THE BURRILL REPORT

Vol. 3, Issue 6

June 2013

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Focus on:
Dealmaking

$13.6B Deal Boosts M&A Numbers

Top pharma sitting on piles of cash that could soon fuel activity

Global M&A activity in the life sciences sector continues to lag the pace of 2012, but signs point to activity increasing as the largest pharmaceutical companies continue to sit on sizeable amounts of cash.

While Thermo Fisher Scientific's $13.6 billion planned purchase of Life Technologies marks the largest acquisition to date in 2013 in the life sciences arena,

Month In Review

global M&A activity through the end of April reached $33.7 billion, down from $45.7 billion for the same period in 2012.

Concurrently, the 13 largest pharmaceutical companies ended April with $142.4 billion in cash, up from $136.1 billion at the same time a year ago. Pfizer, with $32.7 billion, is sitting on the largest store of cash among those companies.

Although the pace of M&A deals continues to be tepid, that's likely to change. With Big Pharma companies rich with cash and needing to refill their pipelines, it's likely the pace of dealmaking will accelerate. Because

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Big Pharma Discovers Big Pharma

Dealmaking between peers has its attractions

BY DANIEL S. LEVINE

When Bristol-Myers Squibb moved to buy diabetes drugmaker Amylin Pharmaceuticals for $7 billion in 2012, it turned to its existing alliance partner AstraZeneca to help fund the transaction and reduce the risk.

AstraZeneca paid BMS's new Amylin subsidiary $3.4 billion for a 50 percent stake in its diabetes pipeline. The deal echoed an existing relationship between BMS and AstraZeneca in which the two equally share profits and losses from their 2007 collaboration to jointly develop diabetes drugs. Both companies needed to strengthen their pipelines and they had struggled to achieve success with their diabetes products. Their drug Onglyza faced tough competition from Merck's Januvia and though they won European approval for dapaglifoxin in Europe, the U.S. Food and Drug Administration refused to approve it in January 2012.

The Amylin deal gave the two companies three FDA-approved type 2 diabetes drugs including the twice-daily injectable Byetta, the once weekly version Bydureon, and Symlin, approved for people with type 1 and type 2 diabetes who need mealtime insulin and who do not have adequate glycemic control of mealtime insulin.

"There has been a mind shift. If you go back three or four years, people in my sort of role in peer companies all knew each other socially, but you kind of avoided each other at meetings like JPM-

(continued on page 3) »

April 2013 Life Sciences Scorecard (USD M)

	YTD 4/30/13	YTD 4/30/12	Change
Global Venture Capital	**3,974**	**3,976**	**0.0%**
U.S. VC	2,919	2,816	3.7%
IPOs (10 in 2013 vs 14 in 2012)	**3,081**	**928**	**232.1%**
U.S. IPOs (9 in 2013 vs 7 in 2012)	3,058	520	488.0%
Global PIPEs	**1,052**	**1,521**	**-30.8%**
U.S. PIPEs	385	561	-31.4%
Global Follow-ons	**3,683**	**2,456**	**50.0%**
U.S. Follow-ons	3,036	2,313	31.2%
Global Other Equity	**385**	**818**	**-52.9%**
U.S. Other Equity	326	745	-56.2%

	YTD 4/30/13	YTD 4/30/12	Change
Global Debt Offerings	**9,848**	**7,373**	**33.6%**
U.S. Debt	7,101	4,512	57.4%
Global Other Debt	**4,137**	**4,793**	**-13.7%**
U.S. Other Debt	1,444	3,522	-59.0%
Total Global Public Financings	**22,186**	**17,888**	**24.0%**
Total U.S. Public Financings	15,350	12,174	26.1%
Global Partnering	**9,879**	**12,040**	**-17.9%**
U.S. Partner/Licenser	7,015	6,753	3.9%
Global M&A	**33,697**	**45,730**	**-26.3%**
M&A, U.S. Target	23,382	35,345	-33.8%

THE BURRILL REPORT

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ISSN:1943-7617
PUBLISHED MONTHLY BY:
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Month in Review

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much of that cash is outside of the United States, it could lead to more global acquisitions.

M&A activity for the month could have been much bigger. Valeant's attempted merger of equals with the specialty pharmaceutical company Actavis through a reported stock swap valued in excess of $13 billion stalled as the two sides failed to agree on price. Royalty Pharma was also stymied in its $7.3 billion bid for Elan, which rejected its offer as inadequate.

Initial public offerings picked up in April as three life sciences companies completed IPOs on U.S. exchanges to raise a combined total of $188.8 million. Chimerix, a developer of antivirals, raised the largest portion of that amount with a $117.9 million offering. The two other offerings, the specialty pharma Omthera Pharmaceuticals and the personalized medicine company Cancer Genetics, both priced below their target ranges. So far, nine life sciences companies have gone public on U.S. exchanges in 2013 and are up a collective 16.8 percent from their offering price. They have raised a total of $3.1 billion, including the $2.6 billion IPO for Pfizer's animal health spinoff, Zoetis, in January. That compares to seven IPOs in 2012 that raised a total of $520 million.

May has already provided follow through with the upsized IPO of contract research manufacturer Quintiles, which priced 23.7 million shares at $40 a share, the top of its range, to raise $947 million. It's strong debut early in the month has fueled greater interest among investors in life sciences IPOs, with seven companies debuting as of May 22.

Investments in PIPEs have slowed in 2013 to a little more than $1 billion through the end of April, a 30.8 percent decline. But follow-ons continue to be a strong source of capital for life sciences companies. Through the end of April, life sciences companies raised a total of $3.7 billion in follow-ons compared to just $2.5 billion for the same period a year ago. That included a $515 million offering of newly listed Hong Kong shares from China-based Sinopharm Group at the beginning of the month. Two therapeutics companies that went public in 2012 also raised capital in follow-on offerings in April: ChemoCentryx raised $69 million through the sale of 5.75 million shares at $12 a share, and Durata Therapeutics raised $57.6 million in an offering of 8.3 million shares at $7 a share.

Nine life sciences companies have gone public on U.S. exchanges so far in 2013 and are up a collective 16.8 percent from their offering price. They have raised a total of $3.1 billion. That compares to seven IPOs in 2012 that raised a total of $520 million.

Global venture capital investment in the life sciences is keeping pace with 2012, with total investments through the end of April reaching almost $4 billion. Precision for Medicine, a provider of personalized medicine services, completed the largest venture financing during April, raising $150 million.

Partnering activity jumped in April with global transactions totaling a potential $2.8 billion compared to $1.9 billion for the same period a year ago. This included Roche's $392 alliance with Isis for a preclinical Huntington's program using antisense technology and three early-stage deals involving AstraZeneca for with a total potential value of $500 million. Nevertheless, global partnering is about 18 percent down year to date compared to levels a year ago.

The U.S. Food and Drug Administration's Center for Biologics Evaluation and Research approved CSL Behring's Kcentra for the urgent reversal of vitamin K antagonist anticoagulation in adults with acute major bleeding. But the agency's Center for Drug Evaluation and Research did not approve any new molecular entities in April, leaving its year-to-date total at nine approvals compared to 10 for the same period in 2012.

The U.S. Supreme Court in April heard oral arguments in the challenge to Myriad's patents on two genetic tests relating to breast and ovarian cancer. The case is being closely watched by the biotechnology industry because it threatens to upend long standing policy about gene-related patents.

It is not known how the court will rule, but the oral arguments suggest the court is aware of the importance of protecting incentives for innovation. There's a lot at stake for the biotechnology industry and the decision could alter the landscape for investment in this industry.

Select Big Pharma-Big Pharma Deals

DATE	DEAL TYPE	COMPANY/LICENSER	COMPANY/LICENSEE	DEAL VALUE (USD M)	UPFRONT PAYMENT (USD M)	MILE-STONES	DEAL PHASE	PRINCIPAL FOCUS
4/29/13	Collaboration	Pfizer	Merck	60.0			Phase 3 ready	Diabetes
10/3/12	License	Astellas Pharma	Janssen Biotech (J&J)	945.0	65	880	Phase 2b	Rheumatoid arthritis
8/14/12	Agreement	AstraZeneca	Pfizer	250.0	250	N/A	Marketed	Gastrointestinal
8/9/12	Collaboration	Bristol-Myers Squibb	AstraZeneca	135.0				Diabetes
7/1/12	Collaboration	Amylin (Bristol-Myers)	AstraZeneca	3,400.0			Marketed	Diabetes
6/29/12	License	Otsuka Pharmaceutical	Kyowa Hakko Kirin	140.0	37.5	102.5	NDA on file	Diabetes
5/13/11	License	Dainippon Sumitomo	Takeda Pharmaceutical	300.0	120	180	Marketed	Schizophrenia
4/8/11	License	Takeda Pharmaceutical	Dainippon Sumitomo	35.8	6	29.8	Marketed	Antibiotics
1/12/11	Alliance	Boehringer Ingelheim	Eli Lilly	1,233.0	400	833	Phase 3/FDA review	Diabetes
1/12/11	Alliance	Eli Lilly	Boehringer Ingelheim	1,175.0		1175	Ph 2/3	Diabetes

Pharma Meets Pharma

» *(continued from page 1)*

organ and BIO because you'd all be chasing the high quality assets in biotech in a very competitive way," says Shaun Grady, vice president for strategic partnering and business development for AstraZeneca. "Now it's just standard practice to be meeting up and having exploratory business discussions about whether there are areas where we are both working and there is mutual interest."

Partnering transactions have generally paired the large with the small as Big Pharmas have provided cash, regulatory finesse, and marketing muscle to small biotechs in exchange for access to innovative drugs. But in recent years, the changing calculus of moving drugs from discovery to market has increasingly led one-time rivals into partnerships with each other. Though the data is limited—just a handful of the 34 transactions since the start of 2011 have disclosed dollar values—these pairings of equals appears to be increasing in the last few years, something dealmakers say will likely accelerate because of the forces driving them.

These forces include the rising cost of drug development, particularly for large market indications such as Alzheimer's disease, diabetes, the growing interest in using combination therapies to attack diseases, and the rising influence of payers on development strategies, according to dealmakers.

"Today it's extremely costly to develop a drug and it's not just that you have to make all the investment up front before you know what you have. The component that is now probably the most significant component in any development decision is, can you get reimbursed? Can you get a fair price?" says Rob Wills, vice president of alliance management, for the Janssen Pharmaceuticals Companies of Johnson & Johnson. "You just can't bring a product to market anymore and expect that payers are just going to pay for it. That has changed the dynamic around risk."

Wills points to the approval in April of Janssen's Invokana, a first-in-class diabetes drug. Ten years ago, he said, a company would typically rely on two well-controlled late-stage studies before seeking approval, but because of input from payers and the need to show differentiation and added value with the drug, the company conducted nine late-stage studies.

As companies prepare to make a decision about entering late-stage testing where he said a company might spend $1 billion or more to get approval, they now must make additional investment to satisfy payers' concerns or risk spending large sums and having nothing to show for it. "If you don't have that," he says, "you are not going to get reimbursed."

While not necessarily the drivers of these deals, there are other factors that make them attractive, say dealmakers. These include more robust pre-clinical and early development work than they might find with assets at cash-strapped biotechs trying to do the bare minimum to get to proof of concept, the cultural similarities and shared views of the world that exists between large drugmakers, and the ability to look to the deep resources of a peer that could accelerate development and commercialization timetables in an era where reaching a global market has become important.

That last point means creating a global development plan rather than looking at regulatory filings and marketing roll outs one country at a time, says Atul Saran, SVP Corporate Development and Ventures at MedImmune. Where that once may have been a sequential process, it has become more of a parallel process as the dominance of the U.S. has waned and new parts of the world have grown in size. "That complexity was there, but it's come more to the forefront," he says. "You are seeing other markets become larger proportionally compared to the U.S. You are starting to see an increase in the other markets collectively."

Matthew Hudes, U.S. managing principal for biotechnology at Deloitte Consulting thinks the megamergers of recent years is one source of fuel for these peer alliances. As Big Pharma has become more willing to acknowledge that even the largest companies need to be focused in their portfolios, they have grown more willing to let go of assets that are no longer a priority rather than just let them languish on the shelf.

"In the past, there's been sort of a reluctance to do things with those. You can call it an admission of failure, or you can just call it a lack of priority on things that for whatever reason you have deprioritized," he says. "We are in the cycle of these megamergers where people now have to show where's the beef from doing the merger and show that financially and they are willing to take some of those shelved assets and let somebody else have a go at them."

The current pipeline of deals should stand as a proof of concept for Big Pharma and determine how aggressively these companies pursue such deals in the future. Nevertheless, there are many reasons to believe the sudden spate of such deals is likely to reflect the routine course of business going forward.

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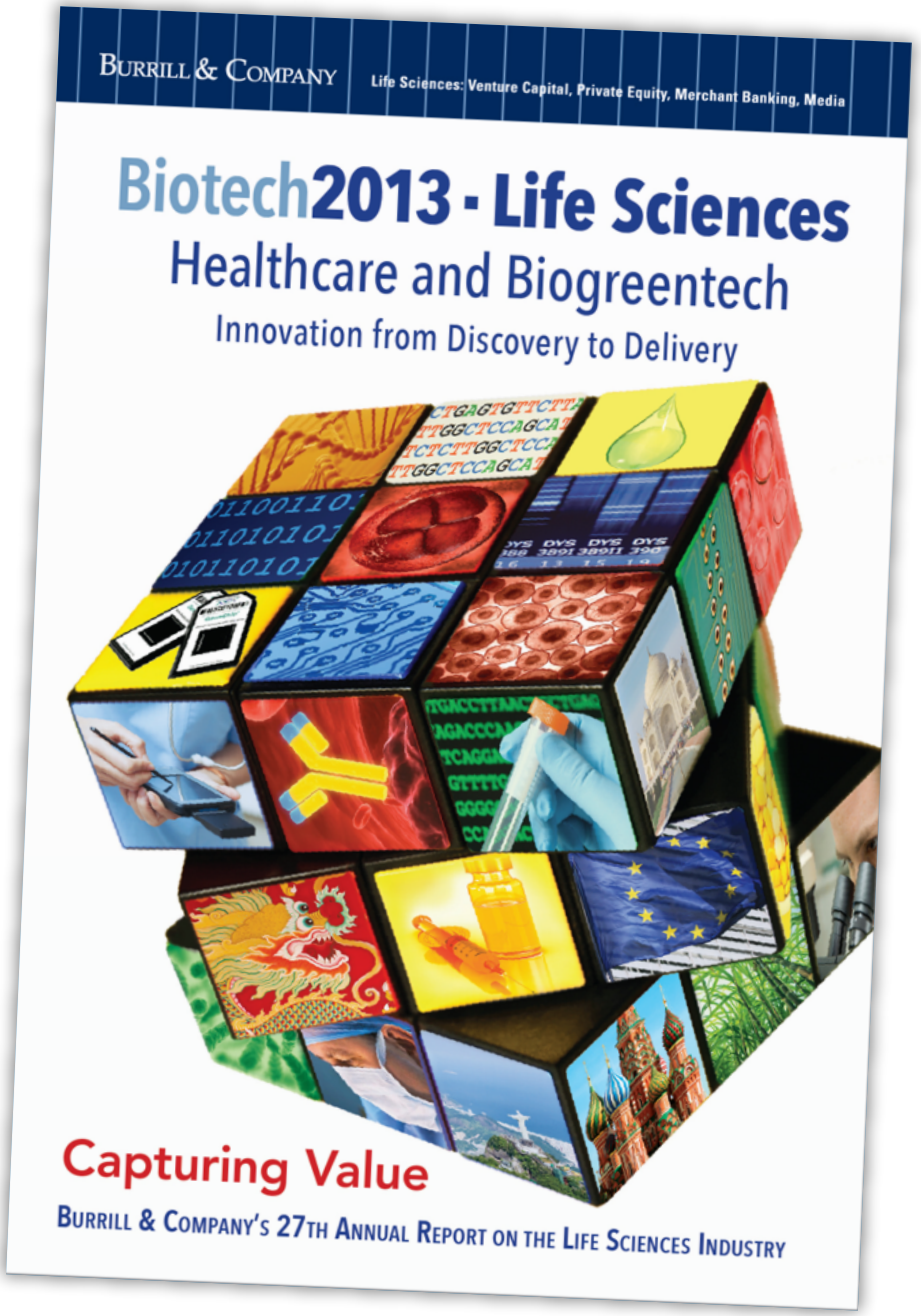

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Partnering Prenuptials: Translating Priorities into Deal Terms

Focus on upfront payment should not overshadow planning for future situations

BY HEMMIE CHANG

For small, innovator companies sitting across the table from a large commercial partner, negotiating deal terms can often be a challenging process.

