying to convince skeptical patients and doctors that the relatively lesser savings offered by biosimilars drugs—maybe 20 percent to 30 percent versus 50 percent with generics—is worth trying or switching to.

At least in the United States, where the biosimilars pathway is still being fine-tuned, a go-slow approach to their introduction is likely to put the brakes on any immediate victories from big drugmakers' current investments in the field. ■

Corporate Venture Capital-Backed Life Sciences Companies More Likely to Succeed

By Vinay Singh

There has been no shortage of commentary on the emergence of corporate venture capital in the life sciences in recent years. As traditional venture capitalists continue to place more bets on later-stage investments or back away completely from the life sciences, corporate venture capital has stepped in to fill an emptying capital tranche for earlier-stage companies.

As Bruce Booth from Atlas Venture puts it, "they are a major syndicate partner for those of us in the early-stage arena, and we couldn't power up our startups without them." But do corporate venture capital's deeper pockets and profound industry expertise really mean better opportunities for early stage biotech and life sciences companies?

Our analysis found that therapeutics companies backed by corporate venture investments are more likely than other venture backed companies to enter into licensing or collaborative deals, and be acquired or complete an initial public offering.

The analysis examined all therapeutics venture investments made between January 1, 2000 and December 31, 2011in the S&P Capital IQ database. A total of 2907 companies received disclosed venture capital funding through 5,100 rounds of financing during that period. Of those companies, 9.9 percent (286 companies) received funding in part from a corporate venture fund.

Of the companies that received corporate venture funding during the analysis period, 24.5 percent (70 companies) were acquired compared to 14.4 percent (380 companies) for those that did not receive funding from a corporate venture investor. But while having corporate venture funding was a greater predictor of an eventual acquisition, it wasn't because the parent of the corporate venture fund was likely to buy the company.

While likely that a corporate venture arm of a Big Pharma would be created to provide a strategic advantage to the parent company, there wasn't much of an apparent business development push by parent companies to secure assets that its venture arm invested in. In fact, only 8.6 percent (six) of the corporate venture funded companies that were eventually acquired were acquired by the parent of that corporate venture arm.

Companies that received corporate venture funding were also far more likely to enter into licensing or collaboration agreements. A total of 48.4 percent, or 139 companies, that received corporate venture funding during the period entered into at least one licensing/collaboration agreement. That compared to 29.9 percent of the non-corporate venture funded companies (782 companies) that entered into licensing/collaboration agreements during the period.

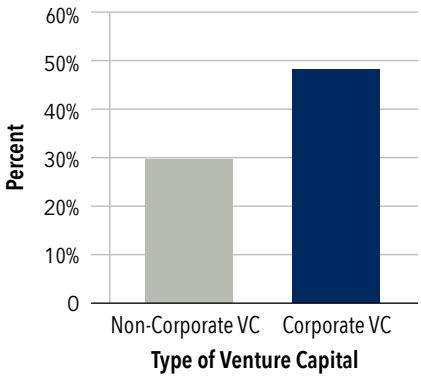
Corporate venture funding was also a greater predictor of an eventual IPO for a company. A total of 12.2 percent of corporate venture backed companies (35 companies) successfully completed IPOs. That compared to 7.8 percent, or 205 companies in the analysis that did not receive corporate venture backing.

Finally, there was not a significant difference between the two groups in terms of the time from first venture funding to an M&A or IPO for the companies in the analysis that achieved exits. The companies backed with corporate venture capital achieved exits, on average, at four years. That compared to four years and a little less than three months for non-corporate venture backed companies.

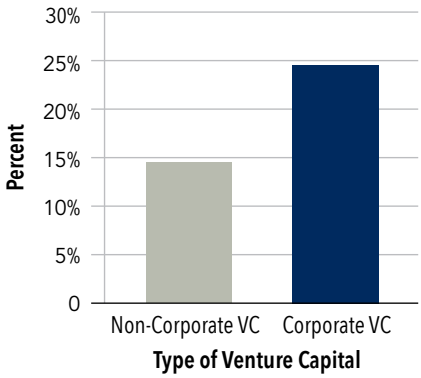
The numbers bear out that the rise of corporate venture capitalists is paying dividends for emerging companies in the life sciences sector as the backing of a corporate venture investment means a significantly greater likelihood of providing an exit for its investors. Having corporate venture capital backing also seems to provide validation for such companies.

Though unclear from the research, the data suggests that one benefit of having corporate venture funding is that it may guide companies to work on projects that are strategically aligned with the longer term priorities of Big Pharma and Big Biotech. In doing so, these corporate venture funds are supporting the lagging venture capital universe while still improving the position of their parent companies for the long haul.

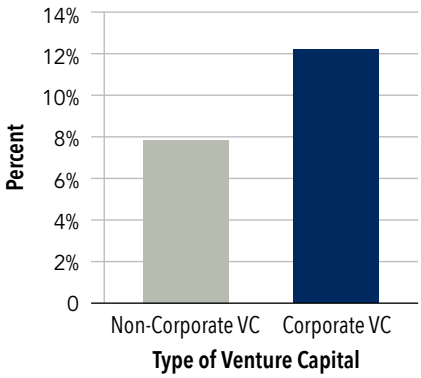
Licensing/Collaborations, 2000-2011



M&As, 2000-2011



IPOs, 2000-2011



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BIO HIGHLIGHT - Tuesday, June 19, 2012

G. Steven Burrill
Chief Executive Officer
Burrill & Company

Track: Super Session
Date: Tuesday, June 19, 2012
Time: 2:00 PM - 3:30 PM
Location: Boston Convention & Exhibit Center
Room: Room 210 ABC

Description: G. Steven Burrill, CEO of Burrill & Company, a global financial services firm serving the life sciences industry, discusses themes from his new annual report, *Biotech 2012: Innovating in the New Austerity*. For 26 years, Mr. Burrill's reports have helped people understand developments in the biotech industry and where it is heading. Governments worldwide are facing new pressures to contain healthcare spending and demands to develop reliable and environmentally sustainable sources of food, energy, and industrial products. Learn what innovation looks like in 2012, the role it will play in addressing global problems, and how companies will fund it going forward.

DON'T MISS OUR BOOT CAMP!

Stephen Sammut
Venture Partner, Burrill & Company
Senior Fellow, Wharton School Health Care Management

Biotechnology Entrepreneurship Boot Camp
Date: Sunday, June 17, 2012 & Monday, June 18, 2012
Location: Boston Convention & Exhibit Center
Room: Room 252B

Description: Biotechnology Entrepreneurship Boot Camp is an intensive, two-day program that will help you build the skills to transform your technologies and inventions into a viable company. Since its debut in 2005, the Boot Camp has evolved to address a broad range of issues faced by entrepreneurs from the managerial, scientific and academic communities. You will develop the insight and energy required for entrepreneurial success as you learn to:

- Think strategically in selecting and managing projects
- Plan for expeditious and cost-effective management
- Understand the requirements of all the involved stakeholders
- Oversee the essential components of the commercialization process

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APRIL STATISTICS

Advancers and Decliners, April 2012

TICKER	COMPANY	PRICE 3/31/2012	PRICE 4/30/2012	PRICE CHANGE	PERCENT CHANGE	REASON
ADVANCERS						
AXK	Accelr8 Technology	1.05	2.73	1.68	160.0	Shares surge after an investment group formed by Jack Schuler, John Patience, and Larry Mehren commit to invest up to $35 million in the company.
HGSI	Human Genome Sciences	8.24	14.71	6.47	78.5	GlaxoSmithKline makes a $2.6 billion bid to to acquire Human Genome Sciences. Shares soar despite offer being rejected.
BDSI	BioDelivery Sciences International	2.42	3.80	1.38	57.0	The U.S. Patent and Trademark Office formally awards BioDelivery a patent which extends patent protection for BioErodible MucoAdhesive through 2027.
RDEA	Ardea Biosciences	21.76	31.87	10.11	46.5	AstraZeneca agrees to acquire the company for $1.26 billion.
ECYT	Endocyte	4.98	7.12	2.14	43.0	Endocyte and Merck enter into an exclusive licensing deal for Endocyte's late-stage cancer drug vintafolide worth up to $1 billion.
ANIK	Anika Therapeutics	12.54	17.06	4.52	36.0	Anika reports record first-quarter 2012 revenue and earnings.
IBIO	iBio	1.12	1.50	0.38	33.9	iBio announces further positive results for its iBioModulator platform, an immunomodulator substance used to alter immune responses.
MTOX	MEDTOX Scientific	16.86	22.10	5.24	31.1	Shares jump after Medtox reports first-quarter earnings that beat consensus expectations.
WCRX	Warner Chilcott	16.81	21.81	5.00	29.7	Announces intent to explore sale of company after speculation arose that Bayer would make a bid for the company at $32 per share.
ASTM	Aastrom Biosciences	2.02	2.56	0.54	26.7	Positive results from a mid-stage trial on ixmyelocei-T, its experimental drug for the treatment of limb ischemia sent shares higher.
DECLINERS						
TBET	Tibet Pharmaceuticals	1.42	0.36	-1.06	-74.6	Trading was halted as additional information was required by the The Nasdaq Stock Market. Tibet was later delisted from the Nasdaq Composite Index.
AEZS	Æterna Zentaris	2.14	0.63	-1.51	-70.6	Failed late-stage study on perifosine, its experimental colorectal cancer drug co-developed with Keryx, sent shares stumbling.
KERX	Keryx Biopharmaceuticals	4.98	1.59	-3.39	-68.1	Failed late-stage study on perifosine, its experimental colorectal cancer drug co-developed with Aeterna, sent shares stumbling.
AVII	AVI Biopharma	1.54	0.83	-0.71	-45.8	Though results from a mid-stage trial on its experimental drug for Duchenne Muscular Dystrophy showed efficacy, it did not translate into clinical benefit.
AMRS	Amyris	5.18	3.13	-2.05	-39.6	Shares have slipped gradually since Amyris ran into scaling issues with its biorenewables program and announced that it would refocus on higher value markest such as cosmetics.
FURX	Furiex Pharmaceuticals	23.63	14.37	-9.26	-39.2%	Development partner, Takeda, announces receipt of a complete response letter from the FDA for alogliptin, their treatment of type 2 diabetes.

(continued) »

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Advancers and Decliners, April 2012

TICKER	COMPANY	PRICE 3/31/2012	PRICE 4/30/2012	PRICE CHANGE	PERCENT CHANGE	REASON
HALO	Halozyme Therapeutics	12.76	8.08	-4.69	-36.7%	Shares plunged 24 percent on the day the FDA requested more data on HyQ, the company's experimental treatment for immune-system disorders.
CBMX	CombiMatrix	1.65	1.05	-0.60	-36.4%	Shareholders responded negatively to the announcement that Ronald Wapner would be named Medical Director for the company.
TTNP	Titan Pharmaceuticals	1.14	0.73	-0.41	-36.0%	Entered into a definitive agreement to sell approximately $5.5 million of shares in common stock in a registered direct offering to institutional investors.
DARA	DARA BioSciences	1.29	0.88	-0.41	-31.9%	Entered into definitive securities purchase agreements with certain investors in connection with a public offering providing for the sale of $10.1 million of shares of Series B-2 convertible preferred stock.

Performance of 2012 U.S. IPOs

COMPANY	TICKER	CATEGORY	IPO DATE	TARGET PRICE RANGE (USD M)	OFFERING PRICE (USD)	PRICE 4/30/12 (USD)	CAPITAL RAISED (USD M)	ACTUAL NUMBER OF SHARES	RETURN FROM IPO
Renewable Energy Group	REGI	Industrial/Ag	1/19/12	13-15	10.0	9.07	72.0	7.2	10.3%
Verastem	VSTM	Therapeutics	1/26/12	9-11	10.0	10.38	63.3	6.3	-3.7%
Greenway Medical Technologies	GWAY	Digital Health	2/1/12	11-13	10.0	15.40	77.0	7.7	-35.1%
Cempra	CEMP	Therapeutics	2/3/12	11-13	6.0	7.00	58.0	9.7	-14.3%
ChemoCentryx	CCXI	Therapeutics	2/8/12	14-16	10.0	17.20	63.8	6.4	-41.9%
Ceres	CERE	Agbiotech	2/22/12	21-23	13.0	13.48	65.0	5.0	-3.6%
Merrimack Pharmaceuticals	MACK	Therapeutics	3/28/12	8-10	7.0	7.9	100.1	14.3	-11.4%
Average performance IPO to date									**-14.2%**

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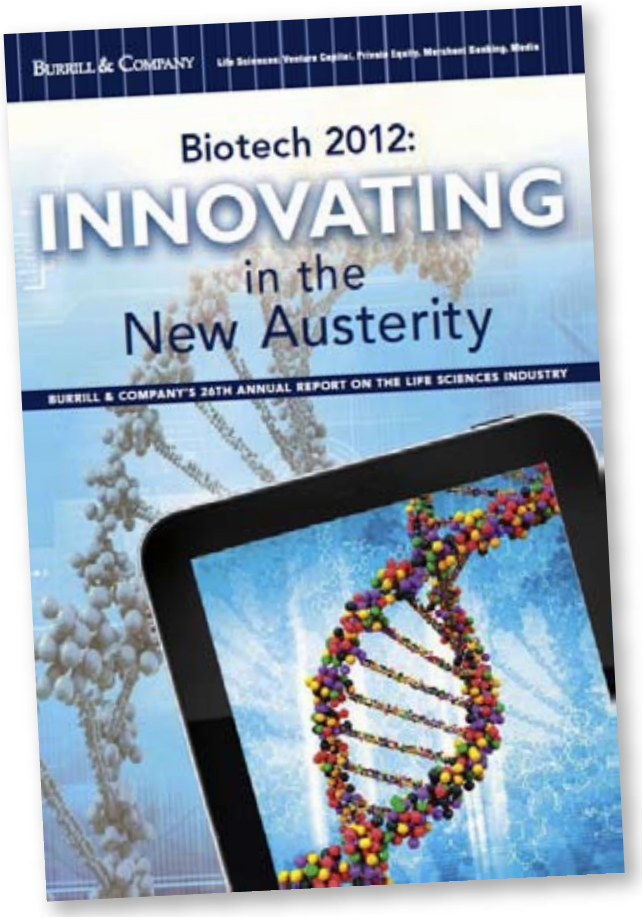

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Financings: Biorenewables Companies Top Fundraising

Two deals account for more than a third of total dollars raised

Algae-based biofuels company Sapphire Energy closed a $144 million series C funding round from backers that included Arrowpoint Partners, Monsanto, and all the major investors in its previous financing, including Bill Gates.