Often a company interested in partnering has few alternatives to accepting commercial terms being proposed by its partner, or, at best, needs to choose among several proposals. However, setting priorities and baking the most critical issues into an approach to partnering can pay off.

There are three main issues to consider in structuring an early-stage collaboration. As large companies seek partnerships earlier in the development cycle, consideration of how to structure the payment stream, maintain alignment of goals, and part ways should the time arise is all the more critical.

Biotech and medical device companies are capital intensive and are typically looking for cash. It's not surprising, then, that their priorities often center on upfront payments. A singular focus on the upfront payment, however, should not overshadow other important issues.

Hemmie Chang
Attorney; Chair of Foley Hoag's Licensing & Strategic Alliances Practice Group in Boston.

It is just as important to focus on the entire stream of payments, particularly on achievable milestones in the near term that will trigger additional cash contributions. What the term sheet does not readily reveal is how manageable the risks are and therefore how much control a company will have in triggering milestones.

Even if a company is disappointed with the size of an upfront payment, it still may be able to receive payments from early deliverables. Licensing milestones are not unlike later-stage venture investments funded in multiple tranches. The real question is, "How achievable are such milestone events?"

The good news is that the larger partner will want to create incentives to drive its partner to accomplish a project's objectives and will see value in tying payment to achieved goals. For example, whether the results are positive or not, a company should be rewarded for delivering data, as early information on a target, patient population, or development challenges is valuable for decision making.

Consideration of how to structure the payment stream, maintain alignment of goals, and part ways is critical.

It is also critical to align commercialization goals between partners. I usually advise life sciences clients not to worry too much about the other partner's commitment, unless the partner has competitive products or programs. Of course, the innovator company may be exposed if its intellectual property position is not adequately protected by patents, or it has effectively transferred its technology to the other partner. Parties may not see eye-to-eye on development or commercialization paths, but usually both partners are motivated to deliver a successful product.

The challenge, though, is how to protect the innovator company from changes in corporate priorities or competitive opportunities that a partner later wants to pursue internally or with other parties. Although M&A activity may have slowed, there are still plenty of reasons a partner's strategic focus might change. As a result, I always prioritize consideration of when and how a partner might want to get out of an agreement.

Expect to meet resistance when seeking to limit a partner's flexibility to change its priorities. The more productive route is to find objective standards that serve as a proxy for a partner's continuing interest. For example, if the partner is providing funding, the partner's willingness to provide an adequate level of funding to conduct the projects to which it is committed serves as a reasonably objective measure.

I prefer periodic points where each side can gauge the commitment of the other. These sign posts are different in every deal. In one case, partners may choose to measure whether each party is making periodic payments or undertaking and executing its work, while in others they may choose to focus on an upcoming annual budget. Ideally, the parties would agree to reasonable touchstones for the filing for regulatory approval to market a product, or the launch of a product by a certain date. It's advantageous for a licensor to set such dates even if with a generous grace period for factors outside everyone's control, whether scientific or regulatory.

Obviously, not all partnerships have happy endings. Large companies know this and will factor the termination costs of a breakup into a deal valuation, even when there is no termination fee. The reality is that, whether there is value in a partnered asset or not, one side or the other may not be able to approach a termination as cooperatively as they did when they first got together to structure the deal. One side may be so invested in a product or therapy that its drive to advance development of a drug is simply greater than the other party, or the parties may have different views on whether there is any value left in an asset.

As with prenuptial agreements, planning for a termination event when deals are being consummated often is the last thing on the parties' minds. It is true that whatever is crafted will often not reflect how events actually unfold. Nevertheless, it's wise to think through some basic scenarios, whether it's because the drug or device fails, or it is just not commercially viable.

Although there may be allegations of fault or lack of good faith on either side, it is often not as productive as just analyzing what is fair under the given circumstances. If one party is no longer committed to development, whether due to a default in funding or work, the other party should have the opportunity to continue to carry the product forward. Similarly, the large partner, if it has funded the program (or contributed its share) may feel it should share in the some of the upside if that product is further developed successfully. Open discussion of each party's concerns and priorities in various scenarios, if done collaboratively at the outset, builds trust and a common template for dealing with other challenges in the collaboration.

Licensing deals, regardless of bargaining position, are subject to the dynamics of dealmaking between partners who usually are motivated to be cooperative where they can. Expressing priorities in a straightforward manner and exchanging ideas based on those priorities does not ensure a successful product, but can facilitate a successfully negotiated deal and increase the likelihood for a successful collaboration. ■

Taking Risks Together

Seeking to minimize risks, venture firms pair with drugmakers to pursue early-stage opportunities

BY MICHAEL FITZHUGH

As the biggest biopharma companies seek to replenish their early-stage pipelines by tapping external research and development talent, collaborations between drugmakers and venture capital firms have grown more common, driven by attractive advantages for both.

Variations in deal structures abound, but the lure of novel assets already vetted by experienced venture teams is drawing increased interest. For drugmakers, these arrangements provide early access to new technologies often with an option to acquire at a fixed price. For venture firms, a clear path to an exit tied to fixed dates or milestones is enticing.

Recent transactions between venture capital firms and biopharmaceutical companies have included Versant Ventures with Celgene and Roche, Avalon Ventures with GlaxoSmithKline, Mission Bay Capital with Roche and Bayer, and Third Rock Ventures and Greylock Partners together with Sanofi. These partnerships represent a rethinking of the relationship between biopharma and venture capitalists, a relationship that Avalon Managing Director Jay Lichter says has hit an all-time low as financing risk and late-stage clinical failures have taken their toll.

"The public markets have been effectively closed. Venture groups have been getting smaller and pharma wasn't doing deals at the same robust rate," say Lichter. "The whole thing was in a bad place."

In search of a solution, Avalon in April said it would work with GSK to repair the relationship, co-funding and launching up to ten early-stage life sciences companies in San Diego. They agreed to jointly approve the formation of new companies based on early-stage technologies and then finance them together, with Avalon committing up to $30 million from its newest venture fund and GSK providing up to $465 million in company seed funding, research and development support, and success-based preclinical and clinical milestones.

"My $3 million can turn into $40 million per company," says Lichter. "It's an outstanding return for me and an outstanding deal for Glaxo. That's why it works."

A pair of deals announced in May between Mission Bay Capital and Roche, and separately between Mission Bay Capital and Bayer Healthcare, targets early-stage assets. Those deals revolve around startups enrolled in the University of California's California Institute for Quantitative Biosciences, or QB3. Roche and Bayer announced that they will work with QB3 to help identify, fund, and support early stage life science companies in the San Francisco Bay area. Mission Bay Capital is the seed-stage venture capital firm formed to fund startups launched from QB3.

Bayer Healthcare over three years will evaluate and support life science startups spun out of QB3, using its experience to help guide these companies as they advance therapeutic candidates and identify risks. Bayer's innovation center is located next to the UCSF Mission Bay campus. Bayer, QB3, and Mission Bay Capital, will jointly evaluate up to 60 companies a year with Mission Bay Capital committing up to $500,000 per startup picked. Bayer will look for potential collaborations, and says it is creating a dedicated research team located in San Francisco to focus on facilitating discovery stage research deals.

Roche's program with QB3, called "Collaborative Startups," will identify candidates for the program through its incubator network. These will be routed through QB3's Startup in a Box, a separate program that coordinates legal support from Bay Area law firms as startups incorporate.

After due diligence, Roche and QB3—through Mission Bay Capital—will co-invest in candidate startups at the seed stage. Roche may also contribute support in the form of scientific expertise or resources and both Roche and QB3 may also invest in a series A funding round for candidate startups.

QB3 has many resources to validate technology and putting the basic nuts and bolts of a startup in place for entrepreneurs, says Neena Kadaba, director of industry alliances at QB3, and a partner at Mission Bay Capital. "But we still see a gap in the amount of capital these companies can access, especially with venture not doing seed stage finance," she says.

Furthermore, says Kadaba, by establishing close ties between industry partners earlier, rather than later, startups can be smarter about planning their paths. "Making the wrong decision with limited capital can have disastrous consequences for startups," she says.

Another common theme in the landscape of biopharma-venture partnerships has been platform deals. Third Rock, Greylock and Sanofi funded Warp Drive Bio in January 2012 with initial financing of up to $125 million, $75 million of which was an initial tranched equity investment. The remaining $50 million was tied to the achievement of specified milestones. Warp Drive is using its proprietary genomics search engine to unlock potentially powerful therapeutics hidden within microbes.

Versant Ventures too has been a pioneer of closer ties between venture and biopharma, forming two complementary partner-bound enterprises: Inception Sciences and Quanticel.

Versant created and funded Quanticel with Celgene in a scientific collaboration to discover first-in-class cancer drugs. Celgene committed $45 million to Quanticel and received a 40-month technology license, equity, and exclusive option to acquire Quanticel at the end of three-and-a-half years.

Versant has had a number of great successes in biotech, says Jerel Davis, a principal at Versant, but biotech companies can take a long time to mature. "We saw this as a complementary model to lock in an exit path from the founding of the company. It's less a build-it-and-they-will come mentality and more of a build-to-buy mentality," he says.

With a related approach in mind, Versant founded Inception Sciences, a small molecule pharmaceutical "discovery engine" focused on translating biological insights into highly targeted, novel drugs. Instead of selling the company, the spin out, Inception 3, has an exclusive partnership with Roche to develop a drug for the treatment of sensorineural hearing loss.

Pharma doesn't want to increase their infrastructure in discovery, says Davis. "They've seen massive downsides there. But they still have a need for innovative products."

Sharing the Risk

Option-to-license and option-to-buy deals increase as both sides look to maximize value

BY MARIE DAGHLIAN

In early May, Concert Pharmaceuticals entered into a strategic collaboration with Celgene to apply its technology to reduce the time, risk, and expense of drug development throught he use of deuterium-modified compounds. The deal, initially focused on a single Celgene target, can be expanded to multiple targets in the future.

While specific terms were not disclosed, Concert will receive an upfront payment and will be eligible for more than $300 million in milestone payments per program if Celgene exercises its option to continue development. Concert will also be eligible for royalties on any commercialized products arising from the collaboration.

The current capital-constrained environment has made smaller companies more willing to accept option deals as a way to validate their technology and continue funding their own development.

Celgene, which markets the top-selling cancer drugs Revlimid and Abraxane, has been one of the most prolific dealmakers of late, searching for innovative platforms that can help it become a leader in oncology. Its early-stage deal with Concert is just one of many the Big Biotech has formed with startups to access different platform technologies as it looks not only to beef up its pipeline, but also to streamline the drug development process.

The one thing these deals all have in common is that Celgene has the option to license the asset or buy the company at a future point in the collaboration. In fact, option-based deal structures, both in M&A and partnering and licensing transactions, are becoming increasingly common as larger pharmaceutical and biotech buyers move to externalize their R&D and tap into innovation at a much earlier, much riskier stage of development.

Just a few years ago, the larger companies would wait until an asset reached proof-of-concept before seeking to license it from biotech. Now, though, they are tapping discovery platforms and preclinical assets in ever increasing numbers. Option deals can mitigate their risk, which is much higher in deals involving early-stage assets and platform technologies that have yet to be validated by generating compounds that have passed initial hurdles in humans.

And while smaller companies prefer the certainty of a deal without options, the current capital-constrained environment has made them more willing to accept such deals as a way to validate their technology and continue funding their own development programs.

Three quarters of the 48 partnering deals struck between Big Pharma/ Big Biotech and startups since the start of 2013 through May 24 are focused on discovery and preclinical assets. Of the 21 deals with disclosed total deal values, 8 were based on an option to license/buy at a future date. Among M&A deals announced by Big Pharma/Big Biotech so far this year, most of which involve assets in phase 2 or beyond, 15 out of 22 deals structured to include earnouts, with an average half the total deal value paid upon its close, and the remainder contingent on the achievement of specified milestones.

Only two of those acquisitions involved companies with discovery or preclinical assets, both of which are focused on rare diseases: BioMarin paid only $10 million upfront for Zacharon Pharmaceuticals, with its investors eligible for unspecified future payments; and Shire paid only $49.3 million for Lotus Tissue Repair, with investors eligible for up to an additional $275 million in milestone-based payments. It was a big win for Lotus' main investor Third Rock Ventures, which owned 75 percent of the biotech and had only invested $2.8 million in it at the time of the sale.

An analysis by Deloitte Recap found that in the 26 years from 1981 through 2006, option to license or buy deals averaged about nine per year. But between 2007 and 2012, they averaged about 54 deals per year. Structured M&A deals, almost non-existent in 2000, make up about 10 percent of all M&A transactions today.

Though option deals usually come with a smaller payment up front, the Recap analysis found that the average deal value of an exercised option deal was $437 million compared to $358 million for a traditional licensing deal, due mainly to the payment of the option fee and the future higher value of an asset that has moved successfully through development. While licensing transactions with options can result in greater value for the smaller company than a traditional licensing deal if the option is exercised, Recap's analysis found that 62 percent of options are never exercised.

Still they are a way to bridge the valuation gap between the buyer/licensee and the seller/licenser. And they can also provide much needed funding for the small company to continue to develop their programs and increase the value of their assets.

"If you think about the difference in what the large companies want to pay and what the small companies want to do—it's pretty dramatic. Small companies want all cash, $300 million to $41 billion of an acquisition price, but large companies want to give you as little upfront as they basically can—more structured to mitigate the risk," says Chris Ehrlich, and independent consultant and former venture partner at InterWest Partners. "The challenge of the option deal became an opportunity for folks to plunk down some money, sometimes even some equity, to give [the smaller company] a chance to develop their product, and once their product is designed well, to start paying them money."

Mark Goldsmith, partner at Third Rock Ventures, notes the difficult envi-

(continued) »

Option Deals

» *(continued)*

ronment not just for smaller companies, but also for the larger companies, which are scrambling to access innovation with limited research budgets, lots of other development commitments, and are dealing with a lack of productivity and the loss of revenues to patent expirations.

"The challenge is to try to bridge these two types of organizations that both have an interest in developing important assets but have valuation problems and cash flow problems on either side," says Goldsmith. He says it's important when structuring an option-based deal to consider what will happen if the option is not exercised.

As chairman of Constellation Pharmaceuticals, Goldsmith was instrumental in the deal struck with Roche's Genentech in early 2012. Goldsmith said Genentech was interested in its epigenetics driven discovery engine and its lead assets but they were too early in development for the two sides to come to terms on their value.

"The structure we defined was one in which we would provide the product engine to Genentech in collaboration—so we would have an all-in deal around the product collaboration, but we would reserve the lead assets in the pipeline as wholly owned assets of Constellation," says Goldsmith.

Genentech committed $95 million in non-dilutive financing over three years, enough to finance the collaboration and develop Constellation's lead assets. At the end of three years, Genentech has an option to acquire Constellation at predefined terms. "If they don't pull the trigger, we got $95 million of non-dilutive capital to pour into our programs," says Goldsmith. He notes that this type of deal works ideally for a company with a discovery engine and a development pipeline, and is not necessarily ideal for an asset-centric company.

As with all partnerships, both sides have to remain aligned toward a common goal for it to work. Although buyers want maximum flexibility, sellers need to consider all the possible outcomes when negotiating and push for specific events that will trigger an option exercise decision.

Option deals, especially involving early-stage assets, are only going to increase in number as both sides of the table look to maximize the value of the deal for themselves.

Select Option Deals in 2013

ACQUIRER	TARGET	DEAL VALUE (USD M)	PRINCIPAL FOCUS	UPFRONT PAYMENT (USD M)	CVRS / MILESTONES (USD M)	ASSET STAGE
M&A						
BioMarin Pharmaceutical	Zacharon Pharmaceuticals	10.0	Rare diseases	10	N/A	Discovery
Shire	Lotus Tissue Repair	324.3	Rare diseases	49.3	275	
Opko Health	Cytochroma	290.0	Kidney disease side effects	100	190	
Progenics Pharmaceuticals	Molecular Insight Pharmaceuticals	105.9	Cancer	12.9	93	
Watson Pharmaceuticals	Uteron Pharma	305.0	Women's health products	150	155	Phase 2
Shire	SARcode Bioscience	160.0	Ophthalmic	160	N/A	Phase 3
Auxilium Pharmaceuticals	Actient Holdings	645.0	Urology specialty pharma	585	60	Marketed
Takeda Pharmaceutical	Inviragen	250.0	Viral vaccines	35	215	Phase 2
Elan Corporation	Newbridge Pharmaceuticals	284.0	Specialty pharma	40	244	Marketed
PARTNERING						
Amplimmune	Daiichi Sankyo	50.0	Autoimmune			
Orexo	AstraZeneca	N/A	Respiratory diseases			
Resolve Therapeutics	Takeda Pharmaceutical	255.0	Lupus, autoimmune	8		
Five Prime Therapeutics	UCB	16.0	Inflammatory diseases	N/A		Discovery
Bluebird Bio	Celgene	225.0	Cancer gene therapies	N/A	225	Discovery
Bind Therapeutics	Pfizer	210.0	Accurins platform technology	50	160	Discovery
Isis Pharmaceuticals	Roche	392.0	Huntington's Disease	30	362	
Forma Therapeutics	Celgene	200.0	Cancer	N/A		Discovery
Concert Pharmaceuticals	Celgene	300.0	Cancer, inflammation	N/A		Discovery

SPECIAL SUPPLEMENT JUNE 2013

Hospital Readmissions in Europe

Using remote monitoring to contain costs

QUALCOMM LIFE
a Qualcomm company

THE BURRILL REPORT

As a growing percentage of Europe's population turns 65 and older, a rising incidence of chronic disease is driving hospital admissions. Readmissions are also rising, adding to the already mounting cost of delivering care in expensive institutional environments. The phenomena will add to the pressure on health care systems as the percent of the population over the age of 65—the largest consumers of medical services—grows.

"Too short a length of stay could also have adverse effects on health outcomes, or reduce the comfort and recovery of the patient. If this leads to a rising readmission rate, costs per episode of illness may fall little, or even rise."

–HEALTH AT A GLANCE 2012

In the European Union, the number of people aged 65 or over is expected to almost double over the next 50 years to 151 million by 2060 from 85 million in 2008. Among those seniors admitted to hospitals to care for complications of chronic or acute episodes of illness, most will be treated and discharged to recuperate at home. But some will face a growing problem, characterized in the European Commission and Organisation for Economic Co-operation and Development's latest overview of Europe's health, Health at a Glance Europe 2012, which expressed concerns about the risk of discharging patients prematurely. "Too short a length of stay could also have adverse effects on health outcomes, or reduce the comfort and recovery of the patient," the report said. "If this leads to a rising readmission rate, costs per episode of illness may fall little, or even rise."

The scope and cost of avoidable hospital readmissions is just beginning to be tracked in some European nations although it remains unaccounted for in most countries. Where data does exist, it is becoming clear that readmissions adds stress to national health budgets, nearly all of which are already under pressure due to austerity measures, growing demands for services, and the rising cost of health care.

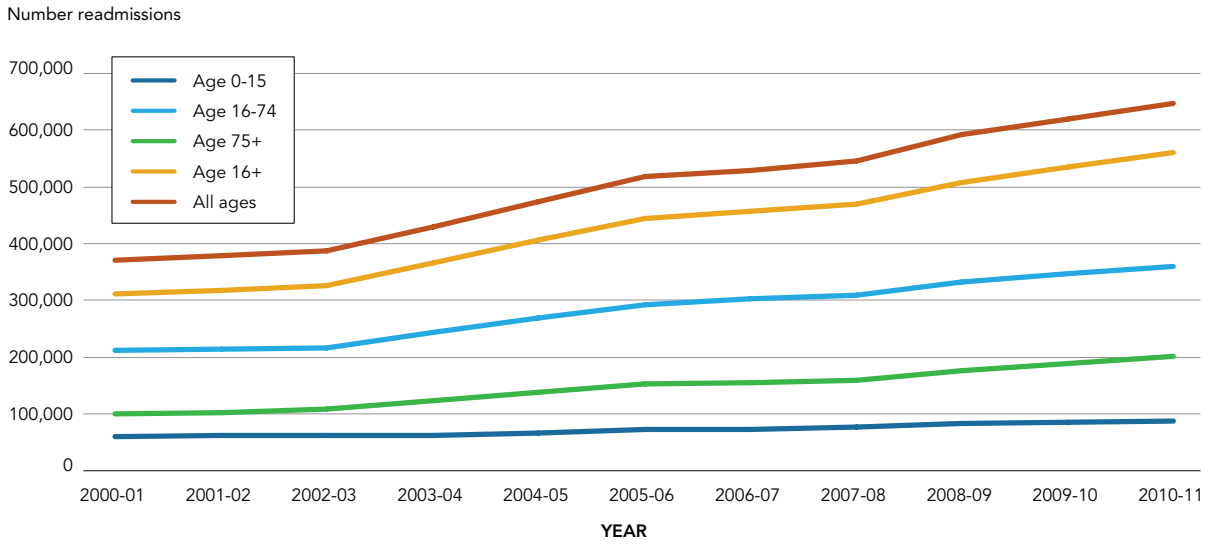
"In a time when resources are scarce, in a time when people in many health care systems are not able to fund what is there over the next 20 years, it is inevitable that we need to start to think very carefully about how we utilize available resources," said John Oldham, a physician and National Clinical Lead Quality and Productivity in the U.K.'s Department of Health. "If we continue to do as we do now, no health care system in the industrialized world is sustainable."

To reduce the cost burden of avoidable readmissions, a number of European and country-specific programs are laying the groundwork for the large-scale delivery of telehealth services. The deployment of medical devices capable of monitoring and tracking patients' health will be critical to supporting efforts to keep people well and out of the hospitals. Finding ways to integrate the data from those devices into programs designed to allow health professions to intervene is parmount, before problems advance to the point where readmissions become necessary.

The United Kingdom has led the way among its European peers in tracking and seeking to address the problem. An average of 6.5 percent of patients were readmitted to hospitals within 30 days at a cost of about $2.4 billion (£1.6 billion) in 2011, according to Karen Taylor, Research Director for the Deloitte U.K. Centre for Health Solutions. Out of about about 14.2 million patients discharged from United Kingdom hospitals, more than 600,000 were readmitted for care.

Between 1999 and 2010, the U.K.'s National Health Service saw a 50 percent increase in readmissions, says Taylor. That led in 2010 to a new focus on readmissions, and the introduction by former U.K. Health Secretary Andrew Lansley of a penalty for hospitals needing to readmit patients within 30 days. Under the rules, hospitals in England are to be paid for initial treatment, but not paid again if a patient is brought back in within 30 days with a related problem.

Emergency Readmissions: England 2000-01 to 2010-11



At the time, Lansley spoke of his desire to make headway against criticisms that some patients are discharged from hospitals too soon and without proper care plans in place. "Over the last 10 years, emergency readmissions have increased by 50 percent. Not primarily because patients were more frail, but because hospitals have been incentivised to push people out early – process targets creating risks for patients," Lansley said in a statement to The Guardian. "So we are going to ensure that hospitals are responsible for patients not just during their treatment, but also for the 30 days after they've been discharged. If a patient is readmitted within that time, the hospital will not receive any payment for the additional treatment – they will be focused on successful initial treatments."

Another estimate by the NHS Institute for Innovation and Improvement has suggested that between 3 percent and 11 percent of patients return to the hospital within 28 days of discharge due to complications arising as a consequence of their health at the time of admission, an operation, an infection during their hospital stay, joint issues, or slower-than-expected rehabilitation.

Solutions to tackle the readmissions problem and assist hospitals in the avoidance of penalties will take many forms.

One of the major efforts to meet the problem head-on is the 3millionlives initiative, a public-private partnership focused on expanding the use of telehealth in the United Kingdom. Launched in January 2012, it seeks to transform delivery of health care and social care services to people with chronic conditions by promoting widespread adoption of telehealth by the NHS with the goal of bringing 3 million people significant benefits evidenced in the U.K.'s Whole System Demonstrator trials (the largest randomized control trial of telecare and telehealth in the world).

The trials resulted in:

- A 15 percent reduction in emergency hospital visits
- A 20 percent reduction in emergency admissions
- A 14 percent reduction in elective admissions
- A 45 percent reduction in mortality rates

Denmark is another nation with a long track record where deploying sophisticated health information technologies, telecare, and home monitoring tools are also making a positive impact. An early program that deployed home monitoring devices for patients with chronic obstructive pulmonary disease reduced avoidable hospital readmissions significantly. Investments in core health information technologies, such as electronic medical records, together

with home monitoring technology contributed to reducing stays at one Danish hospital to 2.9 days, versus the European Union average of approximately 7 days, and lowered re-admission rates are in some cases down by more than 50 percent.

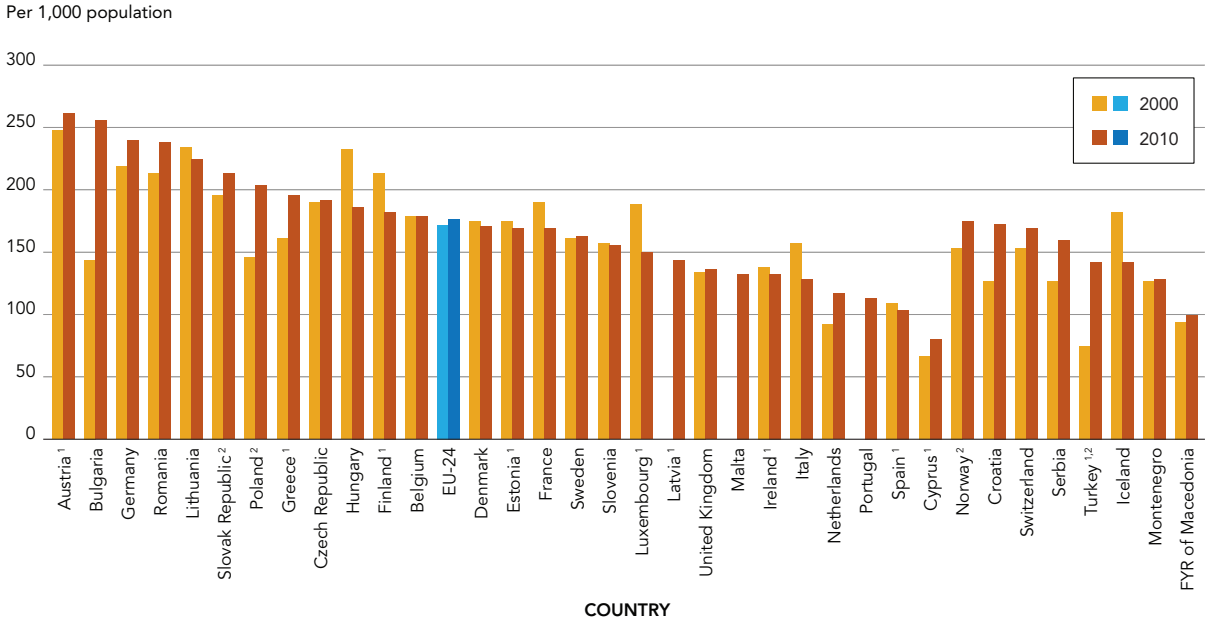
Though data is not as available in other countries, there is evidence that the same rise in hospital readmissions in the United Kingdom has been seen elsewhere as people are pushed out of hospitals to cut costs. The average length of stay in hospitals has decreased over the past decade in all European countries, falling from 8.2 days in 2000 to 6.9 days in 2010 on average in E.U. member states.

The average length of a hospital stay is, to some degree, regarded as an indicator of efficiency, notes the European Commission since a shorter stay may reduce the cost per discharge, and shift care from inpatient to less expensive post-acute settings. However, shorter stays tend to be more service intensive and more costly per day. Too short a length of stay could also have adverse effects on health outcomes, or reduce the comfort and recovery of the patient. If this leads to a rising readmission rate, costs per episode of illness may fall little, or even rise.

The reduction in average length of stay was particularly marked in Bulgaria, Croatia, the Former Yugoslav Republic of Macedonia and Switzerland. It also decreased in the Netherlands and the United Kingdom. Several factors explain this general decline, including the use of less invasive surgical procedures, changes in hospital payment methods, and the expansion of early discharge programs enabling patients to return to their home to receive follow-up care.

Hospital discharges are a measure of the number of people who were released after staying at least one night in the hospital. Together, with the average length of stay, they are important indicators of hospital activities. Hospital activities are affected by a number of factors, including the capacity of hospitals to treat patients, the ability of the primary care sector to prevent avoidable hospital admissions, and the availability of post-acute care settings to provide rehabilitative and long-term care services. In 2010, hospital discharge rates were the highest in Austria, Bulgaria, Germany, and Romania.

Hospital discharges per 1,000 population, 2000 and 2010 (or nearest year)



1. Excludes discharges of healthy babies born in hospital (between 3-7% of all discharges). 2. Includes same-day discharges.

They were the lowest in Cyprus, Portugal and Spain as well as in the Former Yugoslav Republic of Macedonia. In general, countries that have a greater number of hospital beds also tend to have higher discharge rates. For example, the number of hospital beds per capita in Austria and Germany is more than twice the number in Portugal and Spain, and discharge rates are also more than two times greater.

France, which is struggling with 20 years of deficits, is also dealing with the burden of unexpected readmissions. In a study of a thousand patients aged 75 and older admitted to medical wards through emergency departments in nine French hospitals, 14.2 percent of inpatients returned through unplanned readmissions within 30 days.

In all cases, plans that ensure patients are mobile within 24 hours of surgery, clear communication with patients, and close monitoring and support—especially in the two weeks following discharge—can reduce readmission. It is in this area that Qualcomm Life's 2net platform is expected to play a critical role.

In December 2011, Qualcomm Life launched its cloud-based 2net Platform, which is designed to connect disparate monitoring devices to information and communication technology systems to allow health care professionals to continuously monitor patients remotely. The award winning plug 'n' play technology removes the need for patients to gather and report data about their changing health status.