By Marie Daghlian

Two large financings of companies engaged in biorenewables helped lift venture financings for U.S. life sciences companies in April. The two deals—$144 million raised by Sapphire Energy and $110 million raised by Harvest Power—accounted for 35.7 percent of the $722 million raised in the month. In contrast, therapeutics developers, the second biggest sector in total dollar terms, raised $251 million in 26 deals, or 35.3 percent of the total, reflecting a 30 percent increase over the $193 million raised in 11 deals in March.

Although U.S. venture investment in the life sciences is up 17.2 percent on a year-to-date basis compared to 2011 and venture capital raised in April was 12.3 percent higher than what was raised in March, funding for therapeutics developers remains challenging. Private companies in the space have raised $805 million in 69 deals so far this year, an 8.4 percent drop in total capital and a 7.8 percent increase in the number of deals compared to the same period in 2011 when $879 million was raised in 64 deals.

The picture so far this year is reversed for companies developing bio-based products—biofuels and biochemicals. The sector has raised $573 million during the first four months of 2012, a 71 percent increase over the amount raised in the same period last year. Strategic investors play an important part in financing the development of companies in this sector, as huge sums are needed to bring the technologies to commercial scale.

Algae-based biofuels company Sapphire Energy closed a $144 million series C funding round from backers that included Arrowpoint Partners, Monsanto, and all the major investors in its previous financing, including Bill Gates. With this new funding, the San Diego-based biotech has raised more than $300 million from private and public sources since its founding five years ago.

The new capital will be used to support Sapphire's New Mexico "Green Crude Farm," the world's first commercial scale demonstration algae-to-energy facility that will manage the entire value chain of algae-based fuel, from cultivation to production to extraction of ready-to-refine "green crude."

In March 2011, Sapphire and Monsanto entered into a multi-year collaboration on algae-based research projects. Sapphire has also benefited from a $50 million grant from the U.S. Department of Energy and a $54.4 million loan guarantee from the U.S. Department of Agriculture.

Massachusetts-based Harvest Power, which manages organic materials, turning waste into renewable energy as well as soil and fertilizers, closed a $110 million series C financing round led by True North Venture Partners. New investor American Refining and Biochemical also participated with existing investors Kleiner Perkins Caufield & Byers, DAG Ventures, Generation Investment Management, and other investors.

Harvest will use the funding to expand its operations in North America. The company's advanced technology platform processes organic materials, including food scraps, yard trimmings, scrap wood and other organics, to produce renewable energy as well as soil and natural fertilizer products. Harvest sold millions of bags of organic soils and mulches at retail in 2011. The company is building the two largest food waste-to-energy facilities in North America. It expects to complete construction this year.

April 2012 Venture Financings

COMPANY	RAISED (USD M)	PRINCIPAL FOCUS	FINANCING ROUND	INVESTORS
Sapphire Energy	144.0	Industrial/Ag	Series C	Arrowpoint Partners; Monsanto; undisclosed investors
Harvest Power	110.0	Industrial/Ag	Series C	True North Venture Partners; American Refining and Biochemical; Kleiner Perkins Caufield & Byers; DAG Ventures; Generation Investment Management
Alder Biopharmaceuticals	38.0	Therapeutics	Series D	Novo Ventures; Sevin Rosen Funds; Ventures West; WRF Capital; H.I.G. Ventures; Delphi Ventures; TPG Biotech
OvaScience	37.0	Therapeutics	Series B	General Catalyst; Bessemer Venture Partners; Longwood Fund; BBT Capital Management Advisors; Cycad Group; Hunt BioVentures; RA Captial; unnamed global institutional investor; other investors
AlloCure	25.0	Therapeutics	Series B	Lundbeckfond Ventures; SV Life Sciences; Novo A/S
Argos Therapeutics	25.0	Therapeutics	Series D	Forbion Capital; TVM Capital; Lumira Capital; Intersouth Partners; Caisse de depot et placement du Quebec; Morningside Group; aurora Funds
Cerecor	22.0	Therapeutics	Series A	Not disclosed
Inogen	20.0	Medical devices		Novo A/S; other investors
MiRagen Therapeutics	20.0	Therapeutics	Series B	Remeditex Ventures; Atlas Venture; Boulder Ventures; Amgen Ventures; Broadview Ventures
Liazon	18.2	Digital Health	Series D	Bessemer Venture Partners; Fidelity Biosciences; Bain Capital Ventures; Rand Capital; SBIC
WaveTec Vision	16.5	Medical devices		Burrill & Company; Versant Ventures; Accuitive Medical Ventures; De Novo Ventures; Gund Investment Corporation
Telsar Pharma	14.0	Therapeutics	Series A [newco]	InterWest Partners; Sutter Hill Ventures; Astellas Venture Management
Adimab	13.8	Tools/Technology	Series F	Google Ventures; Polaris; SV Life Sciences
CalciMedica	13.2	Therapeutics	Debt and rights	Biogen Idec; Sanderling Ventures; SR One
Silk Road Medical	13.0	Tools/Technology	Series B	The Vertical Group; Warburg Pincus
WhiteGlove Health	12.9	Digital Health	Additional $15.3M in warrants	Burrill & Company; other investors
Principia BioPharma	12.0	Therapeutics	Series A, first tranche of $36M	New Leaf Venture Partners; OrbiMed; Morgenthaler Ventures; SR One; Mission Bay Capital
RainTree Oncology Services	11.1	Other	Series A expansion	Investment partnership of Robert Bass; RainTree management and advisory board members
OrthoAccel Technologies	11.1	Medical devices	Series C	S3 Ventures; Texas Emerging Technology Fund; HealthCare Capital Partners
RainTree Oncology Services	11.0	Digital Health	Series A, part of $33 M round	Not disclosed
Good Start Genetics	10.0	Diagnostics	Series B, first tranche of $14M	Orbimed Advisors; Safeguard Scientifics; SV Life Sciences
Tioga Pharmaceuticals	10.0	Therapeutics	Series B	Thomas, McNerney & Partners; Genesys Capital Partners
Alcresta	10.0	Other	Series A	Bessemer Venture Partners; Frazier Healthcare; Third Rock Ventures
Huya Bioscience	7.6	Therapeutics	Part of $18M round	Not disclosed
PixelOptics	7.0	Medical devices		The Carlyle Group; Delphi Ventures; Life Science Angels; Longitude Capital; Panasonic; SafeGuard Scientifics
MolecularMD	6.0	Diagnostics	Series B	Ballast Point Ventures; Nextech Invest
Ridge Diagnostics	6.0	Diagnostics	Equity, debt, and securities	Not disclosed

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April 2012 Venture Financings

COMPANY	RAISED (USD M)	PRINCIPAL FOCUS	FINANCING ROUND	INVESTORS
Galeanea	6.0	Therapeutics	Equity investment by non-profit	The Stanley Medical Research Institute
GNS Healthcare	5.0	Tools/Technology		Cambia Health Solutions
SynGen	5.0	Medical devices	Series A	Bay City Capital
Axion Health	4.8	Digital Health	Series C	Not disclosed
Regional Diagnostic Laboratories	4.5	Diagnostics	Part of $250M offering	Warburg Pincus
Mersana Therapeutics	4.0	Therapeutics		Not disclosed
Adamis Pharmaceuticals	3.3	Therapeutics		Not disclosed
Thar Energy	3.0	Industrial/Ag	Equity and debt	Not disclosed
CyVek	3.0	Diagnostics		Not disclosed
Aggredyne	3.0	Diagnostics	Series A	Not disclosed
E-Fuel	2.6	Industrial/Ag	Venture debt	Not disclosed
BioVentrix	2.6	Medical devices	Series C	Taglich Brothers; undisclosed angel investors
CV-Sight	2.5	Other	Seed stage	Not disclosed
OncoPep	2.5	Therapeutics		19 investors
Independa	2.4	Digital Health	Seed stage	Not disclosed
Biotix	2.2	Tools/Technology	Part of $2.4 M round	Not disclosed
Fischer Medical Technologies	2.1	Medical devices	Series B	Sequel Venture Partnters
Axikin Pharmaceuticals	2.0	Therapeutics	Part of planned $11M round	Mitsui Ventures; Sanderling Ventures
Oligomerix	2.0	Therapeutics	Series A	Wheatley Partners; Durand Venture Associates
LeukoDx	1.6	Diagnostics	First tranche of $8M	US and EU investors
Pantheryx	1.6	Therapeutics	Seed stage	Sequel Venture Partnters
DermaMedics	1.5	Therapeutics		i2E [a not-for-profit Oklahoma startup accelerator]
Obalon Therapeutics	1.5	Medical devices		Not disclosed
Ocera Therapeutics	1.5	Therapeutics	Part of $3M round	Not disclosed
Sonexa Therapeutics	1.2	Therapeutics		Domain Associates; Alta Partners; Scale Venture Partners
IndiPharm	1.2	Tools/Technology		Not disclosed
Ever Cat Fuels	0.8	Industrial/Ag		Not disclosed
Quantum OPS	0.8	Medical devices		Not disclosed
Corinthian Ophthalmic	0.6	Medical devices		Not disclosed
NexDx	0.5	Diagnostics	Seed stage	City Hill Ventures
Dipexium Pharmaceuticals	0.5	Therapeutics	Series A	Not disclosed
Life Core Technologies	0.3	Medical devices	Seed stage	JumpStart
Elixirgen	0.3	Therapeutics	Seed stage	Not disclosed
Atterocor	0.3	Therapeutics	Venture debt	Frazier Healthcare Ventures
Cadence Biomedical	0.3	Medical devices	Series A2 close	HealthTech Capital; Tech Coast Angels; Frontier Angels; Keiretsu Forum Northwest; Sand Hill Angels; Wings; ACE Fund
Innovative Med Concepts	0.2	Therapeutics	Seed stage	Not disclosed
Cellomics Technology	0.2	Tools/Technology	Seed stage	Not disclosed
Next Health	0.1	Medical devices	Seed stage	Not disclosed
OtoMetrix Medical Technologies	0.1	Diagnostics	Seed stage	Texas Technology Development

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April 2012 Venture Financings

COMPANY	RAISED (USD M)	PRINCIPAL FOCUS	FINANCING ROUND	INVESTORS
RAPA Holdings	0.1	Therapeutics	Seed stage	Texas Technology Development
InEnTec	N/A	Industrial/Ag	Strategic investment	Lakeside Energy [American Securities]
Zephyr Technology	N/A	Digital Health	Series C	3M New Ventures; Alsop Louie Partners; Motorola Solutions Venture Capital; other investors
Wingu	N/A	Tools/Technology	Series A	Google Ventures; Borealis Ventures
DeNovo Sciences	N/A	Tools/Technology	Seed stage	Michigan Pre-Seed Capital Fund
Axonia Medical	N/A	Therapeutics	Seed stage	Michigan Pre-Seed Capital Fund
Blaze Medical Devices	N/A	Medical devices	Seed stage	Michigan Pre-Seed Capital Fund
Angott Medical Products	N/A	Medical devices	Seed stage	Michigan Pre-Seed Capital Fund
Oxus America	N/A	Medical devices	Seed stage	Michigan Pre-Seed Capital Fund
Syzygy	N/A	Tools/Technology	Seed stage	Michigan Pre-Seed Capital Fund
TOTAL U.S VENTURE FINANCINGS	**722.0**			
Intas Pharmaceuticals (india)	57.0	Therapeutics	PE capital ahead of IPO	ChrysCapital
Innovacell Biotechnologie (Austria)	11.0	Therapeutics		Buschier Fides HYBAG; uni Venture
Vivia Biotech (Spain)	9.4	Diagnostics	Equity and debt	Multiinstrument JEREMIE FUND $7.8M loan; Bioanalitica Inversiones $1.6 M equity
Svas Biosana (Italy)	7.9	Tools/Technology		IMI Investimenti
Forus Health (India)	5.0	Digital Health	Series A	Accel Partners; IDG Ventures India
Creo Medical Limited (United Kingdom)	4.9	Medical devices	Series A	Finance Wales; Angel syndicate
Les Laboratoires Nutrition & Cardiometabolisme (France)	4.6	Therapeutics	Series B	Seventure Partners; IRDI; GSO Capital; Aqui-Invest; EPI
Aleva Neurotherapeutics (Switzerland)	4.4	Medical devices	Series B	Banexi Venture Partners; BioMedInvest; BB Biotech Ventures III; Initiative Capital Romandie
Imaxio (France)	3.8	Therapeutics		Pradeyrol Developpement
Trinean NV (Belgium)	3.6	Tools/Technology		Existing investors
Arterial Remodeling Technologies (France)	2.9	Medical devices		Not disclosed
Plexpress (Finland)	2.3	Tools/Technology		Conor Technology Fund; VTT Ventures; Aloitusrahasto Vera; Helsinki University Fund; Tekes
conoGenetix biosciences (Germany)	2.0	Therapeutics	Series A	Mey Capital Matrix; BioM
ImmunoGenes (Switzerland)	1.1	Therapeutics		PolyTechnos Venture Partners; LSWorks; existing investors
Coridon Pty (Australia)	1.0	Therapeutics		Allied Healthcare Group
ImmunAid Pty (Australia)	1.0	Tools/Technology		Not disclosed
Albert Medical Devices (United Kingdom)	0.5	Medical devices	Seed stage	Spark Ventures
TOTAL NON-U.S. VENTURE FINANCINGS	**122.4**			
TOTAL APRIL VENTURE FINANCINGS	**843.4**			