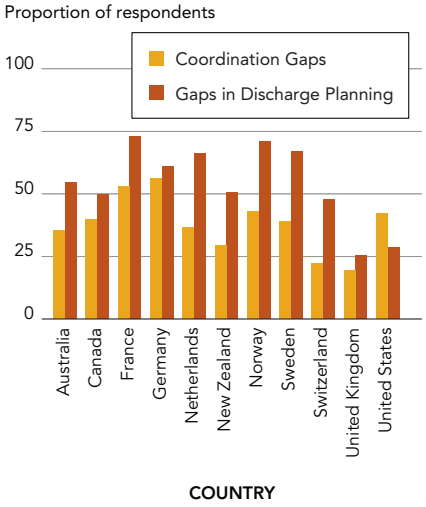
The 2net Platform supports secure socket layer (SSL) communication of data and is FDA listed as a Class I Medical Device Data System (MDDS) in the U.S., Class I MDD and CE registered in Europe, and Class I in Canada. As an MDDS, the 2net Platform is designed, developed and manufactured in accordance with a quality system compliant with ISO13485 standards, meaning it aligns with the quality requirements of U.S. and international regulatory agencies in the health care industry.

The Platform wirelessly connects to devices and apps via one of four gateways, including a wireless communications hub, a mobile app component, medical devices with embedded 2net cellular modules, and platform-to-platform integration using APIs, or application programming interfaces. Together the gateways enable the collection, provision, and cloud-based transfer of a broad array of biometric data. Through 2net, for instance, a blood glucose meter can automatically send test results to a secure database, allowing health care providers or even family members to view the information anytime.

To address the challenges presented by chronic disease in Europe, the coordination of complex care programs over long periods of time will be essential to prolonging life and enhancing its quality for patients, notes Ellen Nolte, Director, Health and Healthcare, RAND Europe. To that end, access to the right medicines and monitoring systems as well as promotion of active patient engagement will be necessary.

The need to deploy wireless monitoring technologies in Europe will be also be driven both by consumers of care and the never-ending quest by payers to keep health care costs in check. As the number of activity monitors, scales, and blood pressure meters sent home with patients rapidly grows, the collection of data from those devices in a reliable and secure manner will be important to improving the quality and efficiency of care.

Patients with chronic disease report deficiencies in care coordination



"In most service industries around the world, the way that they interact with people has changed dramatically due to the digital revolution. Health care is the last vestige almost where that hasn't taken place. But it will. It will not be long before the Facebook generation have long-term conditions," says U.K. Department of Health's Oldham. "Already, they are wanting to download apps about their diabetes, and heart failure, and chronic disease. [...] I can think of no other way to improve the capacity of a health care system than by embracing your users in the management of their own conditions."

But only five percent of all consumer medical devices have any wireless capability. Given the pervasiveness of wireless technology in the home, the fact that so many devices can't transmit any data represents a call to action for Qualcomm Life. One of the first health care providers to adopt 2net in Europe is The Hospital de Torrejón in Madrid, which has deployed mHealthAlert, a spin-off of Cystelcom. The mHealthAlert platform provides an inexpensive, "always on," telemonitoring service to elderly and chronic patients from their homes. It's main objective is to provide a service that raises standards of health care monitoring while reducing the cost of treatment, and provides an inexpensive service to help the elderly keep in touch with their family and friends to avoid loneliness and social exclusion. Additionally, the service is expected to improve wellness monitoring and reduce the cost of treatment, by integrating telemedicine devices that provide real-time medical alerts.

In its collaboration with the Hospital de Torrejón, mHealthAlert is employing devices featuring telemonitoring devices (blood pressure and pulse oximetry) leveraging Qualcomm Life's 2net Platform to help medical professionals to more effectively manage their patients. The technology is expected to help reduce hospital readmissions by more than 20 percent and the duration of hospital stays by more than 25 percent on average.

In a separate collaboration, Italy's Telbios is working with Qualcomm Life's 2net system to deploy a project developed for people suffering from chronic diseases such as diabetes, hypertension, pulmonary, and cardiac failure—people who can easily receive at home care tailored to their needs. The system relies on an integrated disease management service and a cutting-edge technological infrastructure developed by Telbios, the leading company in Italy in telemedicine services, with the help of Qualcomm Life.

The deployment of 2net in Europe is likely to expand rapidly as hospitals and regional government payers begin to recognize the need to reduce readmissions. Integrated care teams, which will be key to addressing readmissions, will be able to work in efficient collaboration only with the best and most up-to-date patient data at hand.

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2. http://www.institute.nhs.uk/scenariogenerator/tools/reduce_readmissions.html
3. http://3millionlives.co.uk//wp-content/uploads/2012/03/3millionlives-News-Release.pdf
4. Health at a Glance: Europe, OECD and the European Commission
5. Lanièce I, Couturier P, Dramé M, Gavazzi G, Lehman S, Jolly D, Voisin T, Lang PO, Jovenin N, Gauvain JB, Novella JL, Saint-Jean O, Blanchard F. Incidence and main factors associated with early unplanned hospital readmission among French
6. Video, Hospitals face penalties for discharging patients too soon - http://www.youtube.com/watch?v=tfiDLHYsQTc
7. http://www.guardian.co.uk/politics/2010/jun/08/hospitals-lansley-penalty-patient-readmissions

About Qualcomm Life

QUALCOMM LIFE a Qualcomm company

Qualcomm Life is defining and connecting the wireless health network to improve lives and advance the capabilities of medical devices. By focusing on device connectivity and data management, we empower medical device manufacturers and service providers to deliver wireless health quickly and easily to those who need it. Our mission is to mobilize health care.

The Burrill Report

THE BURRILL REPORT

The Burrill Report is a digital publication that provides information, insight, and analysis on the life sciences at the intersection of business, policy, and society. It provides daily coverage at www.burrillreport.com and a monthly issue available as a downloadable PDF from the site.

APRIL STATISTICS

April Financings: Funding Innovation

Startups raise early-stage capital for novel programs

BY MARIE DAGHLIAN

While venture capital is harder to come by for early-stage biotechs, corporate venture and other sources of capital bolstered several significant first round financings that were announced recently. Indeed, Big Pharma has stepped up its game in this area as it looks externally to earlier stage innovation to fill its R&D pipeline. This has been evidenced by increased partnerships with venture capital firms, startup accelerators, and academia. Early stage financings picked up in the month with $147 million raised in 14 announced deals in the United States for series A rounds. This was 15 percent of the $989 million raised by U.S. life sciences companies during April. As is often the case, five companies accounted for more than two thirds of the capital raised. What's interesting is the lead role venture capital and established pharmaceutical companies are taking in the launch of new companies. Syros Pharmaceuticals was launched in April with $30 million in series A financing led by company co-founders ARCH Venture Partners and Flagship Ventures. Chinese pharmaceutical and contract research services company WuXi PharmaTech's corporate venture fund and other undisclosed private investors also participated in the financing.

Gene therapy has been gaining renewed respect among researchers, drugmakers and investors, as novel therapies prove successful in the clinic.

Syros' technology harnesses breakthroughs in gene regulation in the discovery and development of new treatments for cancer and other diseases. Based in the Boston area, Syros Pharmaceuticals was co-founded by ARCH and Flagship's VentureLabs unit working with three experts in the field of gene regulation and translational medicine: Richard Young of MIT's Whitehead Institute; James Bradner, of Harvard Medical School, Dana Farber Cancer Institute, and the Broad Institute; and Nathanael Gray, of Harvard Medical School, Dana Farber Cancer Institute.

"It is increasingly clear that much of human diseases lies in the switches that control genes rather than the genes themselves," says Young. "We now can map the regulatory circuits in all human cells, including the critical switches in cancer and other diseases. This offers a promising new way to treat disease."

Nancy Simonian, an industry veteran who has held executive positions at Millenium and Biogen, will be the company's first CEO. Syros has signed exclusive, global licensing agreements with the Whitehead Institute and the Dana Farber Cancer Institute that cover its lead scientific platform components and methods.

Several European biotechs also closed significant first financing rounds, accounting for $72.5 million of the $375 million raised in April by private life sciences companies outside the United States. Gene therapy startup Gensight Biologics raised $41 million (€32 million) in a series A financing to advance its gene therapy program for the treatment of eye diseases. The financing was co-led by Novartis Venture Fund, Abingworth, Versant Ventures, and Index Ventures.

The Paris-based biotech will use the funds to develop a gene replacement therapy for Leber's hereditary optic neuropathy, or LHON, and an optogenetic therapy for retinitis pigmentosa. Its lead product is expected to enter the clinic in 2013 to treat LHON, a rare form of vision loss that is inherited from mothers and for unknown reasons mainly affects males. Loss of central vision usually begins when a person is in his teens or early twenties and in most cases, starts in one eye and after a few weeks delay, occurs in the other eye, leading to loss of visual acuity and color that is often permanent.

GenSight's founders and management team have deep experience in ophthalmic research and gene therapy. Co-founder and CEO Bernard Gilly was formerly CEO of Fovea Pharmaceuticals, which was acquired by Sanofi in 2009.

Gene therapy has been gaining renewed respect among researchers, drugmakers and investors, as novel therapies prove successful in the clinic. "Gene therapy is coming of age and ophthalmology is one of the most promising indications in particular because of the safety and efficacy demonstrated in certain trials," says Gilly. He says that besides the company's technology targeting the mitochondria in LHON will help it successfully move its therapies to proof of concept.

Newly created startup Allecra Therapeutics was launched with $19.5 million in financing to develop novel antibiotics to combat multi drug-resistant bacterial infections.

Antibiotic resistance is an area of significant unmet need, often compromising doctors' ability to treat serious bacterial infections. In March 2012, the Innovative Medicines Initiative of the European Union committed more than $280 million toward a public private partnership made up of pharmaceutical companies and academics with a focus of speeding up research for new antibiotics to combat antimicrobial resistance.

Allecra's mission is to do just that.

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Financings

(continued)

It has been formed as a strategic partnership between the company's founders including Nicholas Benedict, CEO of Allecra working in conjunction with the Indian drugmaker Orchid Chemicals & Pharmaceuticals.

"To combat the increasing threat of bacterial resistance the medical community is trying to conserve the use of currently available antibiotics. At the same time, the biopharmaceutical industry is working to find new antibiotics," says Benedict. "These objectives are complimentary activities in the increasingly urgent battle against bacterial resistance. Allecra has been formed in order to find new cures for some of the most widespread and hardest to treat resistant infections."

Orchid is among the top pharmaceutical companies in India with experience across many segments including anti-infectives. It has a presence in more than 70 countries around the world through alliances, joint ventures and partnerships. Edmond de Rothschild Investment Partners and Forbion Capital Partners co-led a series A round for Allecra, with participation by EMBL Ventures.

Developing early stage discoveries into actual treatments is another area that is gaining a lot of attention. The recently formed company Precision for Medicine secured $150 million in private equity financing to support next-generation approaches to drug development and commercialization with services tailored toward companies focused on patient-centered precision medicine. The financing came from Oak Investment Partners, and J.H. Whitney and Company, along with Precision's co-founders Ethan Leder, CEO and Mark Clein, President.

Precision for Medicine will be based in Maryland. Leder and Clein said the funding will be used to acquire the expertise and infrastructure necessary to guide innovative medical products from discovery to patients. Their most recent company, United BioSource, was bought by Medco Health Solutions in 2010 for an estimated $750 million.

"Next generation medicine is about placing greater emphasis on the patient as the focal point of all product development activity," says Leder. "Our mission is to build the services and infrastructure to support life science innovators as they develop new products that deliver the best outcomes to patients."

Precision for Medicine will use the funding to expand its capability to help clients lower development costs, speed the time to market of their products, and improve success rates. The company also provides next generation bioservices solutions including biorepository, and sample management.

Performance of 2013 U.S. IPOs

COMPANY	TICKER	CATEGORY	TARGET PRICE RANGE (USD M)	CAPITAL RAISED (USD M)	NUMBER OF SHARES	OFFERING PRICE (USD)	PRICE 4/30 (USD)	RETURN FROM IPO AS OF 4/30
LipoScience	LPDX	Diagnostics	13-15	51.8	5.75	9	8.64	-4.0
Stemline Therapeutics	STML	Therapeutics	11-13	38.2	4.8	10	14.34	43.4
Kalobios	KBIO	Therapeutics	12-14	70.0	8.8	8	6.00	-25.0
Zoetis	NYSE:ZTS	Therapeutics	22-25	2,564.0	99	26	33.02	27.0
Tetraphase Pharmaceuticals	TTPH	Therapeutics	10-12	80.6	11.5	7	8.11	15.9
Enanta Pharmaceuticals	ENTA	Therapeutics	14-16	64.4	4.6	14	19.96	42.6
Cancer Genetics	OTC:CGIX	Diagnostics	11-13	6.9	0.69	10	11.40	14.0
Omthera Pharmaceuticals	OMTH	Therapeutics	12-14	64.0	8	8	7.60	-5.0
Chimerix	CMRX	Therapeutics	13-15	117.9	8.4	14	19.93	42.4

Average return from group as of 4/30 : 16.8%

Note: Target range and number of shares is original proposal, which changed as the company failed to price in that range

Note: Includes overallotments

April Market Movers

TICKER	COMPANY	PRICE 3/29/13	PRICE 4/30/13	PERCENT CHANGE	REASON
ADVANCERS					
OCLS	Oculus Innovative Sciences	3.08	5.26	70.8	Expanded label indication for its formulation Dermacyn Wound Care was approved by the British Standards Institution and the Medicines and Healthcare products Regulatory Agency; received three new international patents for their Microcyn technology; announced 1-for-7 reverse split of its common stock effective April 1, 2013.
BCRX	BioCryst Pharmaceuticals	1.19	2.01	68.9	Announced that Peramivir, their influenze vaccine, moves toward NDA submission and possible U.S. approval based on positive correspondence from the U.S. Food and Drug Administration. Peramivir is active against multiple influenza strains including H1N1 swine flu. Concerns regarding a new strain of bird flu emerging in China also fuel positive stock movement.
ACAD	Acadia Pharmaceuticals	7.94	12.89	62.3	Announced that its experimental treatment for Parkinson's disease psychosis, Pimavanserin, performed so well the U.S. Food and Drug Administration will allow the company to skip a planned late-stage confirmatory trial and proceed directly with their NDA filing.
SCMP	Sucampo Pharmaceuticals	6.54	9.51	45.4	U.S. Food and Drug Administration expanded approval of the company's first in class oral medication for the treatment of opioid-induced constipation in adult patients with chronic, non-cancer pain. Amitiza, a specific activator of a subset of chloride channels in the intestinal epithelium, was developed in collaboration with Takeda.
TTHI	Transition Therapeutics	2.15	3.1	44.2	Announced positive results of a five-week proof of concept clinical study of TT-401 in type 2 diabetic and obese non-diabetic subjects. In the study, TT-401 a once-weekly administered peptide, demonstrated significant improvements in glycemic control and reductions in body weight.
THRX	Theravance	23.62	33.75	42.9	Their experimental treatment for smoking-related lung damage received a better-than-expected initial review from the U.S. Food and Drug Administration; the agency advisory panel recommended approval for the treatment developed in collaboration with GlaxoSmithKline.
VRTX	Vertex Pharmaceuticals	54.97	76.82	39.7	Reported positive results from a mid-stage trial of its new cystic fibrosis drug, VX-661. This particular drug targets the most common mutation associated with the CFTR protein, the delta 508 mutation, and helps the protein traffic correctly to the cell membrane. More than 6 million shares traded in one day, the greatest single-day volume since November 2012.
BDSI	BioDelivery Sciences	4.21	5.68	34.9	Announced a product acquisition allowing the company to build their own pipeline utilizing the FDA's 505(b)(2) regulatory process and to diversify outside of opioid therapy and their BEMA technology, while continuing to develop their own pain products.
ISIS	Isis Pharmaceuticals	16.94	22.39	32.2	Announced a general partnership agreement with Roche under which Roche will pay Isis $30 million upfront and up to $362 million in licensing and milestone payments for development of Isis's lead drug candidate that blocks the production of the Huntingtin protein, and subsequent projects. Isis will receive tiered royalties on sales of any commercial drugs that result from the partnership.
ATHX	Athersys	1.68	2.22	32.1	Published articles in two peer-reviewed scientific journals, Journal of Immunology and Circulation, that describe the potential for multipotent adult progenitor cells, or MultiStem cells, to provide benefit in autoimmune disease and in peripheral vascular disease, respectively. Also announces The Medicines and Healthcare products Regulatory Agency approved their application to expand a mid-stage study evaluating the administration of MultiStem therapy to patients who have suffered an ischemic stroke.

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April Market Movers

TICKER	COMPANY	PRICE 3/29/13	PRICE 4/30/13	PERCENT CHANGE	REASON
DECLINERS					
DYAX	Dyax	4.36	2.75	-36.9	The company missed first quarter expectations: first-quarter net sales were $12.0 million, but analysts expected $16.0 million. The net difference translates to a loss of $0.11 per share, more than double the $0.05 per share loss analysts expected.
AFFY	Affymax	1.375	0.9001	-34.5	Reported financial results for the fourth quarter and year ended December 31, 2012 with a net loss for the fourth quarter of 2012 of $68.3 million, $1.85 per share, compared to a net loss of $29.4 million, $0.82 per share, for the fourth quarter of 2011.
CERE	Ceres	3.48	2.35	-32.5	Total revenues for the quarter ended February 28, 2013 were $1.0 million compared to $1.3 million for the same period last year. The decrease was due to lower collaborative research and government grant revenues as well as lower seed sales.
AVEO	Aveo Oncology	7.35	5.11	-30.5	Declined on comments from an analyst stating FDA briefing documents will raise significant concerns about tivozanib's efficacy in kidney cancer as well as about the conduct of the late-stage trial. Analysts predicted a vote against recommending the drug's approval in an upcoming May 2 meeting.
RIGL	Rigel Pharmaceuticals	6.8	4.79	-29.6	The company's oral tyrosine kinase inhibitor for the treatment of rheumatoid arthritis, fostamatinib, gave mixed results in a late-stage clinical trial. The drug demonstrated a statistically significant improvement on a somewhat qualitative symptom response evaluation related to joint tenderness and swelling, but did not show significance in the additional primary endpoint based on quantitative X-ray analysis.
OPXA	Opexa Therapeutics	2.34	1.69	-27.8	Released a negative year-end financial report wtih no commercial revenues in the year ended December 31, 2012 or in the comparable prior-year period. Net loss for the year ended December 31, 2012 was $1.54 per share compared with a net loss of $1.06 per share for the year ended December 31, 2011. The increase in net loss was primarily due to increases in research and development, general and administrative, depreciation and interest expenses.
DSCO	Discovery Laboratories	2.29	1.69	-26.2	Announced that the U.S. Food and Drug Administration wants it to clarify product specifications and a new chemical analysis method for Surfaxin, a synthetic surfactant for infants. The company expects the product launch to be delayed about six more months, to the fourth quarter of 2013.
ATOS	Atossa Genetics	8.75	6.68	-23.7	National rollout of the ForeCYTE breast health test and requisite increased staffing expenses pushed stock prices down.
ROSG	Rosetta Genomics	4.34	3.32	-23.5	Announced negotiated settlement with Sanra Laboratories related to its previous sale of Parkway Clinical Laboaratories to Rosetta.
PTX	Pernix Therapeutics	4.96	3.82	-23.0	Released its annual report in mid-March detailing a fourth quarter 2012 loss of 2 cents/share compared to earnings of 15 cents/share in the fourth quarter 2011, as well as increased expenses due to acquisitions.

Venture Financings in April 2013

COMPANY	RAISED (USD M)	PRINCIPAL FOCUS	FINANCING ROUND	INVESTORS
Precision for Medicine	1	Tools/Technology		Oak Investment Partners; J.H. Whitney and Company; Precision co-founders Leder and Clein
Radius Health	43	Therapeutics	Series B	F2 Biosciences III; Biotech Growth; MPM Capital; Brookside Capital; MPM Bio IV NVS Strategic Fund; BB Biotech Ventures
WorldOne	35	Healthcare IT		Deerfield Management
Revance Therapeutics	33	Therapeutics	Series E	Essex Woodlands; NovaQuest Pharma Opportunities Fund; Delphi Ventures; Vivo Ventures; Technology Partners; Shepherd Ventures; Bio*One Capital; Pac-Lin Ventures; Palo Alto Fund; other investors
Esperion Therapeutics	33	Therapeutics	Series A tranche	Longitude Capital; Aisling Capital; Alta Partners; Domain Associates; Arboretum Ventures and Asset Management
Watermark Medical	32.2	Digital Health	Equity only	Not disclosed
Accumetrics	0.5	Diagnostics	Debt financing	Not disclosed
Syros Pharmaceuticals		Therapeutics	Series A	Flagship Ventures; Arch Venture Partners; WuXi PharmaTech Corporate Venture Fund; individual investors
Health Intelligence Co LLC	25.1	Healthcare IT	Equity only	Not disclosed
Cobalt Technologies	21.3	Industrial/Ag	Series E-1	18 investors
Gen9	21	Tools/Technology	Strategic investment	Agilent Technologies
Genomatica		Industrial/Ag	Strategic investment	Versalis (chemical division of ENI)
Avinger		Medical devices	Venture debt	PDL BioPharma
RainDance Technologies		Tools/Technology	Series E	Myriad Genetics; Mohr Davidow Ventures; Quaker BioVentures; Alloy Ventures; Acadia Woods Partners; Sectoral Asset Management
480 Biomedical	18	Medical devices	Equity only; part of $21.2M round	Not disclosed
Intra-Cellular Therapies	15.3	Therapeutics	Debt financing	Not disclosed
iRhythm Technologies	15.1	Digital Health	Series D	Norwest Venture Partners; New Leaf Ventures; Synergy Life Scienc Partners; Kaiser Permanente Venture
lifeImage	15	Healthcare IT	Series C	
AgBiome	14.5	Industrial/Ag	Series A	Polaris Partners; ARCH Venture Partners; Harris & Harris Group; Innotech Advisors; additional strategic investors
Vital Therapies	14.3	Medical devices	Equity only [reported 3/14/13]	Not disclosed
Redbrick Health	14	Healthcare IT	Equity only	Not disclosed
Angel Medical Systems	13.7	Medical devices	Series A, equity and debt	Existing investors; strategic partners; SOAM Angel Partners
Taris Biomedical	12.5	Therapeutics		Flagship Ventures; Flybridge Capital Partners; Polaris Partners; Third Rock Ventures
Advanced Animal Diagnostics	11.6	Diagnostics	Series B	Intersouth Partners; Novartis Venture Funds; private investors
LineaGen	11.6	Diagnostics	Part of $25M equity and debt	Not disclosed
Orthosensor	11.4	Medical devices	Equity only	Not disclosed; existing investor Ziegler Meditech Capital Advisors

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Venture Financings in April 2013

COMPANY	RAISED (USD M)	PRINCIPAL FOCUS	FINANCING ROUND	INVESTORS
Cervel Neurotech	.3	Medical devices	Equity only	D.E. Shaw Ventures; Aberdare Ventures; East West Bank, other investors
Cleave Biosciences		Therapeutics	Series A extension	New Enterprise Associates
CoStim Pharmaceuticals		Therapeutics	Part of $22.3M round	Not disclosed
ContraFect	9.5	Therapeutics		Zongi Group of China; other investors
Hurel Corporation	9.2	Tools/Technology	Series A	Spring Mountain Capital; other investors
OneHealth Solutions	9	Healthcare IT	Series B	Lemhi Ventures
Scioderm	9	Therapeutics	Series A, first close of $16M	Morgenthaler; Technology Partners
Redwood Bioscience	8.6	Tools/Technology	Equity and debt	Not disclosed
Presidio Pharmaceuticals	8.6	Therapeutics	Equity only, part of $15M round	Not disclosed; existing investors include New Leaf Venture Partners
Anterios	8.5	Therapeutics	Equity only	Ascent Biomedical Ventures; DRW Trading Group; Praesideo Private Equity Partners; Quantum Technology Partners; Scientific Health Development; The Spring Bay Companies
Intellicyt	8.4	Tools/Technology	Equity only	Arboretum Ventures; Prolog Ventures, Verge Fund; New Mexico Community Capital
ForSight Vision5	8	Therapeutics	Series C; equity only	Not disclosed
Biodesix	7.3	Diagnostics	Series D; Part of $14.7M round	Existing investors
Alung Technologies	7.2	Medical devices	Equity only, part of $15M round	Not disclosed
Asthmapolis (Reciprocal Labs)	7	Digital Health	Series A	The Social+Capital Partnership
Viroxis	6.8	Therapeutics	Equity only	Not disclosed
PeriGen	6.4	Medical devices		Private investors
ImmuMetrix	6.4	Therapeutics	Equity only	Not disclosed
Lanx	6.3	Medical devices	Equity only	Not disclosed
AtheroMed	6	Medical devices		US Venture Partners; Kaiser Permanente Ventures; The Vertical Group
Altura Medical	6	Medical devices	Part of $10M round	Not disclosed; existing investors include New Leaf Venture Partners; Advanced Technology Ventures; SV Life Sciences
Provista Diagnostics	6	Diagnostics	Series A	New and existing investors
CardioVIP	5.8	Digital Health	Series A	Not disclosed
Gliknik	5.1	Therapeutics	Second tranche of $15M round	Not disclosed
Heat Biologics	5.1	Therapeutics	Equity only	Not disclosed
EndoEvolution	5	Medical devices	Series C	Spring Bay Companies; other investors
ImThera Medical	4.7	Medical devices	Equity only	Not disclosed
Bioventrix	4.5	Medical devices	Equity only	Not disclosed
Sympara Medical	4.3	Therapeutics	Series A	Longitude Capital; Versant Ventures; Third Rock Ventures
Renovis Surgical	4.2	Medical devices	Equity only	Angel investors

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Venture Financings in April 2013

COMPANY	RAISED (USD M)	PRINCIPAL FOCUS	FINANCING ROUND	INVESTORS
Nvision Medical	4.1	Medical devices	Equity only	Not disclosed
RadioRx	4	Therapeutics	Equity only	Not disclosed; existing investors include Inter West Partners
Orametrix	4	Medical devices	Debt financing	Not disclosed
Cydan LLC	4	Tools/Technology	Newco: first tranche of $16M	New Enterprise Associates; Pfizer Venture Investments; Alexandria Real Estate Equities
HealthTell	4	Digital Health	Debt financing	Not disclosed
Aggamin Pharmaceuticals	3.7	Therapeutics	Equity only	Not disclosed
Avisa Pharma	3.3	Diagnostics	Equity only	Not disclosed
Vital Connect	3.2	Tools/Technology	Part of $20M round	Not disclosed
SteadyMed Therapeutics	3	Therapeutics	Debt financing	Square 1 Bank
Ivera Medical	2.8	Tools/Technology	Equity and debt	Not disclosed
UrgentRx (Breakthrough Products)	2.5	Therapeutics	Equity only	JUMP Investors; David Bonderman; Herb Siman; Sam Zell; Hilary Swank; Boulevard Capital Partners
Adagio Medical	2.5	Medical devices	Seed stage	Fjord Ventures
PharmaJet	2.5	Medical devices	Debt financing	Not disclosed
Beat Biotherapeutics	2.4	Therapeutics	Seed debt financing	CET Capital Partners; W Fund
Cardiac Dimensions	2.4	Medical devices	Debt financing	Not disclosed
BioDirection	2.2	Diagnostics	Equity only	Not disclosed
Blume Distillation	2.2	Industrial/Ag	Series A	Angel and impact investors
Seahorse Bioscience	2	Tools/Technology	Cloase of $11.3M round	Not disclosed
Algenetix	2	Industrial/Ag	Series A-1	Two Oceans; private investors
HealthCare Impact Associates	2	Healthcare IT		Not disclosed
New Haven Pharmaceuticals	2	Therapeutics	Venture debt	Horizon Technology Finance
Micardia Corp	1.8	Medical devices	Debt financing	Not disclosed
Svelte Medical Systems	1.8	Medical devices	Debt financing	Not disclosed
Fixes 4 Kids	1.7	Medical devices	Equity only	Not disclosed
ivWatch	1.6	Medical devices	Equity only	Not disclosed
Caldera Pharmaceuticals	1.6	Tools/Technology	Equity only	Not disclosed
LifeNexus	1.5	Healthcare IT	Equity only	Not disclosed
Thar Pharmacetuicals	1.5	Therapeutics	Debt financing	Not disclosed
EndoStim	1.5	Medical devices	Equity only	Not disclosed
Cerevast Therapeutics	1.5	Medical devices	Part of $8.2 M round	Not disclosed
Mati Therapeutics	1.3	Therapeutics	Equity only; part of $10M round	Not disclosed
Hemera Biosciences	1.3	Therapeutics	Part of $8M round	Not disclosed
Allurion Technologies	1.3	Medical devices	Equity only	Not disclosed

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Venture Financings in April 2013

COMPANY	RAISED (USD M)	PRINCIPAL FOCUS	FINANCING ROUND	INVESTORS
Xlumena	1.2	Medical devices	Debt financing	Not disclosed
VBOX	1	Medical devices	Part of $2.3M round	Not disclosed
Microbion Biosciences	1	Tools/Technology	Equity only	Not disclosed
Ablative Solutions	1	Medical devices	Debt financing	Not disclosed
Callidus Biopharma	1	Therapeutics	Equity only, part of $5M round	Not disclosed
Cyto Wave Technologies	1	Medical devices	Equity only	Not disclosed
PharmacoPhotonics	0.9	Medical devices	Debt financing	Not disclosed
Allozyne	0.9	Therapeutics	Other	Not disclosed
Intuitive Biosciences	0.9	Diagnostics	Equity only	Not disclosed
Promentis Pharmaceuticals	0.8	Therapeutics	Debt financing	Not disclosed
MimOSA Medical	0.8	Medical devices	Seed stage	Prism VentureWorks; Incyte Ventures; The Vertical Group
IROA Technologies	0.7	Tools/Technology	Series A	Not disclosed
Civatech Oncology	0.7	Medical devices	Equity only	Not disclosed
Protea Biosciences Group	0.7	Tools/Technology	Equity only	Not disclosed
RenovoRx	0.7	Medical devices	Equity only	Not disclosed
Life Care Medical Devices	0.6	Medical devices	Debt financing	Not disclosed
My Health Direct	0.5	Healthcare IT	Equity only	Not disclosed
NovoPedics	0.5	Therapeutics	Pre-seed financing	Foundation Venture Capital Group
NuvoMed	0.5	Medical devices	Equity only	Not disclosed
G-Zero Therapeutics	0.5	Therapeutics	Debt financing	Not disclosed
BetterFit Technologies	0.3	Healthcare IT	Debt financing	Not disclosed
Miraclecord	0.2	Tools/Technology	Debt financing	Not disclosed
Seamless Medical Systems	0.2	Healthcare IT	Equity only	Not disclosed
Antegrin	N/A	Therapeutics	Seed stage	BioGenerator
Vivex Biomedical	N/A	Therapeutics	Spinout of medical device maker Amendia	Amendia
Acumen Pharmaceuticals	N/A	Therapeutics	Series A, first close of $20M	BVF Partners; NeuroVentures Fund; Praxis Technologies; Glynn Ventures; private investors
Total U.S. Venture Financings	**989.4**			
Auris Medical (Switzerland)	.6	Therapeutics	Series C	Sofinnova Ventures; Sofinnova Partners
Opsona Therapeutics (Ireland)	43	Therapeutics	Series C	Novartis Venture Fund; Fountain Healthcare Partners; Roche Venture Fund; Seroba Kernel Life Sciences; BB Biotech Ventures; Sunstone Capital; Baxter Ventures; Amgen Ventures; EMBL Ventures
GenSight Biologics (France)	41.6	Therapeutics	Series A	Novartis Venture Fund; Abingworth; Versant Ventures; Index Ventures
SuperSonic Imagine (France)	36	Medical devices		French Investment Fund