April 2012 Public Financings

	COMPANY	TICKER	AMOUNT RAISED (USD M)	PRINCIPAL FOCUS
IPOS				
	Osprey Medical	ASX:OSP	20.8	Medical devlices
	TOTAL APRIL IPOS		**20.8**	
PIPES				
	PhotoMedex	PHMD	12.4	Therapeutics
	DARA BioSciences	DARA	10.3	Therapeutics
	Imprimis Pharmaceuticals	OTC:IMMY	7.9	Therapeutics
	Titan Pharmaceuticals	OTC:TTNP	5.5	Therapeutics
	EnteroMedics	ETRM	5.1	Medical devices
	VirtualScopics	VSCP	3.0	Tools/Technology
	BioRestorative Therapies	OTC:BRTX	2.1	Therapeutics
	Rosetta Genomics	ROSG	1.4	Diagnostics
	Nile Therapeutics	OTC:NLTX	1.3	Therapeutics
	Pressure BioSciences	OTC:PBIO	0.5	Tools/Technology
	Total U.S. PIPEs		**49.5**	
	Henan Taloph (China)	SHA: 600222	64.4	Therapeutics
	BioInvent International (Sweden)	SSE:BINV	15.9	Therapeutics
	InspireMD (Israel)	OTC:NSPR	11.7	Medical devices
	biOasis Technologies (Canada)	TSX-V:BTI	2.5	Therapeutics
	Probiomics (Australia)	ASX:PCC	2.4	Therapeutics
	OctoPlus (Netherlands)	AMS:OCTO	1.6	Therapeutics
	Critical Outcome Technologies (Canada)	TSX-V:COT	1.3	Therapeutics
	Genfit (France)	Euronext:ALGFT	0.8	Therapeutics
	RepliCel Life Sciences (Canada)	OTC:REPCF	0.6	Therapeutics
	Allergy Therapeutics (United Kingdom)	LSE:AGY	0.3	Therapeutics
	TOTAL NON-U.S. PIPES		**101.5**	
	TOTAL APRIL PIPES		**151.0**	
FOLLOW-ONS				
	Clovis Oncology	CLVS	75.0	Therapeutics
	Pacira Pharmaceuticals	PCRX	67.3	Therapeutics
	ArQule	ARQL	60.0	Therapeutics
	Transcept Pharmaceuticals	TSPT	40.5	Therapeutics
	PhotoMedex	PHMD	27.6	Therapeutics
	Derma Sciences	DSCI	19.7	Therapeutics
	Galena Biopharma	GALE	14.6	Therapeutics
	TearLab	TEAR	12.4	Diagnostics
	TOTAL U.S. FOLLOW-ONS		**317.1**	

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April 2012 Public Financings

COMPANY	TICKER	AMOUNT RAISED (USD M)	PRINCIPAL FOCUS
Novadaq Technologies (Canada)	NVDQ	35.1	Medical devices
TOTAL NON-U.S. FOLLOW-ONS		**35.1**	
TOTAL APRIL FOLLOW-ONS		**352.2**	
OTHER EQUITY			
Theravance	THRX	212.9	Therapeutics
Pernix Therapeutic Holdings	AMEX:PTX	21.3	Therapeutics
Vision-Sciences	VSCI	15.0	Medical devices
Cascade Technologies	OTC:CSDT	0.6	Medical devices
TOTAL U.S. OTHER EQUITY		**249.8**	
Newron Pharmaceuticals	SIX:NWRN	26.7	Therapeutics
Bellus Health	TSX:BLU	17.4	Therapeutics
Reneuron Group	LSE:RENE	9.9	Therapeutics
ValiRx	AIM:VAL	1.4	Therapeutics
Galapagos	Euronext:GLPG	1.4	Therapeutics
TOTAL NON-U.S. OTHER EQUITY		**56.8**	
TOTAL APRIL OTHER EQUITY		**306.6**	
DEBT			
Teva Pharmaceuticals (Israel)	TEVA	1,788.8	Biopharmaceuticals
China Cord Blood	NYSE:CO	65.0	Cord blood banking
TOTAL NON-U.S. DEBT		**1,853.8**	
TOTAL APRIL DEBT		**1,853.8**	
OTHER DEBT			
Thermo Fisher Scientific	TMO	2,000.0	Unsecured revolving credit facility
EnteroMedics	ETRM	20.0	Growth capital loan
Delcath Systems	DCTH	20.0	Revolving credit facility
NanoString Technologies	Private	15.0	Senior credit facility
PolyMedix	OTC:PYMX	12.0	Secure credit facility
PharmAthene	PIP	7.5	Senior secured credit facility
Bacterin International	AMEX:BONE	5.0	Credit facility
HepatoChem	Private	0.3	Loan
Total U.S. Other Debt		2,079.8	
Teva Pharmaceuticals	TEVA	1,200.0	JPY 100B senior unsecured term loan facility
Bioniche Life Sciences	TSX:BNC	20.0	Term loan from Capital Royalty
Warnex	TSX-V:WNX	1.0	Credit facility
TOTAL NON-U.S. OTHER DEBT		**1,221.0**	
TOTAL APRIL OTHER DEBT		**3,000.8**	

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April 2012 Grants and Contracts

COMPANY	AMOUNT RAISED (USD M)	PRINICPAL FOCUS	FUNDING AGENCY
GRANTS			
Western Plains Energy	5.0	Biofuel project	USDA grant for anaerobic digester
Thermalin Diabetes	4.5	Next-gen insulin	National Institutes of Health
MitoChem Therapeutics	2.0	Retinal degenerative diseases	The Foundation Fighting Blindness
Biodico	2.0	Biodiesel project	California Energy Commission
Islet Sciences	1.8	Islet cell transpantation	National Institutes of Health
EpiVax	1.5	Immunotherapeutics	HIH NIDDK SBIR
Synta Pharmaceuticals	1.0	Hsp90 inhibitor clinical trial	Multiple Myeloma Research Consortium
Inovio Pharmaceuticals	0.8	DNA bioterror vaccines	Department of Defense SBIR
NeuroSigma	0.7	Brain stent for aneurysms	NIH NINDS Phase 1 STTR
NeurOp	0.7	Schizophrenia research	National Institutes of Health
Winston Pharmaceuticals	0.4	Pain management	NIH NINDS Phase 1 SBIR
Islet Sciences	0.3	Islet cell transpantation	Iacocca Foundation
Catabasis Pharmaceuticals	0.1	Muscular dystrophy	Muscular Dystrophy Association
KineMed	N/A	HDL mimetic to reverse atherosclerosis	NIH Rapid Access to Intervention Development
3Scan	N/A	3-D reconstruction of brain tissue	Thiel Foundation Breakout Labs
Arigos Biomedical	N/A	Organ cooling methods	Thiel Foundation Breakout Labs
Immusoft	N/A	Reprogramming immune cells	Thiel Foundation Breakout Labs
Inspirotec	N/A	Collection and identification of airborne organisms	Thiel Foundation Breakout Labs
Longevity Biotech	N/A	Artificial protein technology	Thiel Foundation Breakout Labs
Positron Dynamics	N/A	Positron technology applicable toward medical imaging	Thiel Foundation Breakout Labs
ViThera Pharmaceuticals	N/A	Inflammatory bowel disease	J&J COSAT
Total U.S. Grants	**20.8**		
Pluristem Therapeutics (Israel)	3.1	Placenta-based cell therapies	Office of Chief Scientist
BioMarCare Technologies (Israel)	0.9	Cancer biomarkers	Israel-U.S. Binational Industrial Research and Development Foundation
BioMarCare and Ariadne (Israel/US)	0.9	Biomarkers of cancer drug response	Binational Industrial Research and Development Foundation
TOTAL NON-U.S. GRANTS	**4.9**		
TOTAL APRIL GRANTS	**25.7**		
CONTRACTS			
Aeolus Pharmaceuticals	9.1	Radiation countermeasures	BARDA, second year of 5-year, $118M
TOTAL APRIL CONTRACTS	**9.1**		

M&A and Partnering: Buyouts Pick Up Global Market Share

After a slow beginning, month ends with $29.1 billion in M&A

By Marie Daghlian

Predictions for increased M&A activity in April held true as $20.6 billion in life sciences deals were announced in the last week of the month, and another $8.5 billion as the month closed, with several deals focused on global market expansion.

The battle to acquire Pfizer's nutrition business was won by Nestlé, the maker of Gerber baby foods, in an effort to increase its share in the global infant nutrition market. Nestle sealed the deal by offering $11.85 billion, a price higher than analysts' expectations of between $9 and $10 billion, to fend off rival bids by French food giant Danone and Mead Johnson Nutrition. It is the Swiss health and wellness company's largest acquisition ever, expanding its presence in emerging markets where 85 percent of Pfizer Nutrition's sales come from. The combined businesses will command a 10 percent share in China and a 38 percent share in the Middle East and Africa, according to Euromonitor International. Pfizer announced its intention to sell its infant nutrition business, acquired through its 2009 purchase of Wyeth, in July 2011 and narrow its efforts to focus on biopharmaceuticals.

The battle to acquire Pfizer's nutrition business was won by Nestlé, the maker of Gerber baby foods, in an effort to increase its share in the global infant nutrition market.

The acquisition of Actavis Group, a Swiss generics powerhouse, also drummed up significant interest as investors speculated about which bidder would win the company. Watson Pharmaceuticals came out on top, agreeing to pay $5.6 billion for the privately-held pharma. The acquisition will make Watson the third largest global generics company with $8 billion in combined revenues, and significantly increase its market presence outside the United States. This too was a play to grab global market share. Actavis had 2011 revenues of approximately $2.5 billion and has a commercial presence in more than 40 countries and markets more than 1,000 products globally, with another 300 in its development pipeline.

"In a single, commercially compelling transaction, we more than double Watson's international access and strengthen our commercial position in key established European markets as well as exciting emerging growth markets, including Central and Eastern Europe and Russia," says Paul Bisaro, president and CEO of Watson. "The transaction achieves Watson's stated strategic objective of expanding and diversifying our business into a truly global company. Once the transaction is completed, approximately 40 percent of our generic revenues will come from markets outside of the U.S."

Hologic's $3.7 billion deal to acquire molecular diagnostics maker Gen-Probe enhances its growing diagnostics portfolio and expands its global marketing opportunities. The combined company will have revenues of approximately $2.4 billion and an expanded global presence in more than 150 countries. In particular, Hologic has over 500 employees focused on diagnostics in China. The deal will enable Hologic to combine Gen-Probe's automation platforms and extensive portfolio of sexually transmitted disease tests with Hologic's strong global market presence and distribution–all targeting women's health.

Amgen made its play in Turkey, agreeing to pay $700 million to acquire 95.6 percent of privately-held Mustafa Nevzat Pharmaceuticals. The deal significantly expands Amgen's presence in Turkey and the surrounding region, which are large, fast-growing, priority markets for the company. Amgen established an affiliate in Turkey in 2010 and currently markets two products there. The deal is part of a broad international expansion strategy that includes its 2011 acquisition of the Brazilian pharmaceutical Bergamo. Amgen's emerging market sales were $250 million in 2011, a number the company wants raise to $1 billion by 2015.

A 90-year-old company, Mustafa Nevzat is the leading supplier of pharmaceuticals to the hospital sector and a major supplier of injectable medicines in Turkey. It also has a successful and fast growing export business. The company had revenues of approximately $200 million in 2011 and has grown on average at double-digit rates in local currency over the past five years.

Takeda pharmaceuticals expanded its U.S. presence and added to its gout portfolio with the acquisition of privately-held URL Pharma for $800 million upfront and future performance-based contingent earn out payments. It is the third major U.S. life sciences acquisition by a Japanese company so far this year as Japanese companies continue to look for overseas acquisitions.

The deal for the 66-year-old Philadelphia based pharmaceutical, the third acquisition for Takeda in less than a year, gives the Japanese drug giant a company with nearly $600 million in revenues in 2011. It follows Takeda's $13.7 billion deal for Swiss biopharmaceutical Nycomed in May 2011 and its $310 million buy of U.S. biotech Intellikine in December.

"This acquisition expands Takeda's gout treatment portfolio and leverages our expertise in primary care," says Douglas Cole, president, Takeda Pharmaceuticals U.S.A. "Gout affects more than eight million Americans, and the prevalence of gout is rising." The acquisition secures for Takeda URL's lead product, Colcrys, which was approved in late 2009 to treat and prevent gout flares. It had sales of more than $430 million in 2011. It also adds Ulo-

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M&A and Partnering

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ric, a drug used to lower blood uric acid levels in adults with gout, to Takeda's product line-up.

Japanese companies have been actively buying overseas firms to expand their market reach, accounting for $21.1 billion in acquisitions in 2011 and another $5.6 billion so far this year that included two of the biggest deals of the first quarter—Dainippon Sumitomo's acquisition of Boston Biomedical and Asahi Kasei's purchase of Zoll Medical.

While GlaxoSmithKline's bid for Human Genome Sciences and Roche's bid for Illumina were spurned, AstraZeneca struck a deal with Ardea Biosciences to acquire the San Diego-based biotech for $1.3 billion. The deal marks AstraZeneca's biggest acquisition since it paid $15.7 billion dollars for MedImmune in 2007 and is expected to be the first in a series of acquisitions designed to help revamp its lagging pipeline, which has suffered a series of setbacks and will be hit by the patent expirations of two of its best-selling drugs in 2014, Nexium for ulcers and the antipsychotic Seroquel.