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Venture Financings in April 2013

COMPANY	RAISED (USD M)	PRINCIPAL FOCUS	FINANCING ROUND	INVESTORS
Genticel (France)	23.8	Therapeutics		Wellington Partners; IDInvest Partners; Edmond de Rothschild Investment Partners; InnoBio Fund; IRDI; Amundi Private Equity Funds
Sutures India	23	Medical devices	Growth equity	TPG
Allecra Therapeutics (Germany)	19.5	Therapeutics	Series A	Edmond de Rothchild Investment Partners; Forbion Capital Partners; EMBL Ventures
Aquinox Pharmaceuticals (Canada)	18	Therapeutics	Series C	Johnson & Johnson Development; Augment Investments (Pharmstandard); Pfizer Venture; Ventures West Capital; Baker Brothers Investments
Novaliq (Germany)	18	Therapeutics	Series E	Dievini Hopp Biotech
Curetis (Germany)	16.3	Diagnostics	Series B	HBM Partners; Aeris Capital; LSP Life Sciences Partners; Forbion Capital; BioMedInvest; Roche Venture Fund; CD Venture; KfW
Treato (Israel)	14.5	Healthcare IT		OrbiMed Israel Partners; New Leaf Venture Partners; Reed Elsevier Ventures; Dr. Shmuel Cabilly; Western Technology Investments
Cheetah Medical (Israel)	14.5	Medical devices	Part of $24 million round	Ascension Health Ventures; Robert Bosch Venture Capital; MVM Life Science Partners
ActoGeniX (Belgium)	14	Therapeutics		Saffelberg Investments; company founders; existing investors
DySIS Medical (Scotland)	11.3	Medical devices		Lundbeckfond Ventures; Albion Ventures; NBGI; Scottish Investment Bank (Scottish Enterprise)
MedDay (France)	.4	Therapeutics	Series A	InnoBio; Sofinnova Partners
AdvanceCOR (Germany)	8.4	Therapeutics		MIG Funds; Bayern Kapital; Bio-M; Hightech-Grunderfonds; KfW
Rodos BioTarget (Germany)	3.4	Therapeutics		EnjoyVenture; High-Tech Gruenderfonds; KfW; angel investors
to-BBB technologies (Netherlands)	3.3	Therapeutics		Existing investors
Canbex Therapeutics (United Kingdom)	3.2	Therapeutics		Merck Serono Ventures; UCL Business; Wellcome Trust
Kerecis (Iceland)	1	Tools/Technology	Series A2, equity and grants	Not disclosed
viDA Therapeutics (Canada)	0.8	Therapeutics	Second tranche of seed financing	BDC Venture Capital
MabLyte (United Kingdom)	0.2	Diagnostics		Mercia Fund Management
Seraxis (Singapore)	N/A	Therapeutics	Series A	East West Capital Partners; GRI Fund; ASAP Ventures; angel investors
Eyevensys (France)	N/A	Therapeutics	Strategic investment	Beohringer Ingelheim Venture Fund
Avilex Pharma (Denmark)	N/A	Therapeutics	Seed stage	Novo Seeds
Total Non-U.S. Venture Financings	**374.8**			
Total April Venture Financings	**1,364.2**			

Public Financings in April 2013

COMPANY	TICKER	AMOUNT RAISED (USD M	PRINCIPAL FOCUS
IPOS			
Chimerix	CMRX	117.9	Therapeutics
Omthera Pharmaceuticals	OMTH	64.0	Therapeutics
Cancer Genetics	OTC:CGIX	6.9	Diagnostics
Total U.S. IPOs		**188.8**	
Total April IPOs		**188.8**	
PIPES			
VistaGen Therapeutics	OTC:VSTA	36.0	Tools/Technology
Solta Medical	SLTM	25.5	Medical devices
MEI Pharma	MEIP	15.2	Therapeutics
Coronado Biosciences	CNDO	10.1	Therapeutics
Northwest Biotherapeutics	NWBO	10.0	Therapeutics
Anacor Pharmaceuticals	ANAC	5.0	Therapeutics
BSD Medical	BSDM	5.0	Therapeutics
OxiGene	OXGN	5.0	Therapeutics
TOMI Environmental Solutions	OTC:TOMZ	4.0	Tools/Technology
CareView Communications	OTC:CRVW	3.1	Digital Health
Cardium Therapeutics	NYSE:CXM	2.4	Therapeutics
Genspera	OTC:GNSZ	1.9	Therapeutics
LabStyle Innovations	OTC:DRIO	1.7	Digital Health
Stellar Biotechnologies	SBOTF.Pk	1.6	Tools/Technology
Catasys	OTC:CATS	1.5	Healthcare IT
Manhattan Scientifics	OTC:MHTX	1.0	Diagnostics
BioZone Pharmaceuticals	OTC:BZNE	0.8	Tools/Technology
Alliqua	OTC:ALQA	0.7	Therapeutics
Total U.S. PIPEs		**130.5**	
Galapagos (Belgium)	Euronext:GLPG	70.5	Therapeutics
Genfit (France)	Euronext:ALGFT	18.7	Therapeutics
Aerocrine (Sweden)	SSE:AERO	14.4	Medical devices
Spectral Diagnostics (Canada)	TSX:SDI	5.6	Diagnostics
Medicago (Canada)	TSX:MDG	3.5	Therapeutics
Viridis Energy (Canada)	TSX-V:VRD	2.9	Industrial/Ag
Alchemia (Australia)	ASX:ACL	2.9	Therapeutics
Genovis (Sweden)	SSE:GENO	2.1	Medical devices
Miraculins (Canada)	TSX-V:MOM	1.0	Diagnostics
RepliCel Life Sciences (Canada)	OTC:REPCF	0.5	Therapeutics
Total Non-U.S. PIPEs		**122.1**	
Total April PIPEs		**252.7**	

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Public Financings in April 2013

COMPANY	TICKER	AMOUNT RAISED (USD M	PRINCIPAL FOCUS
FOLLOW-ONS			
BioScrip	BIOS	106.5	Healthcare IT
Synergy Pharmaceuticals	SGYP	90.1	Therapeutics
Spectranetics	SPNC	85.5	Medical devices
ChemoCentryx	CCXI	69.0	Therapeutics
Durata Therapeutics	DRTX	57.6	Therapeutics
Anacor Pharmaceuticals	ANAC	23.0	Therapeutics
Sunshine Heart	SSH	15.1	Medical devices
iBio	NYSE:IBIO	4.3	Tools/Technology
Total U.S. Follow-ons		**451.1**	
Sinopharm Group (China)	HK:1099	515.0	Therapeutics
Trimel Pharmaceuticals (Canada)	TSX:TRL	45.2	Therapeutics
InspireMD (Israel)	NYSE-M:NSPR	25.0	Medical devices
Total Non-U.S. Follow-ons		585.2	
Total April Follow-ons		1,036.3	
OTHER EQUITY			
Anthera Pharmaceuticals	ANTH	18.5	Common stock purchase agreement
InSite Vision	OTC:INSV	16.0	Royalty stream funding
Elite Pharmaceteuticals	OTC:ELTP	10.0	Stock purchase agreement
Ohr Pharmaceutical	OTC:OHRP	5.1	Warrant exercise
Navidea Biopahrmaceuticals	NYSE:NAVB	5.1	At-the-market offering
Total U.S. Other Equity		**54.7**	
Genmab	CSE:GEN	5.1	Warrant exercise
Total Non-U.S. Other Equity		**5.1**	
Total April Other Equity		**59.8**	
DEBT			
Supernus Pharmaceuticals	SUPN	90.0	Therapeutics
Agenus	AGEN	5.0	Therapeutics
Adamis Pharmaceuticals	OTC:ADMP	0.6	Therapeutics
RegeneRx	OTC:RGRX	0.2	Therapeutics
Total U.S. Debt		**95.8**	
Mallinckrodt (Covidien-Ireland)	COV	900.0	Therapeutics
Aerocrine (Sweden)	SSE:AERO	35.0	Medical devices
Total Non-U.S. Debt		**935.0**	
Total April Debt		**1,030.8**	

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Public Financings in April 2013

COMPANY	TICKER	AMOUNT RAISED (USD M	PRINCIPAL FOCUS
OTHER DEBT			
Henry Schein	HSIC	300.0	Secured committed financing facility
Anthera Pharmaceuticals	ANTH	20.0	Debt financing facility
StemCells	STEM	10.0	Loan
Agenus	AGEN	5.0	Loan
Unigene Laboratories	OTC:UGNE	0.8	Senior notes under agreement with Victory Park Capital
Total U.S. Other Debt		**335.8**	
Allenex (Sweden)	SSE:ALNX	13.7	Loan
Proteome Sciences (United Kingdom)	LSE:PRM	1.5	Loan from CEO
Total Non-U.S. Other Debt		**15.2**	
Total April Other Debt		**351.0**	

Grants and Contracts in April 2013

COMPANY	AMOUNT RAISED (USD M)	PRINICPAL FOCUS	FUNDING AGENCY
GRANTS			
StemCells	19.3	Stem cell therapy for Alzheimer's	California Institute for Regenerative Medicine forgivable loan
Anacor Pharmaceuticals	17.7	Boron compounds for neglected diseases	Bill & Melinda Gates Foundation
BioProcess Algae	6.4	Pilot-scale biorefinery project	U.S. Department of Energy
Mercurius Biorefining	4.6	Pilot-scale biorefinery project	U.S. Department of Energy
Frontline BioEnergy	4.2	Pilot-scale biorefinery project	U.S. Department of Energy
Inovio Pharmaceuticals	3.5	Synthetic vaccines	NIH NIAID
Cobalt Technologies	2.5	Pilot-scale biorefinery project	U.S. Department of Energy
Vaccinate	2.2	Dengue vaccine	NIH NIAID
ARMGO Pharma	1.0	Duchenne muscular dystrophy	Muscular Dystrophy Association
Prometheus Research	0.7	Data management of autism research	NIH SBIR
Xeris Pharmaceuticals	0.7	Diabetes drug delivery	NIH NIDDK Phase II SBIR
Remedium Technologies	0.5	Hemorrhage control	National Science Foundation SBIR
Z Lens	0.2	Intraocular lens	National Science Foundation SBIR
Applied DNA Sciences	0.2	DNA-based anti-counterfeiting technology	U.S. Missile Defense Agency Phase 1 grant
Total U.S. Grants	**63.6**		
Prana Biotechnology (Australia)	5.8	Neurology	Australian R&D Tax Incentive Program refund
Licella (Australia)	5.5	Cellulosic ethanol	Australian Renewable energy Agency's Advanced Biofuels Investment Readiness Program
Muradel (Australia)	4.5	Algal biofuels	Australian Renewable energy Agency's Advanced Biofuels Investment Readiness Program
Theradiag (France)	1.6	HIV; obesity diagnostics	OSEO, participation in CaReNA project
Total Non-U.S. Grants	17.4		
Total April Grants	81.0		
CONTRACTS			
Combat Medical Systems	86.0	Medical equipment and devices	U.S. Department of Defense
Achaogen	60.0	Phase 3 study of plazomicin	Biomedical Advanced Research and Development Agency
Total April Contracts	**146.0**		

Big Pharma Ramps Up Early-Stage Collaborations

As R&D continues to be externalized, drugmakers tap novel technologies from biotech.

BY MARIE DAGHLIAN

Research and discovery deals continued to dominate partnering activity as many of the top pharmaceutical companies reported shrinking revenues due to patent expirations. Nine of the top 10 deals with disclosed values in April were research collaborations with biotechs in the search for new therapeutic candidates to build out Big Pharma and Big Biotech pipelines.

While the biotechnology industry gathered in Chicago for its annual international convention, AstraZeneca announced several early-stage deals, along with a sales decline of 12 percent as patent losses took a toll on the company's first quarter earnings.

While the biotechnology industry gathered in Chicago for its annual international convention, AstraZeneca announced several early-stage deals, along with a sales decline of 12 percent as patent losses took a toll on the company's first quarter earnings. The deals provide access to promising technology to help AstraZeneca build out its early-stage pipeline, but they don't address the pharma's more immediate problem of replacing revenue lost to generic competitors as patents expire on its blockbusters.

AstraZeneca entered into a strategic collaboration with BIND Therapeutics focused on the development and commercialization of a targeted and encapsulated cancer nanomedicine using BIND's technology platform in conjuction with a targeted kinase inhibitor developed and owned by AstraZeneca (*see clinical trials*).

BIND is developing a new class of therapeutics called "Accurins," which it says has superior target selectivity and the potential to improve patient outcomes in the areas of oncology, inflammatory diseases and cardiovascular disorders. It says it develops Accurins that outperform conventional drugs because they selectively accumulate in tissues and cells. The result is higher drug concentrations at the site of action with minimal off-target exposure, leading to markedly better efficacy and safety.

Under the terms of their agreement, the companies will collaborate on preclinical studies of the lead Accurin, identified from a previously-completed feasibility program. AstraZeneca will then have exclusive development and commercialization rights, while BIND will lead manufacturing during the development phase. BIND could receive upfront and pre-approval milestone payments totaling $69 million, and more than $130 million in regulatory and sales milestones and other payments as well as tiered single to double-digit royalties on future sales.

BIND started several feasibility projects with major pharmaceutical companies a year ago. Its collaboration with AstraZeneca is the first one completed, according to BIND CEO Scott Minick.

AstraZeneca also entered into an exclusive collaboration and license agreement with Horizon Discovery to explore its first-in-class kinase target program to develop new cancer therapies based on modulation of a novel kinase. The company said the target has been shown to be mutated in a range of cancer types including colon and lung and has also been shown to play a key role in K-Ras mutant tumors. Mutant K-Ras involved in about 40 percent of all cancer types, cause resistance to many available therapies and are associated with poor patient outcomes.

Under the terms of the agreement, Horizon will receive undisclosed upfront and preclinical milestone payments, and is eligible for milestones totaling up to $75 million, as well as tiered royalties.

Separately, AstraZeneca said it entered into a multi-target drug discovery collaboration with Australian biotech Alchemia. AstraZeneca will use Alchemia's platform technology to discover and develop small molecule drugs against multiple targets to treat diseases across a variety of therapeutic areas including oncology, respiratory, cardiovascular, metabolism, infection, and neuroscience.

Under the terms of this agreement, Alchemia will receive an undisclosed upfront payment and is eligible for potential preclinical, clinical and commercial launch milestones payments totaling up to $240 million, as well as a single digit royalty.

AstraZeneca also entered into a cancer biomarker discovery deal with U.K. biotech Oxford Cancer Biomarkers, with the potential for further collaboration on validation and development of the resulting biomarkers. Oxford Cancer Biomarkers will work with an undisclosed AstraZeneca cancer drug to discover biomarkers that have the potential to predict responders to the drug. It has granted AstraZeneca an option to license biomarkers from the program.

M&A in April 2013

ACQUIRER	COUNTRY	TARGET	COUNTRY	DEAL VALUE (USD M)	ASSET STAGE	PRINCIPAL FOCUS
Thermo Fisher Scientific	United States	Life Technologies	United States	13,0		Tools/Technology
Bayer	Germany	Conceptus	United States	1,0		Birth control devices
Auxilium Pharmaceuticals	United States	Actient Holdings	United States	645	Marketed	Urology specialty pharma
Opko Health	United States	Prolor Biotech	Israel	4	Phase 3 ready	Longer-acting protein drugs
Valeant Pharmaceuticals	Canada	Obagi Medical Products	United States	418.4	Marketed	Aesthetics; dermatology
Frazier Healthcare led investment group	United States	AndersonBrecon	United States	8		Pharmaceutical packaging
Tasly Pharmaceutical	China	TaslyDiyi Pharmaceutical	China	2		Pharmaceuticals
Fosun Pharma; Chindex; Pramerica-Fosun Fund	China	Alma Lasers	Israel	2		Aesthetic lasers
Qiagen	Germany	Ingenuity Systems	United States	5		Bioinformatics
Eli Lilly	United States	China Animal Healthcare stake	China	N/A		Animal health
Jawbone	United States	ModyMedia	United States	N/A		Wearable body sensors
Opko Health and Rusnano	US/Russia	Pharmsynthez stake	Russia	N/A	Phase 2	Biopharmaceuticals
Emergent BioSolutions	United States	Bracco Diagnostics' unit	United States	26		Biodefense products
PLI Holdings	United States	Pfanstiehl Laboratories (Ferro Corp)	United States	24.9		Pharmaceuticals
Mortara Instrument	United States	Cardiac Science unit	India	21		Cardiology diagnostics
Mati Therapeutics	Not disclosed	QLT assets	Canada	.8	Phase 3 ready	Ophthalmic drug delivery
OriGene Technologies	United States	SDIX assets	United States	16		Tools/Technology
Celgene	United States	Cyclacel Pharmaceuticals' patents	United States	5.5		Romidepsin injection
Sanomedics International	United States	Prime Time Medical	United States	3		Home medical equipment
SUDA	Australia	NovaDel Pharma assets	United States	1		NovaMist technology
Vitrolife	Sweden	HertArt	Denmark	0.5		Disposable IVF supplies
Smith & Nephew	United Kingdom	Pro cirurgia Especializada	Brazil	N/A		Medical device distributor
VRW International	United States	Prolab Laboratuar Teknolojileri Limited	Turkey	N/A		Supply/service
AstraZeneca	United Kingdom	AlphaCore Pharma	United States	N/A	Phase 1	Cardiovascular
VRW International	United States	Basan UK Limited	United Kingdom	N/A		Supply/service
Frazier Healthcare	United States	Orthotic Holdings	United States	N/A		Foot and leg diseases
Mobidiag	Finland	Genewave; Amplidiag	France	N/A		Diagnostics
Life Technologies	United States	KDR Biotech	South Korea	N/A		Reagent distributor
GranBio Investimentos	Brazil	American Process	United States	N/A		Bio-based chemicals
OK Biotech	Taiwan	Prodigy Diabetes Care	United States	N/A		Diabetes testing supplies
Eli Lilly	United States	Siemens Medical Solutions assets	Germany	N/A		Alzheimer's imaging agents
Abyrx	United States	Orthocon and DRG	United States	N/A	Marketed	Orthopedic products
Ocera Therapeutics	United States	Tranzyme Pharma	United States	N/A		Hepatic therapies

Partnering in April 2013

COMPANY/LICENSER	COMPANY/ LICENSEE	DEAL TYPE	TOTAL POTENTIAL DEAL VALUE (USD M)	UPFRONT PAYMENT (USD M)	ASSET STAGE	PRINCIPAL FOCUS
BASF (Germany)	Petronas Chemicals (Malaysia)	Joint Venture	500.0			Biorenewable fragrances
Isis Pharmaceuticals	Roche (Switzerland)	Alliance	392.0	30	Preclinical	Huntington's Disease
Ambrx	Astellas Pharma (Japan)	Collaboration	300.0	15	Discovery	Antibody drug conjugates
ImmunoGen	Novartis (Switzerland)	License amendment	300.0	4.5	Preclinical	Cancer therapeutics
Alchemia (Australia)	AstraZeneca (United Kingdom)	Collaboration	240.0	N/A	Discovery	Drug discovery platform
BIND Therapeutics	Pfizer	Collaboration	210.0	50	Discovery	Accurins platform technology
Ra Pharmaceuticals	Merck	Collaboration	200.0		Discovery	Cyclomimetic platform
BIND Therapeutics	AstraZeneca (United Kingdom)	Collaboration	200.0	N/A	Preclinical	Cancer nanomedicines
Forma Therapeutics	Celgene	Collaboration	200.0	N/A	Discovery	Cancer
Santaris Pharma	Bristol-Myers Squibb	Alliance	100.0	10	Discovery	mRNA drug discovery
Pfizer	Merck	Collaboration	60.0		Phase 3 ready	Diabetes
China NT Pharma Group	Sinopharm Group (China)	Joint Venture	32.0			Drug distribution agreement
Aeterna Zentaris (Canada)	Ergomed Clinical Research (Germany)	Co-development	10.0		Phase 3	Endometrial Cancer
Cel-Sci	Ergomend Clinical Research (United Kingdom)	Agreement	10.0		Phase 3	Cancer
Carbios (France)	French National Institute for Agricultural Research	Collaboration	9.1			Bioplastics
University of Western Australia	Sarepta Therapeutics	License	7.1			Exon-skipping IP
ZoomMed (Canada)	EvEMR	License	3.5			Electronic medical records
Aeterna Zentaris (Canada)	Merck KGaA (Germany)	License	3.2			Manufacturing rights
Intrexon	AmpliPhi BioSciences	License	3.0			Technology
Plandai Biotechnology	Phyto Nutricare (United Kingdom)	License	2.0			Nutraceuticals
TheraVida	SK Chemicals (South Korea)	License	N/A		Phase 2	Overactive bladder
X-Body Biosciences	Jiangsu Hengrui Medicine (China)	Alliance	N/A		Preclinical	Age-related macular degeneration
CollabRx	OncoDNA (Belgium)	Partnership	N/A			Molecular diagnostics
Bristol-Myers Squibb	Vertex Pharmaceuticals	Agreement	N/A			Hepatitis C combo trial

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Partnering in April 2013

COMPANY/LICENSER	COMPANY/ LICENSEE	DEAL TYPE	TOTAL POTENTIAL DEAL VALUE (USD M)	UPFRONT PAYMENT (USD M)	ASSET STAGE	PRINCIPAL FOCUS
Ingenuity Systems	Affymetrix	Partnership	N/A			Tools/Technology
scPharmaceuticals	Sensile Medical (Switzerland)	Partnership	N/A			Drug/device for heart failure
Eddingpharm (China)	GlaxoSmithKline (United Kingdom)	Collaboration	N/A			Cancer drug distribution
A*Star (Singapore)	GlaxoSmithKline (United Kingdom)	Alliance	N/A			Reformulated drugs
Proteros biostructures (Germany)	Priaxon (Germany)	Collaboration	N/A			Lead discovery
Inventiva (France)	NovAliX (France)	Alliance	N/A			Drug discovery
CollabRx	Sengenics (Singapore)	Partnership	N/A			Molecular diagnostics
Debiopharm (Switzerland)	Shasun Pharmaceuticals (India)	License	N/A			Manufacturing technology
Genomatica	Versalis (Eni-Italy)	Joint Venture	N/A			Biochemicals
Merck	Hawaii Biotech	License	N/A			Vaccine Technology
PeptiDream (Japan)	Ipsen Group (France)	Partnership	N/A		Discovery	Neurology; endocrinology; oncology
Ascletis (China/US)	Roche (Switzerland)	Collaboration	N/A		Phase 2	Hepatitis C
MRC Technology (United Kingdom)	EMBLEM (Germany)	Collaboration	N/A			Drug development
PerkinElmer	National Center for Drug Screening of China	Partnership	N/A			Diabetes biomarker validation
Monsanto	Bayer CropScience (Germany)	Cross-licensing	N/A			Agbiotech traits
Xencor	CSL Limited (Australia	License	N/A			Antibody technology
Pfenex	Agila Biotech (Strides Arcolab-India)	Joint Venture	N/A			Biosimilars
Chiesi Farmaceutici (Italy)	Eddingpharm (China)	Joint Venture	N/A			Asthma drugs marketing
Lorus Therapeutics (Canada)	Elanco (Eli Lilly	License option	N/A			Animal health
Seegene (South Korea)	bioMerieux (France)	License	N/A			Food safety diagnostics
Sony Corp (Japan)	Olympus (Japan)	Joint Venture	N/A			Medical devices
Oxford Cancer Biomarkers (United Kingdom)	AstraZeneca (United Kingdom)	Collaboration	N/A			Biomarker discovery
University Health Network (Canada)	Stem Cell Therapeutics (Canada)	License	N/A	1.6		Stem cell technology
Suzhou Ascepion Pharma (China)	Debiopharm (Switzerland)	Collaboration	N/A		Preclinical	Cancer
Abbott	Epizyme	Partnership	N/A			Companion diagnostic

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Partnering in April 2013

COMPANY/LICENSER	COMPANY/ LICENSEE	DEAL TYPE	TOTAL POTENTIAL DEAL VALUE (USD M)	UPFRONT PAYMENT (USD M)	ASSET STAGE	PRINCIPAL FOCUS
Illumina	Kindstar Global (China)	License	N/A			Diagnostic
Ranbaxy Pharmaceuticals (India)	Daiichi Sankyo (Japan)	Collaboration	N/A			Emerging markets
Opko Health	Pharmsynthez (Russia)	Partnership	N/A		Phase 3	Endocrine
Cerecor	Merck	License	N/A		Preclinical	Neurology
Advaxis	FusionVax (Taiwan)	License	N/A		Phase 2	HPV-assoc. cancers
GNS Healthcare	Centers for Medicare & Medicaid Services	Partnership	N/A			Bioinformatics
Kymab (United Kingdom)	Novo Nordisk (Denmark)	License	N/A			Antibody technology
DecImmune Therapeutics	Royal DSM (Netherlands)	Partnership	N/A			Antibody manufacture
Merck	Bristol-Myers Squibb	Agreement	N/A		Phase 2	Hep C combo trial
Horizon Discovery (United Kingdom)	AstraZeneca (United Kingdom)	License	N/A	N/A	Discovery	Cancers with K-Ras mutations
National Vaccine & Serum Institute (China)	Guizhou Factorr Bio-Technology (China)	Joint Venture	N/A			Biopharmaceuticals
Selventa	Seegene (South Korea)	Collaboration	N/A			Molecular diagnostics
Sanofi (France)	Takeda Pharmaceutical (Japan)	Co-promotion	N/A		Pre-approval	Diabetes
CardioDx	Core Diagnostics India	Agreement	N/A			Cardiovascular tests
CytoVas	Becton Dickinson	Alliance	N/A			Diagnostic
Cara Therapeutics	Maruishi Pharmaceutical (Japan)	License	N/A		Phase 2	Pain management
Oxford BioTherapeutics (United Kingdom)	Boehringer Ingelheim (Germany)	Collaboration	N/A		Discovery	Cancer antibody targets
Almac Discovery (Ireland)	Shin Poong Pharmaceutical (South Korea)	License	N/A		Phase 1	Cancer
Janssen R&D Ireland (J&J)	Ascletis (China/US)	License	N/A		Phase 2	HIV
NextBio	Sanofi (France)	Partnership	N/A			Big data/translational medicine
Afraxis	Servier (France)	Collaboration	N/A			Central nervous system disorders
Lentigen	Nanolek LLC (Russia)	License	N/A			VLP flu vaccine

Company/Academic/Non-Profit Partnerships in April 2013

COMPANY	COUNTRY	ACADEMIA/NON-PROFIT	COUNTRY	PRINCIPAL FOCUS
Neurotrope BioScience	United States	BRNI at West Virginia University	United States	Alzheimer's drug and diagnostic development agreement
Pfizer	United States	Children's Hospital of Philadelphia	United States	Translational R&D
Roche	Switzerland	Institute Pasteur Korea	South Korea	Infectious diseases partnership
Anacor Pharmaceuticals	United States	Bill & Melinda Gates Foundation	United States	Neglected diseases research agreement
ReXceptor	United States	Alzheimer's Drug Discovery Foundation; BrightFocus Foundation	United States	Alzheimer's early-stage trial

PIPELINE

Clinical Trials for April 2013

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
PHASE 3					
Pfizer	NYSE: PFE	Prevenar 13, pneumococcal polysaccharide 13-valent conjugate vaccine	vaccination against pneumococcal disease caused by the Streptococcus pneumoniae	Positive	Met all primary and secondary objectives; in adults 18 to 49 years of age, functional antibody responses to all 13 serotypes included in the vaccine were non-inferior to responses in adults 60 to 64 years of age. Provides the clinical foundation for regulatory submission in the European Union, United States, and other countries to seek expansion of the use of Prevenar 13 to include adults age 18 to 49.
Gilead Sciences	Nasdaq: GILD	Sofosbuvir, nucleotide analogue inhibitor of the hepatitis C virus NS5B protein	chronic hepatitis C virus infection	Positive	Sofosbuvir-based HCV therapy demonstrated high efficacy rates and a favorable safety profile while reducing the need for interferon injections up to 12 weeks, or eliminating interferon completely from the regimen. In the four trials–NEUTRINO, FISSION, POSITRON, and FUSION–overall sustained viral response 12 weeks after completing therapy ranged from 50 to 90 percent. After three months of combined therapy with sofosbuvir and ribavirin, the patient response rate was 93 percent for those with genotype 2, and 61 percent for those with genotype 3.
Janssen R&D	Private	Simeprevir, hepatitis C virus NS3/4A protease inhibitor	treatment-naive adult patients with genotype 1 chronic hepatitis C with compensated liver disease, including all stages of liver fibrosis	Positive	In two trials, QUEST-1 and QUEST-2, the drug led to sustained virologic response 12 weeks after the end of treatment in 80 and 81 percent, respectively, of treatment-naive genotype 1 chronic hepatitis C adult patients with compensated liver disease, including all stages of liver fibrosis. Patients enrolled in the trials were stratified by HCV and IL28B genotypes.
Boehringer Ingelheim Pharmaceuticals	Private	Faldaprevir in combination with pegylated interferon and ribavirin	untreated patients with genotype-1 hepatitis C virus	Positive	In the once-daily faldaprevir plus PegIFN/RBV treated group, 80 percent of the patients achieved viral cure when measured 12 weeks after treatment was completed compared with 52 percent of patients receiving PegIFN/RBV plus placebo. Protocol-defined early treatment success was achieved by 88 percent of patients treated with the faldaprevir-based regimen.
Almirall and Forest Laboratories	CATS: ALM and NYSE: FRX	Combination of aclidinium bromide, long-acting muscarinic antagonist, and formoterol fumarate, long-acting beta-agonist, delivered by inhaler	moderate to severe chronic obstructive pulmonary disease	Positive	Patients receiving combination therapy demonstrated statistically significant improvements in the co-primary endpoints of change from baseline in morning predose forced expiratory volume in one second, FEV1, versus those receiving formoterol. Combination therapy significantly improved FEV1 at 1 hour post-dose versus aclidinium.
Eli Lilly	NYSE: LLY	Dulaglutide, long-acting glucagon-like peptide 1 receptor agonist, alone or in combination with insulin lispro	once-weekly treatment for type 2 diabetes	Positive	In two studies the primary efficacy endpoint of non-inferiority to insulin glargine, as measured by the reduction of hemoglobin A1c levels, was met. In AWARD-2, a comparison was made between dulaglutide and insulin glargine in patients with type 2 diabetes on metformin and glimeperide. In AWARD-4 a comparison was made between dulaglutide in combination with insulin lispro and insulin glargine in combination with insulin lispro.