The $32 per share deal for Ardea represents a 54 percent premium to the biotech's closing share price on the day before the announcement was made and gives AstraZeneca rights to Ardea's lead drug candidate, lesinurad, a late-stage drug currently in development for the treatment of joint inflammation in gout patients. AstraZeneca will also acquire Ardea's promising next-generation gout and cancer compounds.

April 2012 M&A

ACQUIRER	COUNTRY	TARGET	COUNTRY	DEAL VALUE (USD M)	ASSET STAGE	PRINCIPAL FOCUS
Nestle	Switzerland	Pfizer Nutrition	United States	11,850.0		Infant nutrition
Watson Pharmaceuticals	United States	Actavis Group	Switzerland	5,617.0		Generics
Hologic	United States	Gen-Probe	United States	3,720.0		Diagnostics
AstraZeneca	United Kingdom	Ardea Biosciences	United States	1,260.0	Phase 3	Gout
Takeda Pharmaceutical	Japan	URL Pharma	United States	800.0	Marketed	Gout
Corning	United States	BD Biosciences-Discovery Labware	United States	730.0		Tools/Technology
Amgen	United States	Mustafa Nevzat Pharmaceuticals	Turkey	700.0		Pharmaceuticals
Jazz Pharmaceuticals	United States	EUSA Pharma	United Kingdom	700.0	Marketed	Specialty pharma
Haemonetics	United States	Pall's blood business	United States	551.0		Medical devices
Genstar Capital	United States	eResearch Technology	United States	400.0		Tools/Technology
Forest Laboratories	United States	Janssen's Bystolic	United States	357.0	Marketed	Cardiovascular
Covidien	Ireland	Oridion Systems	Israel	346.0		Respiratory devices
Amgen	United States	KAI Pharmaceuticals	United States	315.0	Phase 3	Endocrine
Biomet	United States	DePuy Orthopaedics (J&J)	United States	280.0		Orthopedic devices
Aspen Pharmacare	South Africa	GlaxoSmithKline's OTC brands	United Kingdom	263.0		OTC medicines
Nabi Biopharamaceuticals	United States	Biota Holdings Limited	Australia	250.0		Bioharmaceuticals
Spectrum Pharmaceuticals	United States	Allos Therapeutics	United States	206.0	Marketed	Cancer
Shire	Ireland	Pervasis Therapeutics	United States	200.0	Phase 2	Cell-based therapies
Water Street Healthcare Partners	United States	Breg (OrthoFix International)	United States	157.5		Medical devices
Valeant Pharmaceuticals	Canada	Atlantis Pharma assets	Mexico	71.0		Branded generics
Johnson & Johnson	United States	Angiotech Pharmaceuticals	Canada	62.0	Marketed	Wound repair
Natus Medical	United States	CareFusion's neurodiagnostic unit	United States	58.0		Neurodiagnostics

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April 2012 M&A

ACQUIRER	COUNTRY	TARGET	COUNTRY	DEAL VALUE (USD M)	ASSET STAGE	PRINCIPAL FOCUS
Renhe Pharmacy	China	Jiangxi Yaodu Zhangshu Pharmacy and Jiangxi Yaodu Pharmacy	China	46.0		OTC medicines
Cell Therapeutics	United States	S*Bio's JAK2 inhibitor	Singapore	30.0	Phase 2	Rare disease
Haemonetics	United States	Hemerus Medical	United States	27.0		Blood collection
Nolato	Sweden	Cope Allman Jaycare	United Kingdom	26.4		Pharmaceutical packaging
Arrowhead Research	United States	Alvos Therapeutics	United States	25.6		Tools/Technology
Heartware International	United States	World Heart	United States	8.0		Cardiac devices
Mediware	United States	Cyto Management System	Netherlands	2.2		Patient tracking
Sequenom	United States	Helicos BioSciences' IP	United States	1.3		Prenatal diagnostics
Daiichi Sankyo	Japan	Shanghai Xinshengyuan Pharma	China	N/A		Generics importer
Bruker	United States	SkyScan	Belgium	N/A		Tools/Technology
Sigma-Aldrich	United States	Research Organics	United States	N/A		Tools/Technology
Pentax (Hoya Corporation)	Japan	Digital Endoscopy	Germany	N/A		Endoscopic imaging
GE Healthcare (GE)	United States	SeqWright	United States	N/A		Genomics
Cook Group	United States	General BioTechnology	United States	N/A		Tools/Technology
3M	United States	CodeRyte	United States	N/A		Technology
Valeant Pharmaceuticals	Canada	Pedinol Pharmacal	United States	N/A		Specialty pharma
Piramal Healthcare	India	Bayer's imaging portfolio	Germany	N/A	Phase 3	Molecular imaging
Par Pharmaceuticals	United States	Handa Pharmaceuticals' drug rights	United States	N/A		Generics
IntegenX	United States	GEHealthcare's DNA consumables	United States	N/A		Tools/Technology
BioTime and LifeMap Sciences	United States	XenneX	United States	N/A		Genomics
IMS Health	United States	DecisionView	United States	N/A		Clinical trials software
VWR Interantional	United States	basan Germany	Germany	N/A		Supply/service
Riemser Arzneimittel	Germany	anwerina AG	Switzerland	N/A		Musculoskeletal
Covidien	Ireland	PolyTouch Medical	Israel	N/A	Marketed	Medical devices

April 2012 Partnering

COMPANY/LICENSER	COMPANY/LICENSEE	DEAL TYPE	TOTAL POTENTIAL DEAL VALUE (USD M)	UPFRONT PAYMENT (USD M)	ASSET PHASE	PRINCIPAL FOCUNITED STATES
Endocyte	Merck	License	1,000.0	120	Phase 3	Cancer
Epyzyme	Celgene	Partnership	250.0	90	Preclinical	Epigenetic drug discovery
Five Prime Therapeutics	GlaxoSmithKline (United Kingdom)	Alliance	223.5	30	Discovery	Respiratory
MannKind	Tolero Pharmaceuticals	License	130.0	N/A	Preclinical	Cancer
Eli Lilly	Vanda Pharmaceuticals	License	100.0	1	Phase 2	Neurology
Elevance Renewable Sciences	Wilmar Indonesia (Singapore)	Collaboration	80.0			Aviation biofuels
The Medicines Company	AstraZeneca (United Kingdom)	Collaboration	80.0	60	Marketed	Heart disease
Advanced Liquid Logic	GenMark Diagnostics	License	3.0			Diagnostic
Dyax	GE Healthcare	License	N/A	N/A		Diagnostics
Eisai (Japan)	Minophagen Pharmaceutical (Japan)	License	N/A		Marketed	Cancer
Synageva BioPharma	Mitsubishi Tanabe Pharma (Japan)	Collaboration	N/A	9	Preclinical	Rare diseases
PolyTherics (United Kingdom)	Spirogen (United Kingdom)	Collaboration	N/A		Discovery	Antibody drug conjugates
Amgen	AstraZeneca (United Kingdom)	Collaboration	N/A	50	VarioUnited States	Monoclonal antibodies
Bessor Pharma	AMRI	License option	N/A		Phase 1	Cancer
Albireo AB (Sweden)	Ajinomoto Pharmaceuticals (Japan)	License	N/A		Phase 2	GI disorders
Protein Genomics	American CryoStem	Collaboration	N/A			Wound repair
Ridge Diagnostics	Ameritox	License	N/A			Diagnostics
KeyGene (Netherlands)	Incotec (Netherlands)	Collaboration	N/A			Agbiotech
Metabolon	Charles River Laboratories	Partnership	N/A			Cancer research
Rosetta Green	Bayer CropScience (Germany)	License	N/A			Agbiotech
Solazyme	Bunge	Joint venture	N/A			Bio-based oils
Presage Biosciences	Millenium (Takeda-Japan)	Collaboration	N/A			Cancer research
Chiome Bioscience (Japan)	GlaxoSmithKline (United Kingdom)	Collaboration	N/A		Discovery	Antibody generation
Newron Pharmaceuticals (Italy)	Zambon (Italy)	License option	N/A	N/A	Phase 3	Parkinson's disease
Bipharma (Netherlands)	Biofrontera (Germany)	License	N/A	0.1	Marketed	Dermatology
Allergan	Biofrontera (Germany)	License	N/A	1.5	Marketed	Dermatology
AnaptysBio	Celgene	Partnership	N/A		Discovery	Cancer, inflammation
Vitruvian Biomedical	Nuron Biotech	License	N/A		Preclinical	Alzheimer's vaccine
Ventana Medical Systems (Roche-Switzerland)	Seattle Genetics and Millenium (Takeda-Japan)	Collaboration	N/A			Companion diagnostics
AnGes MG (Japan)	BioLeaders (South Korea)	Partnership	N/A			Vaccine against hypertension

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April 2012 Partnering

COMPANY/LICENSER	COMPANY/LICENSEE	DEAL TYPE	TOTAL POTENTIAL DEAL VALUE (USD M)	UPFRONT PAYMENT (USD M)	ASSET PHASE	PRINCIPAL FOCUNITED STATES
Conformetrix (United Kingdom)	AstraZeneca (United Kingdom)	Collaboration	N/A			Discovery research
Metabolon	Takeda Pharmaceutical (Japan)	Collaboration	N/A			Biomarkers
Janssen R&D Ireland	Bristol-Myers Squibb	Collaboration	N/A		Phase 2	Hepatitis C
Adimab	Gilead Sciences	Collaboration	N/A		Discovery	Antibody generation
Abbott Laboratories	St. Jude Medical	Alliance	N/A			Cardiovascular products
Timesco of London (United Kingdom)	Dehaier Medical Systems (China)	Agreement	N/A			Medical devices distribution
Amgen	Bayer (Germany)	Partnership	N/A		Preclinical	Cancer
Nantworks	Verizon	Partnership	N/A			Health IT
Novozymes (Denmark)	Syngenta (Switzerland)	Partnership	N/A			Agbiotech
Astellas Pharma (Japan)	Drais Pharmaceuticals	Partnership	N/A	N/A	Phase 2a	Gastrointestinal
SK Biopharmaceuticals (South Korea)	Hanmi Pharmaceuticals (South Korea)	Partnership	N/A		Pre-NDA filing	Epilepsy
Ocimum Biosolutions (India)	Malaysian company	Joint venture	N/A			Bioinformatics
Somaxon Pharmaceuticals	CJ CheilJedang (South Korea)	Collaboration	N/A	0.6	Marketed	Insomnia
FAES Farma (Spain)	Invida (Menarini-Italy)	License	N/A		Marketed	Allergies
Artes Biotechnology (Germany)	Crucell (J&J)	Partnership	N/A			Vaccines
Kadimastem (Israel)	Merck KGaA (Germany)	Agreement	N/A		Discovery	Multiple sclerosis
Horizon Discovery (United Kingdom)	H3 Biomedicine	Collaboration	N/A		Discovery	Cancer

Company/Academic/Non-Profit Partnerships in April 2012

COMPANY	COUNTRY	ACADEMIA/NON-PROFIT	COUNTRY	PRINCIPAL FOCUS
Quintiles	United States	American Diabetes Association	United States	Medication monitoring
Pathway Genomics; 23andMe	United States	Harvard Medical School; University of Michigan	United States	Genetic risk study
AstraZeneca	United Kingdom	SciLifeLab	Sweden	Genomics
Sanofi	France	Michael J Fox Foundation	United States	Parkinson's disease
Ezose Sciences	United States	Hirosaki University	Japan	Cancer biomarkers
Origin Agritech	China	Henan Agricultural University	China	Corn genomics institute
Dexcom	United States	JDRF	United States	Artificial pancreas project
Cerus Corporation	United States	New York Blood Center	United States	Blood products collaboration
Novo Nordisk	Denmark	Kennedy Institute of Rheumatology	United Kingdom	Autoimmune biomarkers

APRIL PIPELINE

Clinical Trials in April 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
PHASE 3					
OXiGENE	NASDAQ: OXGN	Zybrestat	Thyroid cancer	Positive	A subgroup analysis compared patients on the FACT study who underwent prior cancer-related surgery (thyroidectomy) followed by fosbretabulin (Zybrestat) and chemotherapy to patients without surgery who received chemotherapy alone. The results showed that improvements were observed in median survival and one-year survival for patients with prior thyroidectomy followed by fosbretabulin and chemotherapy.
Macrocure	Private	CureXcell	Hard-to-heal ulcers	Positive	Trial results, presented at the Symposium on Advanced Wound Care Spring conference support the broad spectrum efficacy and safety of CureXcell, and included 68 percent and 81 percent and complete closure rates for diabetic foot ulcers and venous ulcers, respectively, at 24 weeks. Overall the complete closure rate for all ulcers was about 71 percent and the median time to complete closure was about 12 weeks.
Chelsea Therapeutics	NASDAQ: CHTP	Northera	Low-blood-Pressure	Positive	Overall, the results of the study showed droxidopa demonstrated statistical improvement compared to placebo in the trial for the primary clinical endpoint (OHQ composite score), which provides a comprehensive measure of symptoms for neurogenic orthostatic hypotension (known as Neurogenic OH or NOH). The results were consistent irrespective of gender, concomitant medications or primary diagnosis.
Baxter International	NYSE: BAX	Gammagard liquid	Multifocal motor neuropathy	Positive	Gammagard Liquid met its two primary efficacy endpoints, demonstrating a 3.75 percent increase in mean grip strength of the more affected hand during treatment, as compared to a 31.38 percent decrease in mean grip strength with placebo administration. The study also found that a greater proportion of patients who received placebo experienced progressive disability, as assessed by the Guy's Neurological Disability Score compared to those receiving Gammagard Liquid (35.7 percent vs. 11.9 percent, respectively).
Forest Laboratories; Pierre Fabre Medicament	NYSE: FRX; Private	levomilnacip-ran	Major depressive disorder	Positive	Treatment with levomilnacipran significantly reduced depression symptoms in patients with MDD compared to placebo, as measured by the Montgomery-Asberg Depression Rating Scale - Clinician Rated (MADRS-CR). This is the third, positive phase 3 study of levomilnacipran in adults with MDD. Further analyses of the data are ongoing. The companies anticipate filing a new drug application with the FDA in the third quarter of the calendar year 2012.
Piramal Healthcare Limited	NSE: PIRHEALTH BSE: 500302	florbetaben	Detection of Alzheimer's	Positive	The results of a phase 3 study showed reliability in the detection of beta-amyloid in the living brain. In order to prove that the florbetaben PET scan detects beta-amyloid in the brain, the global phase 3 study directly compared six brain regions in the PET scans to respective brain regions of the same subjects after death during autopsy.Comparison of the visual assessment method proposed for florbetaben for clinical practice with the post mortem diagnosis revealed a sensitivity of 100 percent and a specificity of 92 percent. Sensitivity is the percentage of actual positives that are correctly identified as positive, and specificity is the percentage of negatives that are correctly identified.

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Clinical Trials in April 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Nymox Pharmaceutical	NASDAQ: NYMX	NX-1207	Benign prostatic hyperplasia	Positive	NX-1207 has been shown to improve the signs and symptoms of BPH, producing improvements which reached statistical significance compared to double-blinded placebo and study controls. A single administration of NX-1207 2.5 mg has produced on average improvements in the standardized BPH symptom score (8-10 points at 90 days) that were approximately double that reported for currently approved BPH drugs (3-5 points).
Sanofi	NYSE: SNY	Lemtrada	Multiple sclerosis	Positive	Accumulation of disability was significantly slowed in patients with multiple sclerosis (MS) who were treated with alemtuzumab versus Rebif (high dose subcutaneous interferon beta-1a), as measured by the Expanded Disability Status Scale (EDSS), a standard assessment of physical disability progression. In addition, significant improvement in disability scores was observed in some patients treated with alemtuzumab from baseline and compared to patients treated with Rebif, suggesting a reversal of disability in these patients. In the trial, patients with pre-existing disability treated with alemtuzumab were more than twice as likely to experience a sustained reduction in disability than patients given Rebif.
Omthera Pharmaceuticals	Private	Epanova	Treatment of patients with very high triglycerides	Positive	The phase 3 clinical trial randomized 399 subjects with triglyceride levels of 500-2000 mg/dl to 2, 3, or 4 grams of Epanova, or 4 grams of olive oil for a total of 12 weeks of treatment. The primary endpoint of the trial was the percentage change in triglyceride level from baseline to week 12, and the secondary endpoint was the reduction in non-HDL-cholesterol. The top-line results demonstrated highly statistically significant reduction of triglycerides in all dose groups, with median decreases in triglycerides from baseline to end of treatment of approximately 26 percent in the 2 gram cohort and 31 percent for those subjects on the 4 gram dose. Furthermore, Epanova appeared safe and well tolerated, with discontinuation rates due to adverse events, primarily gastrointestinal, ranging from 5 percent to 7 percent across all dosing groups.
Biogen Idec	NASDAQ: BIIB	BG-12	Relapsing-remitting multiple sclerosis	Positive	In its second phase 3 trial, BG-12 demonstrated efficacy across a variety of clinical and radiological outcome measures, as well as favorable safety and tolerability profiles. These data, along with results from BG-12's first phase 3 study, DEFINE, were included in regulatory applications that were submitted to U.S. and EU regulatory agencies early this year.
Novartis	NYSE: NVA	alisporivir	Hepatitis-C	Fail	The development program of an experimental drug for the treatment of Hepatitis C has been placed on hold by U.S. regulators after the death of a patient, which may be linked the drug. A small number of patients treated with the DEB025 drug or alisporivir developed pancreatitis, which is believed to be a contributing factor to the death.
Kythera Biopharmaceuticals	Private	ATX-101	Reduction of unwanted fat	Positive	In a top-line analysis of the trial data, ATX-101 was well tolerated and met the pre-specified primary endpoints by demonstrating statistically significant reduction of moderate to severe submental fat, compared to placebo, as assessed by: a 5-point Clinician-Reported Submental Fat Rating Scale (CR-SMFRS) ($p<0.001$) and a 7-point Subject Satisfaction Rating Scale (SSRS) ($p<0.001$).

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Clinical Trials in April 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Keryx Biopharmaceuticals	NASDAQ: KERX	ferric citrate	Hyperphos-phatemia	Positive	The phase 3 study, conducted in Japan, was an open-label, randomized study evaluating the efficacy and safety of ferric citrate against an active control, sevelamer hydrochloride, over 12 weeks in hemodialysis patients with hyperphosphatemia. In the top-line results, which evaluated the change of serum phosphorus from baseline, the primary endpoint of efficacy met non-inferiority to sevelamer hydrochloride. Furthermore, there were no clinically significant findings on safety and tolerability of ferric citrate within the treatment period.
Merck	NYSE: MRK	Victrelis	Anemia	Mixed	The results of this study show there was no difference in SVR rates among these anemia management strategies and that ribavirin dose reduction should be the primary strategy for managing anemia in patients taking Victrelis combination therapy.
Abbott	NYSE: ABT	levodopa-carbidopa intestinal gel (LCIG)	Parkinson's Disease	Positive	The study showed that patients treated with LCIG for 12 weeks reported clinically meaningful and statistically significant improvements in "off" time compared to levodopa-carbidopa immediate release (IR) tablets, without increasing troublesome dyskinesia. "Off" time refers to the periods of poor mobility, slowness and stiffness experienced by patients with Parkinson's disease.
Corcept Therapeutics	NASDAQ: CORT	Korlym	Cushings Syndrome	Positive	The recently published SEISMIC study showed that Korlym significantly improved diabetes control (blood glucose levels, insulin sensitivity and Hemoglobin A1C), promoted weight loss and decreases in waist circumference, and improved body composition, mood and cognition in patients with Cushing's syndrome.Though clinically significant adrenal insufficiency is a potential side effect of glucocorticoid receptor antagonism, it was uncommon during this study.
Spectrum Pharmaceuticals	NASDAQ: SPPI	apaziquone	Bladder cancer	Fail	On the drug test, Spectrum said two clinical trials of its potential bladder cancer treatment apaziquone failed to show a statistically significant difference in the rate of tumor recurrence at two years. But the company said pooled data from the studies did show a statistically significant treatment effect.
Sucampo Pharmaceuticals	NASDAQ: SCMP	lubiprostone	Opioid-induced Bowel Dysfunction	Positive	The company stated that the open-label study conducted over a period of 36 weeks did not reveal any serious adverse events that were considered drug-related. Adverse events were categorized in the study as mild, moderate or severe. Severe events of nausea and diarrhea each occurred in 0.5 percent of patients. Overall, only 3.4 percent and 5.2 percent of patients withdrew from the trial due to lack of efficacy or adverse events, respectively, over the 9-month treatment period.
Onyx Pharmaceuticals	NASDAQ: ONXX	regorafenib	Metastatic and/ or unresectable gastrointestinal stromal tumors	Positive	The trial met its primary endpoint of statistically significant improvement in progression-free survival. In this trial, the safety and tolerability of regorafenib were consistent with what was seen in earlier studies.
Keryx Biopharmaceuticals	NASDAQ: KERX	perifosine	Colorectal cancer	Fail	The clinical trial evaluating perifosine (KRX-0401) + capecitabine (Xeloda) in patients with refractory advanced colorectal cancer did not meet the primary endpoint of improving overall survival versus capecitabine + placebo.This phase 3 trial was conducted pursuant to a Special Protocol Assessment (SPA) agreement with the FDA. 468 patients at sixty-five U.S. sites participated in this study.

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Clinical Trials in April 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Genentech	SIX: RO, ROG OTCQX: RHHBY	trastuzumab emtansine	Breast Cancer	Positive	The study enrolled people with HER2-positive metastatic breast cancer (mBC) who had previously received treatment with Herceptin (trastuzumab) and a taxane chemotherapy. The study showed people who received trastuzumab emtansine lived significantly longer without their disease getting worse (progression-free survival) compared to those who received lapatinib plus Xeloda (capecitabine). The safety profile of trastuzumab emtansine was consistent with that seen in previous studies.
Shire	LSE: SHP NASDAQ: SHPGY	SPD476, MMX	Diverticulitis	Fail	The study, conducted in 10 countries worldwide including the United States, did not meet the primary endpoint in reducing the rate of recurrence of diverticulitis over a 2-year treatment period. In addition, SPD476, MMX mesalamine did not show a significant difference compared to placebo on the key secondary endpoint of the study.
Sosei Group	TSE Mothers Index: 4565	QVA149	Chronic obstructive pulmonary disease	Positive	The trial met the primary endpoint by demonstrating the superiority in trough FEV1 ($p<0.001$) of once-daily QVA149 compared to once-daily indacaterol or once-daily NVA237 in patients with moderate to severe COPD. In addition, QVA149 showed superiority in trough FEV1 ($p<0.001$) compared to placebo and open-label tiotropium (18 mcg). The results of BRIGHT demonstrated that patients experienced significantly better exercise endurance versus placebo ($p=0.006$). ENLIGHTEN demonstrated that QVA149 was well tolerated with a safety and tolerability profile similar to placebo.
PHASE II					
Cytokinetics	NASDAQ: CYTK	CK-2017357	Amyotrophic lateral sclerosis (Lou Gherigs Disease)	Positive	Cytokinetics announced encouraging results from two phase II clinical trials evaluating CK-2017357 in patients with amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's Disease. In these studies, CK-2017357 was determined to be safe and well-tolerated when dosed with riluzole, the only approved treatment for ALS.
PolyMedix	OTCBB: PYMX.OB	PMX-30063	Acute Bacterial Skin and Skin Structure Infections	Positive	In the study, patients were first evaluated at day 3 for clinical response using FDA's most recent ABSSSI Guidance. As summarized in the following table, patients receiving low, medium, or high doses of PMX-30063 experienced high clinical response rates at day 3. All regimens of PMX-30063 for all patient populations and time points showed early, high and sustained clinical responses. The 95 percent confidence intervals for the day 7, 10 and 28 assessments illustrate the consistency of clinical responses for all dosing arms of PMX-30063 compared to active control.
Adocia	NYSE Euronext Paris: FR0011184241 - ADOC	BioChaperone	Diabetic foot ulcer	Positive	The primary endpoint was the percentage of complete wound closure at 20 weeks. The rates of complete wound closure are all superior or equal to 66 per cent after 20 weeks, therefore proving success on non-inferiority criteria for the three tested PDGF-BB doses. One of the most promising results is the 80 percent rate of complete wound closure at 20 weeks obtained with the dose of BioChaperone containing one-third of the Regranex equivalent of PDGF-BB dose and with only one application every two days.

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Clinical Trials in April 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
CrystalGenomics	Private	CG100649	Osteoarthritis	Positive	This phase 2b study was a double-blind, randomized, multicenter, non-inferiority, repeat dose study of CG100649 versus Celebrex in OA patients. The study met its primary and secondary endpoints which were to evaluate the safety, analgesic efficacy and functional benefits of CG100649 (2 mg or 4 mg per day) versus Celebrex (celecoxib) (200 mg per day) over the 4 week treatment period.
Bristol-Myers Squibb Company	NYSE: BMY	daclatasvir and asunaprevir	Hepatitis C	Positive	Results from a phase II study in which treatment with an all-oral, dual direct-acting antiviral regimen of daclatasvir, an investigational NS5A replication complex inhibitor, and asunaprevir, an investigational NS3 protease inhibitor, achieved undetectable viral load 24 weeks post-treatment (SVR24) in 77 percent (33/43) of difficult-to-treat genotype 1b hepatitis C (HCV) patients. Difficult-to-treat patients in this study included null responders, or patients who had previously not responded to treatment with peginterferon alfa and ribavirin.
Gilead	NASDAQ: GILD	GS-7977	Hepatitis C	Positive	Data from the phase 2 ELECTRON study examining the investigational once-daily oral agent GS-7977 plus ribavirin (RBV) in treatment-naive patients with genotype 1 chronic hepatitis C virus (HCV) infection. Of the 25 patients who completed 12 weeks of treatment with the GS-7977-based regimen, 88 percent of patients (n=22/25) remained HCV RNA undetectable four weeks after completion of treatment. Three patients experienced viral relapse.
Boehringer Ingelheim	Private	BI 201335 and polymerase inhibitor BI 207127	Hepatitis C	Positive	New data from a pre-specified interim analysis of the phase 2b SOUND-C2 study show that 68 percent of genotype-1 (GT1) hepatitis C virus (HCV) patients achieved sustained viral response 12 weeks after the end of treatment (SVR12) with Boehringer Ingelheim's investigational direct-acting antiviral compounds the protease inhibitor BI 201335 and polymerase inhibitor BI 207127 plus ribavirin (RBV), without interferon.
Ono Pharmaceutical Company	Private	ONO-4641	Multiple sclerosis	Positive	For the study, 407 people between the ages of 18 and 55 with relapsing-remitting MS were randomly given placebo, 0.05 mg, 0.10 mg, or 0.15 mg of ONO-4641 once per day for 26 weeks. People were included in the study if they had two or more relapses in the two years prior to the study, one or more relapses within the year prior to the study or one or more new MS-related brain lesions, also known as Gd-enhancing lesions, detected on MRI within three months prior to the study. Brain scans were performed every four weeks from 10 to 26 weeks. At the end of the study, people taking 0.05, 0.10, or 0.15 mg of ONO-4641 had 82 percent, 92 percent and 77 percent fewer Gd-enhancing brain lesions, respectively, compared to placebo.
Akebia Therapeutics	Private	AKB-6548	Chronic kidney disease	Positive	The phase 2 randomized, double-blind, placebo-controlled dose range finding study was designed to evaluate the safety, tolerability and pharmacokinetics of AKB-6548 in patients with stage 3 and 4 CKD. Subjects were randomized into 5 different dosing groups, and AKB-6548 was administered orally on an outpatient basis once daily for 42 days. The study enrolled 93 subjects at multiple sites in the United States. The results show a highly significant, dose-responsive increase in hemoglobin and overall red blood cell production.

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Clinical Trials in April 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Abbott Laboratories	NYSE: ABT	ABT-450/r, plus ABT-333	Hepatitis C	Positive	In the study known as "Co-Pilot," different doses of ABT-450/r, plus ABT-333 and ribavirin administered for 12 weeks showed sustained virological response at 12 weeks post treatment (SVR12) in 95 percent and 93 percent of treatment-naive genotype 1 (GT1) patients. In these patients, response was independent of HCV subtype, host IL28B genotype or dose of ABT-450/r. In addition, SVR12 was achieved in 47 percent of patients who were previous non-responders to past HCV treatment.
Array BioPharma	NASDAQ: ARRY	selumetinib	Ovarian Cancer	Positive	The Gynecological Oncology Group reported a disease control rate, defined as either complete or partial response or progression-free survival or progression-free survival of greater than 6 months, of 81 percent of patients. Eight patients had complete (1) or partial (7) responses, and 34 (63 percent) had progression-free survival of greater than 6 months. The median survival rate without cancer progression was 11 months. Only three patients experienced grade 4 adverse events.
AVI BioPharma	NASDAQ: AVII	eteplirsen	Duchenne muscular dystrophy	Mixed	Eteplirsen administered once weekly at 30mg/kg over 24 weeks resulted in a statistically significant ($p \leq 0.002$) increase in novel dystrophin (22.5 percent dystrophin-positive fibers as a percentage of normal) compared to no increase in the placebo group. In the study, a shorter duration of eteplirsen treatment, 12 weeks, did not show a significant increase in novel dystrophin (0.79 percent dystrophin-positive fibers as a percentage of normal; p-value NS), despite administration of the drug at a higher dose (50mg/kg once weekly).
Stemedica Cell Technologies	Private	itMSC	Cardiac function	Positive	Forty five patients who had experienced an acute myocardial infarct underwent reperfusion by stent and after being carefully matched, were divided into a treatment and a control group. The treatment group received intravenous infusion of Stemedica itMSCs on day seven; the control group received normal saline. At the end of three months, those in the treatment group experienced an 11 point improvement in the ejection fraction of the left ventricle (the amount of blood pumped with each heart contraction) in comparison with the control group. This level of improvement restored the treatment group's ejection fraction to normal levels.
PHASE I					
Savara Pharmaceuticals	Private	AeroVanc	Respitory infections in patients with Cystic Fibrosis	Positive	The dose-escalating phase Ia clinical trial examined the safety and pharmacokinetics of AeroVanc in healthy volunteers. Single-ascending doses of inhaled AeroVanc were compared to vancomycin administered intravenously. AeroVanc demonstrated a favorable pharmacokinetic profile with slow systemic absorption from the lungs, suggesting prolonged residence of the drug in the lung, the site of anti-MRSA action. AeroVanc was well tolerated at all dose levels, with only infrequent mild adverse events that resolved spontaneously.
Genprex	Private	Oncoprex	Lung cancer	Positive	A clinical trial has demonstrated that Oncoprex (TUSC2 nanoparticles) can be safely administered in advanced lung cancer patients to halt cancer or shrink primary and metastatic tumors in some patients. The clinical trial results were published April 26 in a paper entitled, "phase I Clinical Trial of Systemically Administered TUSC2 (FUS1)-Nanoparticles Mediating Functional Gene Transfer in Humans" in the journal PLoS One

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Clinical Trials in April 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Repligen	NASDAQ: RGEN	RG3039	Spinal muscular dystrophy	Positive	The phase 1 trial was a blinded, ascending, single dose study of RG3039 administered to 32 healthy volunteers. The study results demonstrate that RG3039 was well tolerated at all doses administered, with no serious adverse events reported. The data also showed evidence of a dose-related drug response resulting in 90 percent inhibition of the target enzyme. These outcomes may help to establish appropriate RG3039 dosing regimens for future studies, including potential efficacy studies in SMA patients.
W. R. Grace & Co	NYSE: GRA	mesoporous silica-based drug delivery technology	Poorly soluble compounds	Positive	This was the first-ever clinical study to demonstrate the bioavailability enhancing properties of silica in humans. Improved bioavailability enables active pharmaceutical ingredients (API's) to more effectively absorb into the body. In this study, the bioavailability profile of fenofibrate formulated with silica was compared to the marketed micronized formulation (Lipanthyl). The study results show a 54 percent higher bioavailability for the silica formulation than the marketed formulation.
Alnylam Pharmaceuticals	NASDAQ: ALNY	ALN-PCS	Severe hypercholes-terolemia	Positive	ALN-PCS is a PCSK9 synthesis inhibitor that reduces intracellular and extracellular levels of PCSK9 resulting in lowered plasma levels of low-density lipoprotein cholesterol (LDL-C), or "bad" cholesterol. The new data were presented at the American Heart Association's Arteriosclerosis, Thrombosis and Vascular Biology 2012 Scientific Sessions held in Chicago. Results showed that administration of a single dose of ALN-PCS, in the absence of concomitant lipid-lowering agents such as statins, resulted in statistically significant and durable reductions of PCSK9 plasma levels of up to 84 percent and lowering of LDL-C of up to 50 percent.
Biodel	NASDAQ: BIOD	BIOD-123 and BIOD-125	Ultra-rapid-acting formulations of recombinant human insulin	Positive	In the phase 1 clinical trial, absorption rates of BIOD-123 and BIOD-125 were significantly faster than that of Humalog as indicated by 64 percent and 54 percent reductions, respectively, in mean times to half maximal insulin concentrations ($p<0.001$ for both BIOD-123 and BIOD-125 compared to Humalog). In a previous clinical trial, the Linjeta formulation demonstrated a 61 percent reduction compared to Humalog®. Peak metabolic effects were not significantly different between the three study drugs.
Stealth Peptides	Private	Bendavia	Mitochondrial dysfunction	Positive	During the studies, volunteers received a single dose of Bendavia administered as an intravenous infusion followed by a standard dose of heparin, aspirin or clopidogrel. Results from these clinical trials indicate that Bendavia does not appear to affect the pharmacodynamics of these commonly used drugs. Safety data from these studies and preliminary results also demonstrate that Bendavia appears to be safe and well–tolerated at the doses evaluated, with no serious adverse events reported.
Peregrine Pharmaceuticals	NASDAQ: PPHM	bavituximab	Cancer and infectious disease	Positive	In a phase I trial of bavituximab with paclitaxel in five evaluable patients with HER-2 negative metastatic breast cancer, two patients achieved a complete tumor response, one achieved a partial response, and two had progressive disease according to Response Evaluation Criteria In Solid Tumors measurement criteria. The trial is also investigating the dynamics and potential effects of circulating tumor cells and microparticles shed from dying tumor cells for possible correlations with therapeutic response.

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Clinical Trials in April 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Astex Pharmaceuticals	NASDAQ: ASTX	SGI-110	Acute myelogenous leukemia	Positive	Demonstrated differentiated PK profile, good tolerability, and preliminary promising complete responses in heavily pretreated acute myelogenous leukemia patients enrolled in the phase 1 segment of the trial. The data was presented at an oral session at the American Association for Cancer Research (AACR) 2012 Annual Meeting and was featured in a joint AACR-Stand Up To Cancer (SU2C) media forum.
Immunomedics	NASDAQ: IMMU	TF2 bispecific antibody	Colorectal cancer	Positive	Reported that colorectal cancer can be safely, specifically and rapidly targeted with TF2 bispecific antibody and a radiolabeled peptide, with limited toxicity to the patient. Results from the phase I clinical study were reported at the 2012 Annual Meeting of the American Association for Cancer Research by investigators from the Radboud University Nijmegen Medical Center, Nijmegen, The Netherlands.
Oncolytics Biotech	ONC.TO	Reolysin	Head and neck cancer	Positive	An initial phase I study was carried out in patients with a range of advanced cancers, which showed the drug combination was safe. Side-effects were found to be generally mild, and consistent with chemotherapy alone. Patients with head and neck cancers were found to have the best responses, so a phase II expansion study at The Royal Marsden Hospital, London, and St James's Hospital, Leeds, was therefore targeted to patients with these types of cancers. Cancers shrank for about one third of the patients who could be evaluated, and disease stabilised for a further third. For one patient, all signs of their cancer disappeared.

Patents for April 2012

COMPANY	TICKER	COMPANY DESCRIPTION	GRANTING AGENCY	PATENT NUMBER	PATENT COVERS
Rexahn Pharmaceuticals	NYSE Amex: RNN	A clinical stage pharmaceutical company dedicated to developing and commercializing first in class and market leading therapeutics for cancer, CNS disorders, sexual dysfunction and other unmet medical needs	Japanese Patent Office	Japanese Patent No. 4,934,432	Patent covers Rexahn's anti-cancer candidate RX-1792 and related compounds, and a composition for treating anti-proliferative and anti-tumor activities.
Ampio Pharmaceuticals	NASDAQ: AMPE	Ampio Pharmaceuticals develops innovative proprietary drugs for inflammation, eye disease, kidney disease, CNS disease, metabolic disease and male sexual dysfunction	U.S. Patent and Trademark Office and Canadian Intellectual Property Office	Notices of Allowance	These initial patents cover the North American territories and multiple additional patents for using Optina for the treatment of macular edema and diabetic retinopathy are pending worldwide.

Patents for April 2012

COMPANY	TICKER	COMPANY DESCRIPTION	GRANTING AGENCY	PATENT NUMBER	PATENT COVERS
Apricus Biosciences	NASDAQ: APRI	Apricus Bio is a San Diego-based pharmaceutical company, with commercial products and a broad pipeline across numerous therapeutic classes	U.S. Patent and Trademark Office	Notice of Allowance	This soon-to-be issued patent claims certain compositions and methods for inhibiting tumor growth related to PrevOnco, Apricus Bio's proprietary Phase III-ready cancer treatment for patients with advanced, unresectable hepatocellular carcinoma ("HCC"), or liver cancer.
VistaGen Therapeutics	OTCBB: VSTA	A biotechnology company applying human pluripotent stem cell technology for drug rescue and cell therapy	U.S. Patent and Trademark Office	U.S. Patent No. 11,445,733	Patent covers all mammalian liver stem cells. Liver stem cells used in drug testing can be derived from in vivo tissue or produced from embryonic stem cells or induced pluripotent stem cells.
Lpath	OTCBB: LPTN	A therapeutic antibody company focused on the emerging field of medicine that targets bioactive signaling lipids for treating a wide range of human disease	U.S. Patent and Trademark Office	U.S. Patent No. 8,158,124	Patent protecting Lpathomab, a monoclonal antibody against lysophosphatidic acid.
Metabolix	NASDAQ: MBLX	An innovation-driven bioscience company delivering sustainable solutions to the plastics, chemicals and energy industries	U.S. Patent and Trademark Office	U.S. Patent No. 8,093,022 U.S. Patent No. 8,114,643	Patents enable production of a series of new PHA biopolymer compositions using genetically engineered microbial strains and creation of genetic constructs to make the biobased chemical 3-hydroxypropionic acid in microbial and crop plant systems.
Marshall Edwards	NASDAQ: MSHL	A privately-held California corporation with expertise in the application of advanced polymer-coupling technology to make protein-based drugs safer and longer acting	U.S. Patent and Trademark Office	U.S. Patent No. 8,163,795	Patent covers the company's lead drug candidate ME-143 for use in treating cancer. The patent is expected to provide protection until September 2025.
NewLink Genetics	NASDAQ: NLNK	A biopharmaceutical company focused on discovering, developing, and commercializing novel immunotherapeutic products to improve cancer treatment options for patients and physicians	U.S. Patent and Trademark Office	Notice of Allowance	Patent will cover oral pharmaceutical compositions comprising 1-methyl-D-tryptophan (D-1MT) and also oral pharmaceutical compositions comprising 1-methyl-DL-tryptophan.
MediciNova	NASDAQ: MNOV	A publicly traded biopharmaceutical company founded upon acquiring and developing novel, small-molecule therapeutics for the treatment of diseases with unmet need with a commercial focus on the U.S. market	Australian Patent Office	Notice of Allowance	Patent covers the use of ibudilast (MN-166) for the treatment of multiple forms of chronic neuropathic pain. MN-166 is the company's lead drug development candidate for certain neurological conditions, including progressive forms of multiple sclerosis, neuropathic pain and drug addiction.
Regulus Therapeutics	Private	A biopharmaceutical company focused on the discovery and development of innovative medicines targeting microRNAs	Japanese Patent Office	Notice of Allowance	Patent covers series for microRNA-122 (miR-122) therapy in the treatment of chronic hepatitis C virus (HCV) infection

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Patents for April 2012

COMPANY	TICKER	COMPANY DESCRIPTION	GRANTING AGENCY	PATENT NUMBER	PATENT COVERS
Acetylon Pharmaceuticals	Private	Acetylon Pharmaceuticals is applying its unique capabilities to discover and develop next-generation, highly selective small molecule drugs to realize the therapeutic potential of HDAC inhibition to treat cancer, autoimmune and other diseases	U.S. Patent and Trademark Office	U.S. Patent 8,148,526	This patent contains fundamental composition of matter claims covering the company's selective HDAC6 inhibitor, ACY-1215, which is currently being investigated in human clinical trials for the treatment of multiple myeloma.
Rosetta Genomics	NASDAQ: ROSG	Company develops and commercializes a full range of microRNA-based molecular diagnostics	European Patent Office	N/A	Patent claims cover a core element of Rosetta Genomics' microRNA technology in the development of cancer therapeutics associated with p53-negative cancers
Crimson Life Sciences	Private	A division of TransPerfect Translations International, Inc. and is the only translation practice exclusively devoted to the medical device industry	U.S. Patent and Trademark Office	U.S. Patent No. 8,140,322	Patent is the first translation risk management patent covering the company's ISO 13485 and ISO 14971 certified translation providers
Opsona Therapeutics	Private	An immunology drug development company focused on novel therapeutic approaches to key targets of the innate immune system associated with a wide range of major human diseases, including autoimmune and inflammatory diseases, transplant rejection, cancer, diabetes, Alzheimer's disease and atherosclerosis	European Patent Office	European Patent No. 1,664,118	Patent covers an antibody directed against Toll-like Receptor-2 (TLR-2) and the use and development thereof
BioDelivery Sciences International	NASDAQ: BDSI	A specialty pharmaceutical company that is leveraging its novel and proprietary patented drug delivery technologies to develop and commercialize, either on its own or in partnerships with third parties, new applications of proven therapeutics	U.S. Patent and Trademark Office	Notice of Allowance	Patent extends the patent protection for BDSI's BioErodible MucoAdhesive (BEMA) products, BEMA Buprenorphine and BEMA Buprenorphine/Naloxone, by seven years to 2027
NewLink Genetics	NASDAQ: NLNK	A biopharmaceutical company focused on discovering, developing and commercializing novel immunotherapeutic products to improve cancer treatment options for patients and physicians	Japanese Patent Office	Notice of Allowance	Patent contains broad pharmaceutical composition claims covering NewLink's HyperAcute products for the treatment of cancer
Cyclacel Pharmaceuticals	NASDAQ: CYCC	A biopharmaceutical company developing oral therapies that target the various phases of cell cycle control for the treatment of cancer and other serious diseases	U.S. Patent and Trademark Office	U.S. Patent No. 8,124,593	Patent grants claims to a specified method of administration of sapacitabine, Cyclacel's lead drug candidate, with patent exclusivity until July 2030.
CytRx	NASDAQ: CYTR	A biopharmaceutical research and development company specializing in oncology	U.S. Patent and Trademark Office	U.S. Patent No. 8,153,581	Patent covers the tumor-targeting conjugate INNO-206 linker platform technology and INNO-206 pharmaceutical compositions.

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Patents for April 2012

COMPANY	TICKER	COMPANY DESCRIPTION	GRANTING AGENCY	PATENT NUMBER	PATENT COVERS
Raptor Pharmaceutical	NASDAQ: RPTP	Company seeks to research, produce, and deliver medicines that improve life for patients with severe, rare disorders. Raptor currently has product candidates in clinical development designed to potentially treat nephropathic cystinosis, Non-alcoholic Steatohepatitis, Huntington's Disease, aldehyde dehydrogenase deficiency, and thrombotic disorder	European Patent Office	Notice of Allowance	Patent covers the use of enteric-coated, delayed-release oral formulations of cysteamine bitartrate, including Raptor's proprietary microbead formulation, RP103, as well as other formulations of cystamine and cysteamine
Alitair Pharmaceuticals	Private	Company discovers, invents, and develops medicines for the treatment of respiratory illnesses	U.S. Patent and Trademark Office	Notice of Allowance	Patent covers its ion exchange resin platform drug delivery technology, REA.
AcelRx	NASDAQ: ACRX	A specialty pharmaceutical company focused on the development and commercialization of innovative therapies for the treatment of acute and breakthrough pain	U.S. Patent and Trademark Office	Notices of Allowance	Treating pain by adhering a small-volume solid tablet containing sufentanil to the oral mucosa, as well as compositions and dosage forms broadly covering NanoTab formulations.
Sunshine Biopharma	OTCBB: SBFM	Sunshine Biopharma is focused on the research, development, and commercialization of drugs for the treatment of verious forms of cancer	U.S. Patent and Trademark Office	Notices of Allowance	Patent covers its lead anti-tumor compound, Adva-27a. The allowed claims protect Adva-27a and extensively cover various formulations, derivatives and cancer applications.
Echo Therapeutics	NASDAQ: ECTE	Echo Therapeutics is developing the Symphony tCGM System as a non-invasive, wireless, transdermal continuous glucose monitoring system for patients with diabetes and for use in hospital critical care units	34 European Countries	N/A	The patents include claims that encompass the Prelude SkinPrep System, which prepares the skin in a controlled, dermabrasive manner to permit either drug delivery or analyte extraction. These patents will expire in 2028.
Athersys	NASDAQ: ATHX	A clinical stage biotechnology company engaged in the discovery and development of therapeutic product candidates designed to extend and enhance the quality of human life	U.S. Patent and Trademark Office	U.S. Patent No. 8,147,824	Patent covers the use of non-embryonic, multipotent stem cells for the reduction in severity or prevention of Graft-versus-Host Disease, associated with hematopoietic stem cell transplants used to treat leukemia and related conditions.
Applied BioCode	Private	The company was formed to research, develop, and commercialize its Barcoded Magnetic Bead (BMB) technology within the medical diagnostic and life sciences markets	U.S. Patent and Trademark Office	U.S. Patent No. 8,148,139	Patent covers the method of use and manufacturing of its Barcoded Magnetic Beads products.

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Patents for April 2012

COMPANY	TICKER	COMPANY DESCRIPTION	GRANTING AGENCY	PATENT NUMBER	PATENT COVERS
XenoPort	NASDAQ: XNPT	A biopharmaceutical company focused on developing and commercializing a portfolio of internally discovered product candidates for the potential treatment of neurological disorders	U.S. Patent and Trademark Office	U.S. Patent No. 8,148,414	Patent covers composition and formulations of XP23829, a novel fumarate analog for the potential treatment of relapsing-remitting multiple sclerosis and psoriasis.
Cytochroma	Private	A clinical stage specialty pharmaceutical company focused on developing and commercializing proprietary products to treat and prevent the clinical consequences of vitamin D insufficiency and SHPT associated with CKD	U.S. Patent and Trademark Office	Notice of Allowance	Patent covers the anticipated method of use of the Company's lead product, CTAP101 Capsules, which is in phase 3 development for treating patients with Stage 3 or 4 chronic kidney disease, secondary hyperparathyroidism and vitamin D insufficiency.
Lixte Biotechnology Holdings	Private	A cancer drug discovery company, combining selection of novel targets from the medicinal chemistry and molecular biology literature with innovative synthetic chemistry to develop new potentially more effective anti-cancer drugs	U.S. Patent and Trademark Office	Notice of Allowance	Patent covers lead histone deacetylase inhibitor LB-201 and other structural homologs.
Advanced Cancer Therapeutics	OTCBB: ACT	A privately held company dedicated to advancing novel therapeutics for the prevention and treatment of cancer	U.S. Patent and Trademark Office	U.S. Patent No. 8,088,385	ACT is the exclusive licensee to this issued patent that was initially filed by the University of Louisville Research Foundation.

New Drug Approvals, April 2012*

COMPANY	PROPRIETARY NAME	ESTABLISHED NAME	INDICATION
UNITED STATES			
Vivus Mitsubishi Tanabe Pharma	Stendra	avanafil	Erectile Dysfunction
Avid Radiopharmaceuticals	Amyvid	Florbetapir F 18	Imaging agent for PET evaluation for Alzheimer's Disease

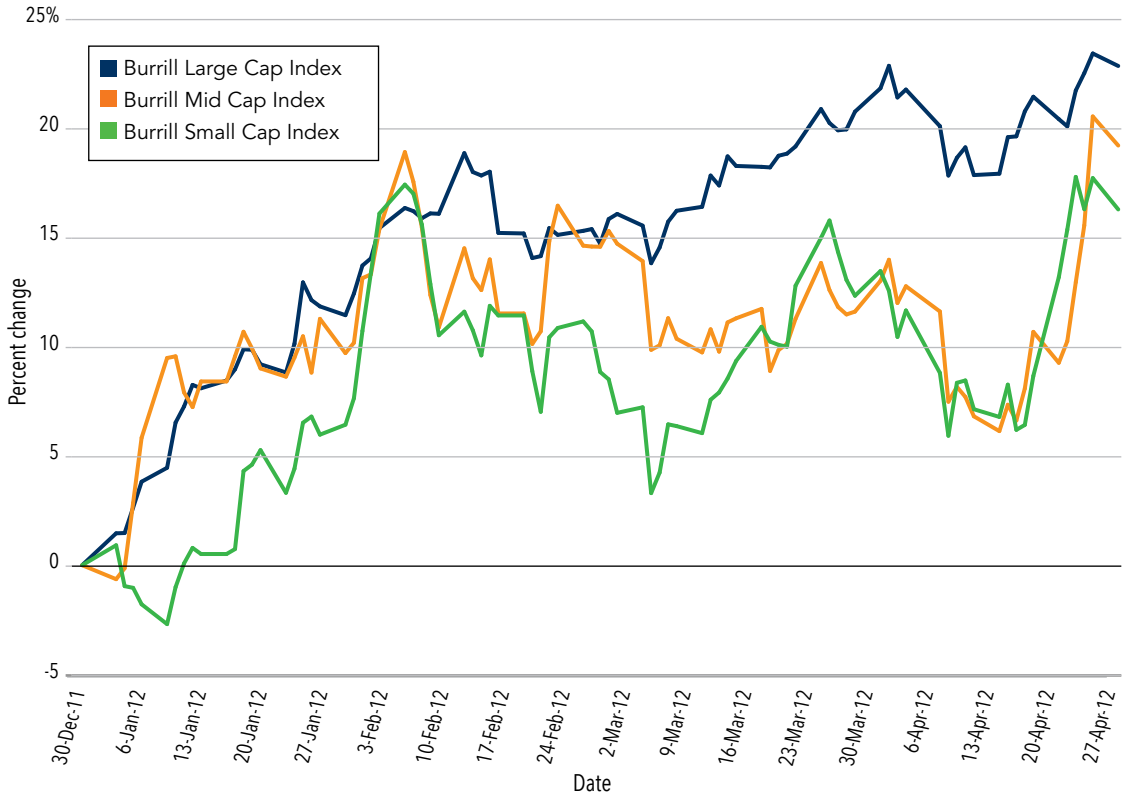
* List only includes New Molecular Entities

Upcoming PDUFA Dates

COMPANY	TICKER	PROPRIETARY NAME	ESTABLISHED NAME	INDICATION	PDUFA DATE
Talon Therapeutics Tekmira Pharmaceuticals	TLON TKMR	Marqibo	vincristine	Acute lymphoblastic leukemia	8/12/2012
Napo Pharmaceuticals Salix Pharmaceuticals	Private SLXP	Crofelemer	proanthocyanidin	Chronic Diarrhea in HIV/AIDS patients	6/5/2012
Merck Ariad	NYSE: MRK ARIA	Taltorvic	ridaforolimus	Sarcoma	6/5/2012
Genentech Roche Chugai Pharmaceutical	SIX: ROG OTCQX: RHHBY Tokyo: 2914	N/A	pertuzumab	First-line HER2-positive metastatic or locally recurrent unresectable breast cancer	6/8/2012
Repligen	RGEN	SecreFlo	secretin	Imaging agent for pancreatic duct abnormalities	6/21/2012
QRxPharma	ASX: QRX and OTCQX: QRXPY	MoxDuo IR	morphine, oxycodone	Acute pain	6/25/2012
Arena Pharmaceuticals	ARNA	N/A	lorcaserin	Obesity	6/27/2012
Bristol-Meyers Squibb Pfizer	NYSE: BMY NYSE: PFE	Eliquis	apixiban	Stroke and systemic embolism in patients with atrial fibrillation	6/28/2012
Astellas Pharma	Tokyo: 4503	Betanis	mirabegron	Overactive bladder	Jun-12
Vivus	VVUS	Qnexa	phentermine, topiramate	Obesity	7/17/2012
Amarin	AMRN	AMR101	AMR101	Hypertriglyceridemia	7/26/2012
Onyx Pharmaceuticals	ONXX	N/A	carfilzomib	Multiple Myeloma	7/27/2012
Ironwood Pharmaceuticals Forest Laboratories	IRWD NYSE: FRX	N/A	linaclotide	Irritable bowel syndrome with constipation and chronic constipation	9/8/2012
Gilead Sciences	GILD	Quad	elvitegravir, cobicistat, emtricitabine and tenofovir disoproxil fumarate	HIV-1 infection in treatment-naïve adults	8/27/2012
Pfizer	NYSE: PFE	N/A	tofacitinib	Rheumatoid arthritis	8/1/2012
Horizon Pharma	HZNP	Lodotra	prednisone	Rheumatoid arthritis	7/26/2012
Regeneron Pharmaceuticals Sanofi	NYSE: SNY	Zaltrap	aflibercept	Prostate cancer	8/4/2012
Navidea Biopharmaceuticals	NAVB	Lymphoseek	99m-Tc-Tilmanocept	Imaging agent for lymphatic mapping	9/10/2012
NPS Pharmaceuticals	NPSP	Gattex	teduglutide	Short bowel syndrome	9/28/2012
Sanofi Isis Pharmaceuticals		Kynamro	mipomersen sodium	hypercholesterolemia	9/28/2012
Raptor Pharmaceutical	RPTP	N/A	Rp103	cystinosis	10/1/2012
Santarus	SNTS	Uceris	budesonide	Ulcerative colitis	10/16/2012
Impax Laboratories	IPAX	N/A	IPX066	Parkinson's Disease	10/19/2012
Dynavax	DVAX	Heplisav	hepatitis b adult vaccine	Hepatitis B prevention	10/26/2012
United Therapeutics	UTHR	Remodulin	treprostinil sodium	Remodulin	10/26/2012
Cornerstone Therapeutics	CRTX	N/A	lixivaptan	Hyponatremia	10/29/2012
Celgene	CELG	N/A	pomalidomide	Refractory/relapsed multiple myeloma	Q4
Biogen Idec	BIIB	N/A	BG-12	Multiple sclerosis	12/28/2012

INDICES

Burrill Small-, Medium-, and Large-Cap Indices, April 2012



PERFORMANCE OF INDEX COMPONENTS

LARGE CAP
Percent change April 2012

Index	1.7%
REGN	16.0%
GILD	6.5%
BIIB	6.4%
VRTX	-6.2%
ELN	-8.1%
ILMN	-15.4%

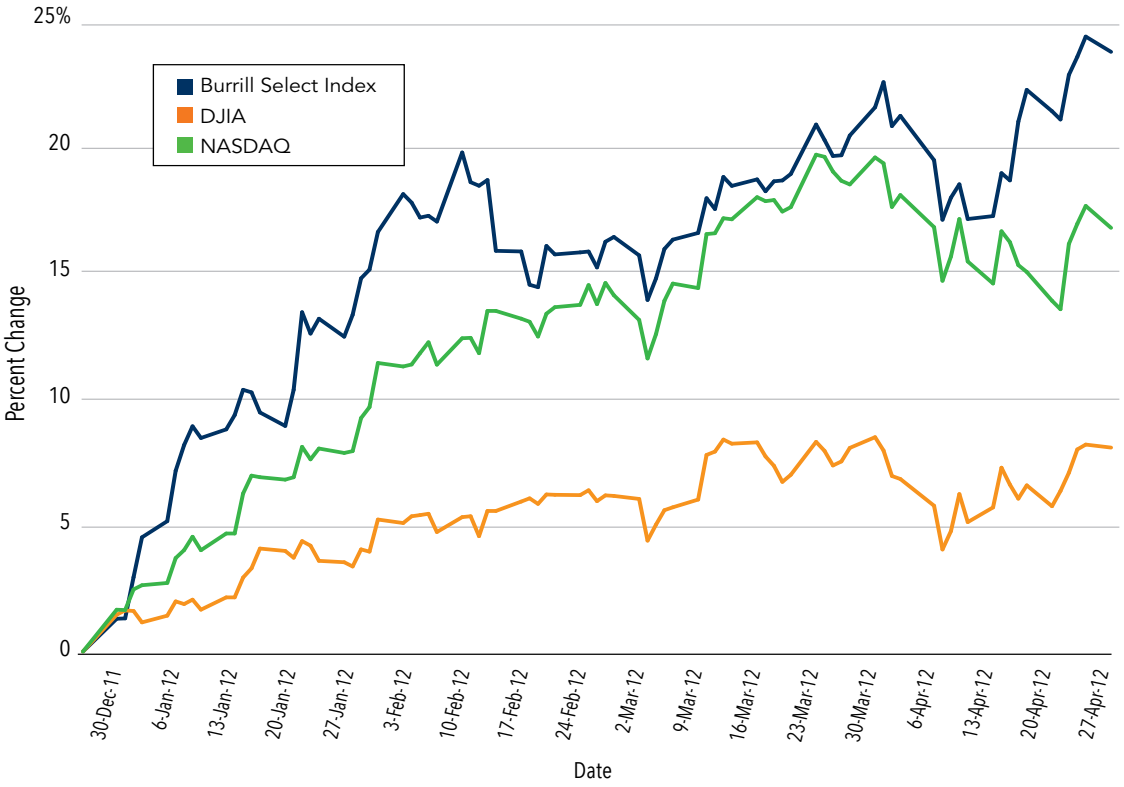
MID-CAP
Percent change April 2012

Index	6.8%
SQNM	25.8%
QCOR	19.4%
INCY	17.4%
MDCO	10.1%
EXEL	-7.3%
TRGT	-7.4%
ISIS	-8.8%
IMGN	-11.4%

SMALL-CAP
Percent change April 2012

Index	3.5%
RDEA	46.5%
ALTH	23.0%
INFI	12.9%
PTIE	11.9%
AFFY	11.7%
ARNA	-20.8%
PACB	-21.1%
RGEN	-25.3%
AVII	-45.8%

Burrill Biotech Select Index, April 2012

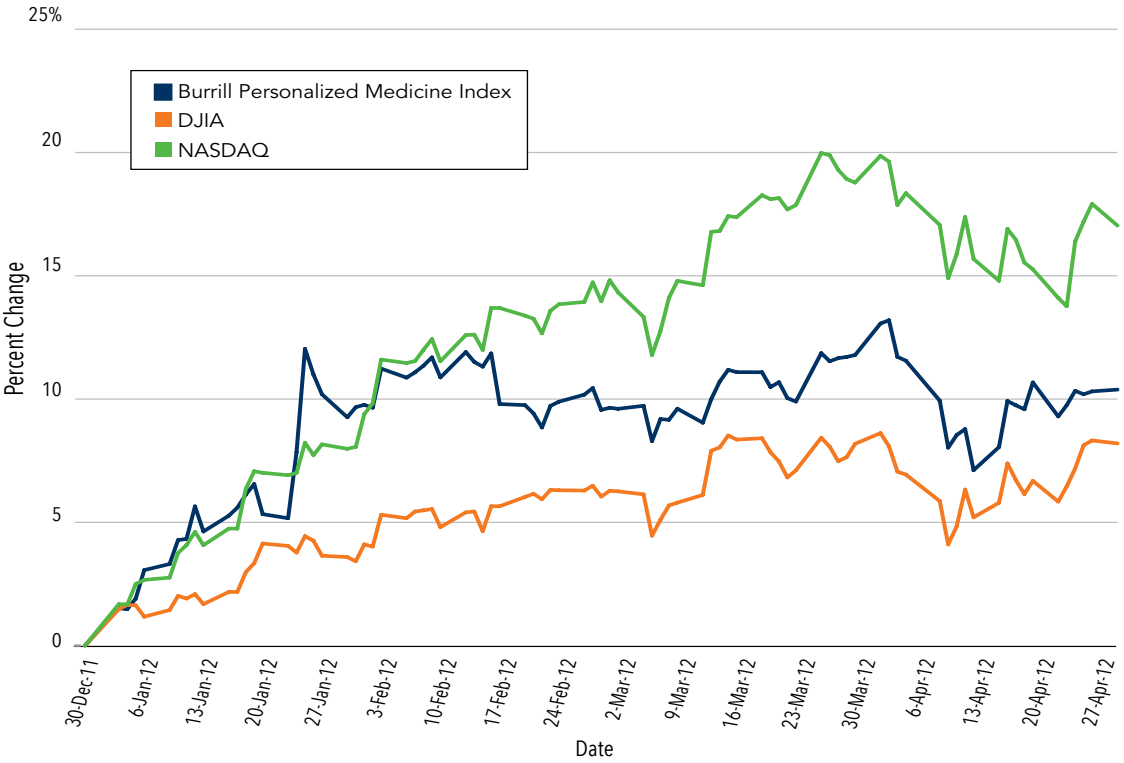


BURRILL BIOTECH SELECT INDEX

Percent change April 2012

Index	2.8%
HGSI	78.5%
REGN	16.0%
MYGN	9.9%
DNDN	40.2%
VRTX	-6.2%
EXEL	-7.3%
ILMN	-15.4%

Burrill Personalized Medicine Index, April 2012

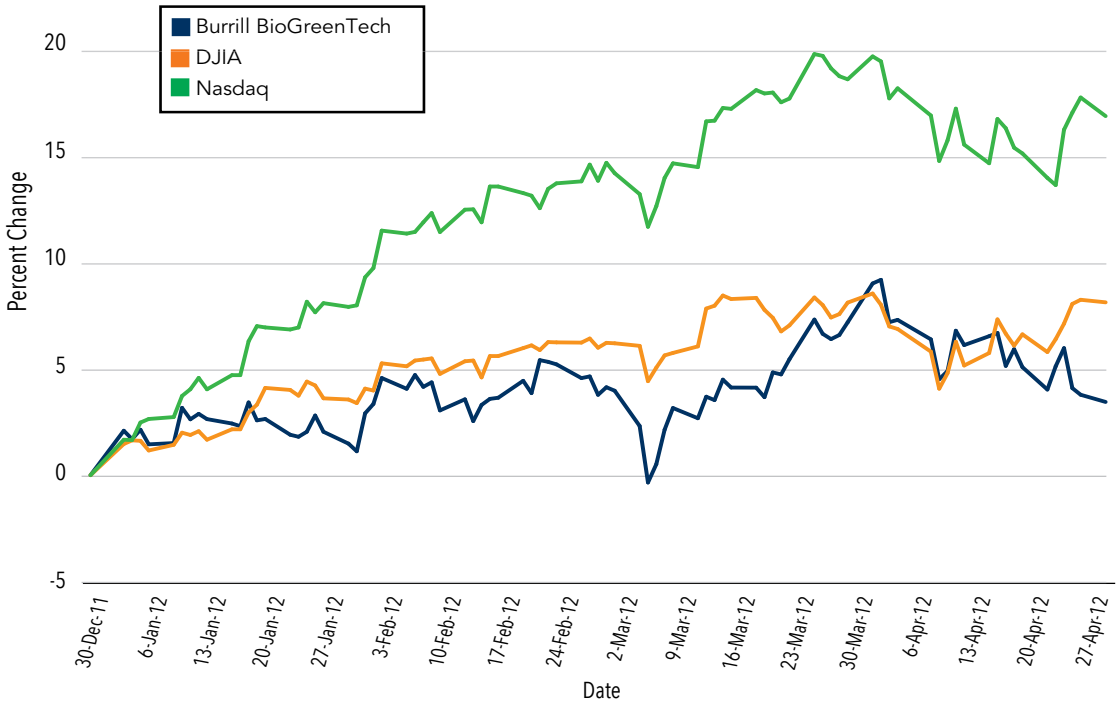


BURRILL PERSONALIZED MEDICINE INDEX

Percent change April 2012

Index	-1.2%
ECYT	43.0%
MYGN	9.9%
QGEN	7.5%
GHDX	-6.4%
ILMN	-15.4%
PACB	-21.1%

Burrill BioGreenTech Index, April 2012

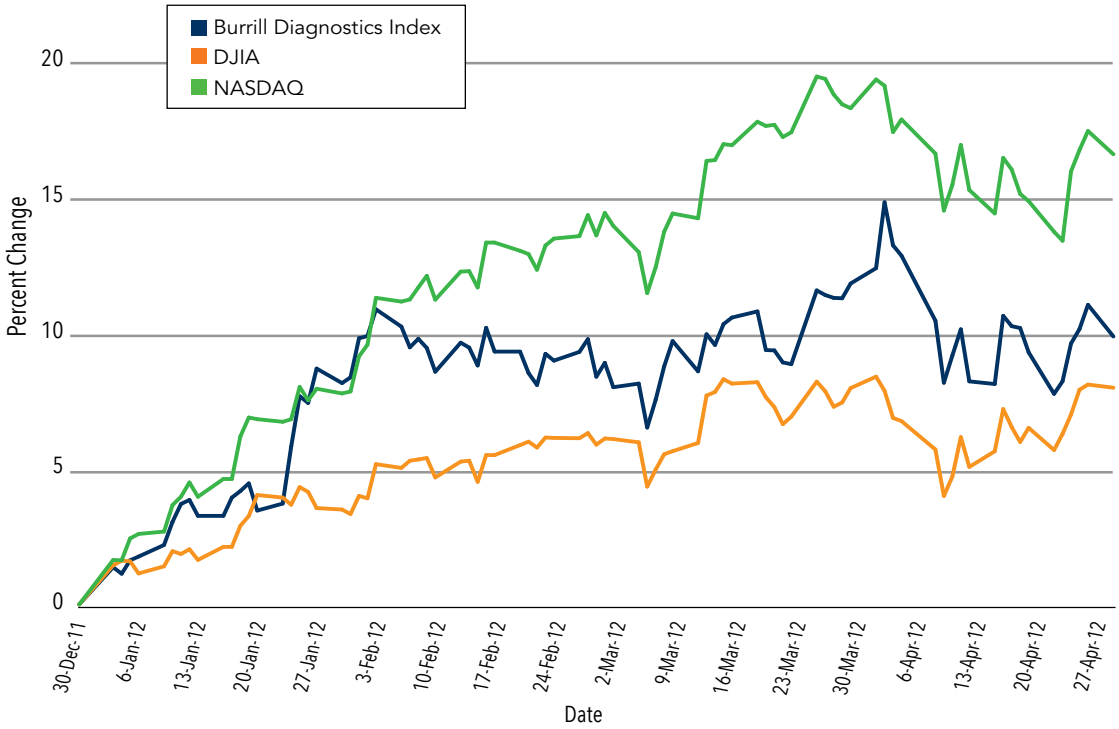


BURRILL BIOGREENTECH INDEX

Percent change April 2012

Index	-3.5%
AEB	17.6%
RTK	11.1%
GEVO	5.4%
SZYM	-24.8%
GPRE	-25.9%
KIOR	-26.7%
SEED	-27.6%
AMRS	-39.6%

Burrill Diagnostics Index, April 2012



BURRILL DIAGNOSTICS INDEX

Percent change April 2012

Index	-1.8%
SQNM	25.8%
GNMK	14.3%
MYGN	9.9%
CPHD	-8.2%
QDEL	-10.1%
HOLX	-11.3%