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Clinical Trials for April 2013

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Iroko Pharmaceuticals	Private	Submicron dose of the non-steroidal anti-inflammatory indomethacin	post-surgical acute pain	Positive	Low-dose indomethacin provided significant improvement in pain relief as measured by summed pain intensity difference measurements in patients with post-surgical acute pain. Some evidence of pain control was observed as early as 30 minutes in the submicron indomethacin three times daily and twice daily groups compared with placebo.
Iroko Pharmaceuticals	Private	Submicron dose of the non-steroidal anti-inflammatory diclofenac	pain from osteoarthritis of the hip or knee	Positive	Low-dose submicron diclofenac administered three times daily in people with osteoarthritis significantly reducted pain as measured over 12 weeks using the arthritis index standardized questionnaire compared to placebo.
Lundbeck	CPSE: LUN	Vortioxetine, a 5-HT3, 5-HT7, and 5-HT1D receptor antagonist, 5-HT1B receptor partial agonist, 5-HT1A receptor agonist and inhibitor of the serotonin transporter	major depressive disorder in adults	Positive	In a double-blind comparative study versus agomelatine, vortioxetine met primary and secondary endpoints for efficacy and overall functioning in patients with major depression and inadequate response to SSRI/SNRI treatment and was well tolerated. The study was conducted in Europe and one of the newest antidepressants agomelatine was chosen as a comparator because of its different mode of action from conventional SSRI/SNRI therapies.
EyeGate Pharma	Private	EGP-437, corticosteroid formulation	anterior uveitis	Positive	Two iontophoretic treatments of EGP-437 achieved the same response rate as the positive control, prednisolone acetate 1 percent ophthalmic suspension administered as multiple daily eyedrops, the current standard of care. The primary efficacy endpoint was the proportion of patients with anterior chamber cell count of zero on day 14, defined as a complete response. Standard management of uveitis consists of corticosteroid treatment applied either topically several times per day, by injection, systemically or by a combination thereof and its effectiveness is compromised due to poor patient compliance or inadequate dosing.
Millennium: Takeda Oncology and Takeda Pharmaceutical	TSE: 4502	Velcade, proteasome inhibitor	induction therapy prior to autologous stem cell transplant in patients with previously untreated multiple myeloma	Positive	The median progression-free survival was significantly higher with Velcade-based induction therapy compared to non-Velcade-based at a median follow up of 37 months and the post-transplant combined complete response plus near-complete response rate was, respectively, 38 percent compared to 24 percent. The meta-analysis of data from more than 1,500 patients augments an already large body of evidence supporting use of Velcade.
AstraZeneca	NYSE: AZN	Fostamatinib, oral SYK tyrosine kinase inhibitor	rheumatoid arthritis	Mixed	In the OSKIRA-1 study, fostamatinib achieved a statistically significant improvement in patient questionaire responses assessing signs and symptoms of rheumatoid arthritis compared to placebo, but did not demonstrate a statistically significant difference in the quantitative X-ray endpoint compared to placebo at 24 weeks.
Navidea Biopharmaceuticals	NYSE MKT: NAVB	Lymphoseek, technetium 99m tilmanocept	lymp node detection in patients with head and neck squamous cell carcinoma	Positive	Met the primary efficacy endpoint of accurately identifying sentinel lymph nodes in subjects with squamous cell carcinoma of the head or in the mouth, as compared to the removal of all lymph nodes during multiple level nodal dissection surgery of the head and neck, the standard of care. The study's Data Safety Monitoring Committee recommended closing the trial early to move to the next development stage.

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Clinical Trials for April 2013

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
PHASE 2					
AbbVie and Enanta Pharmaceuticals	NYSE: ABBV and Nasdaq: ENTA	Interferon-free, triple drug combination including hepatitis C virus protease, polymerase, and NS5A inhibitors	hepatitis C virus infection in null responders	Positive	At 12 weeks of treatment, combination therapy cured 90 percent of patients new to treatment or who had previously failed treatment with pegylated interferon and ribavirin. Enrollment was open to genotype 1-infected patients regardless of IL28B host genotype.
AcelRx Pharmaceuticals	Nasdaq: ACRX	Sufentanil, opioid in NanoTab technology for rapid sublingual absorption	moderate-to-severe acute pain trauma or injury	Positive	Patients receiving sufentanil NanoTab doses administered by a healthcare professional no more frequently than once per hour had significantly greater pain reduction than placebo-treated patients as measured by summed pain intensity difference from baseline during the 12-hour study period.
Vertex Pharmaceuticals	Nasdaq: VRTX	Combination VX-661, CFTR chaperone, and ivacaftor, CFTR potentiator	adults with cystic fibrosis who have two copies of the most common cystic fibrosis transmembrane conductance regulator gene mutation, F508del	Positive	The primary endpoints of the study were safety, tolerability and change in sweat chloride. Change in lung function was measured as a secondary endpoint. There were statistically significant mean absolute decreases in sweat chloride, both within-group and versus placebo, across the combination and monotherapy groups. Mean absolute and relative improvements in lung function were observed in all the combination dosing groups, both within group and versus placebo.
ViroPharma	Nasdaq: VPHM	VP20621, contains spores of a naturally occurring non-toxin producing strain of Clostridium difficile	recurrent C. difficile gastrointestinal infections in older adults after use of antibiotic medications	Positive	Colonization with VP20621 was achieved in the majority of patients as detected by stool culture, and in these patients, 98 percent had no recurrence of C. difficile infection. Across all dose groups, VP20621 reduced the incidence of CDI recurrence, a secondary endpoint, by greater than or equal to 50 percent versus. placebo. Mild to moderate headache was the only notable associated adverse event reported by 10 percent of subjects compared to 2 percent on placebo.
TiGenix	Euronext Brussels: TIG	Expanded allogeneic adult adipose derived-stem cells delivered by intravenous injection	refractory rheumatoid arthritis	Positive	Patients were dosed at day 1, 8, and 15 and were followed up monthly over a six-month period. Only one patient suffered serious adverse events that led to discontinuation of the treatment; all other side effects were mild and transient. Importantly, treatment showed no signs of hematological side effects or thrombosis. In preliminary analysis, the treatment resulted in therapeutic activity on standard outcome measures and biologic markers of inflammation for at least three months after dosing.
Ceregene	Private	CERE-120, adeno-associated virus vector carrying the gene for the neurotrophic factor neurturin	Parkinson's disease	Failed	A marked placebo effect was observed in this trial of 51 patients in that both the sham-surgery-control patients and the CERE-120 treated patients showed significant improvement following surgery. The trial did not demonstrate statistically significant efficacy on the primary endpoint, the Parkinson's motor-off assessment. However, one of the key secondary endpoints, diary-off score, did produce statistically significant benefit. The trial also provided further evidence for the safety of CERE-120 and the dosing methods employed.

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Clinical Trials for April 2013

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Civitas Therapeutics	Private	CVT-301, inhaled formulation of levodopa	intermittent debilitating motor fluctuations in Parkinson's disease	Positive	Administering CVT-301 to patients in the off state produced a rapid and durable improvement in motor function. The pharmacokinetic data recapitulated the early-stage study results showing CVT-301 provided immediate L-dopa absorption and consistent increases in plasma concentrations in marked contrast to the delayed and variable L-dopa levels seen with sinemet.
Navidea	NYSE: NAVB	NAV4694, fluorine-18 labeled amyloid imaging agent	amyloid imaging agent	Positive	NAV4694 displayed ß-amyloid imaging characteristics nearly identical to those of the gold-standard benchmark amyloid imaging agent, 11C-labeled Pittsburgh compound. Results of the study are published in the *Journal of Nuclear Medicine*.
Immune Targeting Systems	Private	Flunisyn, pan-strain influenza A T-cell vaccine	prevention of influenza in the elderly	Positive	Flunisyn induced a robust cell-mediated immunity across a number of influenza antigens, with a responder frequency of 95 percent. The vaccine was found to have a good safety profile and did not negatively impact the antibody response to conventional influenza vaccine in subjects who received both vaccines.
Alkermes	Nasdaq: ALKS	ALKS 5461, combination of ALKS 33 and buprenorphine	major depressive disorder in patients who have an inadequate response to standard therapies for clinical depression	Positive	ALKS 5461 significantly reduced depressive symptoms over a four-week treatment period across a range of standard measures including the study's primary outcome measure, the Hamilton depression rating scale HAM-D17. Enrolled patients were those with major depressive disorder who had an inadequate response to a stable dose of either a selective serotonin reuptake inhibitor or a serotonin-norepinephrine reuptake inhibitor.
Shenzhen Chipscreen Biosciences	Private	Chidamide, orally active benzamide class I- histone deacetylase inhibitor	relapsed or refractory peripheral T-cell lymphoma	Positive	The CHIPEL trial, a single arm study in a Chinese population, achieved its primary endpoint of efficacy and safety of orally administrated Chidamide in patients with relapsed or refractory peripheral T-cell lymphoma who had failed at least one prior systemic therapy. Pathological subtypes of peripheral T-cell lymphoma in the Chinese population are significantly different from those in North American and European populations.
Fibrocell Science	AMEX: FCSC	Azficel-T, autologous fibroblast cell product for intradermal injection	moderate-to-severe acne scars	Positive	Azficel-T treatment was associated with clinically meaningful improvement in acne scar appearance and was judged safe and superior to control treatment. Results are published in the journal *Dermatologic Surgery*.
Kythera	Nasdaq: KYTH	ATX-101, injectable formulation of synthetically-derived deoxycholic acid, an endogenous molecule that aids in the breakdown of dietary fat	submental fat	Positive	MRI assessments were performed in the study as a quantifiable and objective measure of submental fat volume and thickness. Compared to placebo, treatment resulted in statistically significant reductions in submental fat, known as double chin, and statistically significant improvements in self-evaluated visual and psychological impacts of submental fat.
Acorda Therapeutics	Nasdaq: ACOR	Dalfampridine extended release tablets	post-stroke deficits in walking, motor and sensory function, and manual dexterity	Positive	In ischemic stroke patients, the drug improved walking for people with mobility impairment and induced positive changes on the functional independence measurement scale. The safety findings were consistent with previous clinical trials and post-marketing experience of Ampyra in multiple sclerosis, with dizziness in 10.4 percent of patients receiving dalfampridine-ER compared to 2.5 percent receiving placebo the most common adverse event .

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Clinical Trials for April 2013

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Laboratorios Salvat and Kwang Dong Pharmaceutical	KOSE: A009290	Tarafenacin, selective M3 muscarinic receptor antagonist	overactive bladder syndrome	Positive	Tarafenacin proved superior to placebo after 4 weeks in reducing the number of micturitions per day, the main endpoint of the study. The trial was conducted in eight sites in South Korea.
Photocure	OSE: PHO	Cevira, an integrated drug-delivery device for hexylaminolevulinate	low to moderate grade cervical intraepithelial neoplasia; oncogenic HPV infections and precancerous lesions	Positive	Cevira showed significant and sustained efficacy in the eradication of oncogenic HPV infections and precancerous lesions in CIN2 patients. At six months of treatment there was a statistically significant and sustained eradication of precancerous cervical neoplasia lesions compared to placebo, 95 percent versus 62 percent, respectively. In addition there was high clearance of HPV oncogenic subtypes 16 and 18 with Cevira compared to placebo, at 83 percent versus 33 percent.
Vaxil BioTherapeutics	TASE: VAXL	ImMucin, 21 amino acid peptide of the MUC1 antigen	multiple myeloma	Positive	Patients received either six or twelve intra-dermal ImMucin injections along with GM-CSF. The injections showed a high safety profile, with no side effects observed except for minor local irritations which were all resolved within 24 hours without any additional treatment or medical intervention.
Pharmacyclics	Nasdaq: PCYC	Ibrutinib, selective inhibitor of Bruton's tyrosine kinase	untreated, relapsed and refractory chronic lymphocytic leukemia	Positive	Ibrutinib was highly efficacious as a single agent in patients with untreated, relapsed and unresponsive chronic lymphocytic leukemia, irrespective of their del 17p status. Results indicate the drug is effective against the disease in lymph nodes, spleen and bone marrow. After 6 months, 95 percent of patients experienced a reduction in lymph node size and all showed reduction in spleen enlargement, with a median reduction of 55 percent. In 26 patients, for whom a bone marrow biopsy was done, tumor infiltration decreased by 82 percent.
Merrimack Pharmaceuticals	Nasdaq: MACK	MM-121, human monoclonal antibody against ErbB3	non-small cell lung cancer	Failed	The study did not meet its primary endpoint to modulate or reverse resistance to erlotinib, an EGF-receptor tyrosine kinase inhibitor therapy used in treatment of NSCLC. The primary endpoint was to obtain a 40 percent progression free survival rate at four months of treatment.
Starpharma	ASX: SPL	VivaGel, SPL7013, a dendrimer microbicide designed specifically with HIV and HSV antiviral activity	prevention of recurrent bacterial vaginosis	Positive	VivaGel reduced overall risk of recurrent bacterial vaginosis and time to first recurrence was delayed compared with placebo.
Biogen Idec	Nasdaq: BIIB	Daclizumab high-yield process, subcutaneous formulation of the drug antibody conjucate DAC HYP incorporating a humanized monoclonal antibody against CD25	relapsing-remitting multiple sclerosis	Positive	Both doses of subcutaneous injections of DAC HYP, administered once every four weeks, met the study's primary endpoint by significantly reducing annualized relapse rate by an average of 52 percent compared to placebo at one year. Compared to placebo, DAC HYP also reduced multiple sclerosis brain lesions. Results are published in *The Lancet*.
Novavax	Nasdaq: NVAX	Respiratory syncytial virus nanoparticle vaccine	maternal immunization	Positive	The primary objectives of the study measured the difference in anti-F IgG elicited by the use of alum adjuvant, one versus two immunizations, and across doses. Significant maternal response was detected in all groups. The trial was conducted in collaboration with PATH, an international nonprofit organization that transforms global health through innovation, and who committed $2 million to advance development of an RSV vaccine to protect infants through maternal immunization in low-resource countries.

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Clinical Trials for April 2013

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Aspireo Pharmaceuticals	Private	Somatoprim, somatostatin analogue	acromegaly	Positive	Somatoprim demonstrated a dose-dependent effect on lowering excess growth hormone on treatment-naïve patients suffering from acromegaly. No serious adverse events were reported and those reported were mild to moderate and of transient nature.
PHASE 1					
Galleon Pharmaceuticals	Private	GAL-021, small molecule for intravenous administration	drug-induced respiratory depression	Positive	The first time a drug has been shown to regulate and protect respiratory drive from drug-induced respiratory depression. In this study, intravenous GAL-021 was able to reverse respiratory depression under challenging post-surgery conditions including high doses of opioids and elevated carbon-dioxide levels.
Isis Pharmaceuticals	Nasdaq: ISIS	Antisense inhibitor of apolipoprotein C-III	reduce plasma triglycerides and risk of atherosclerosis	Positive	Treatment with an antisense compound targeting apoC-III produced a variety of potential cardio-protective effects including significant dose-dependent reductions of apoC-III and triglycerides. In the early-stage study, treatment with ISIS-APOCIIIRx was well tolerated and produced rapid, dose-dependent median reductions of up to 44 percent in plasma triglycerides and up to 78 percent in apoC-III protein. Results are published in *Circulation Research*.
Transition Therapeutics	Nasdaq: TTHI	TT-401, a dual agonist of GLP-1 and glucagon receptors	glycemic control in type 2 diabetes and obese non-diabetic patients	Positive	TT-401-treated patients in the three highest dose groups experienced statistically significant reductions in mean fasting plasma glucose levels, glycemic control, and reductions in body weight relative to placebo. In addition, statistically significant mean body weight reduction relative to baseline occurred in the three highest dose groups.
Versartis	Private	VRS-317, long-acting form of recombinant human growth hormone	growth hormone deficient adults	Positive	The elimination half-life for VRS-317 was 30-60-fold longer over those reported in package inserts for daily recombinant human growth hormone and stimulated more durable insulin like growth factor-I responses than previously studied recombinant human growth hormone products. Results are published in the *Journal of Clinical Endocrinology & Metabolism*.
Neuralstem	NYSE: CUR	NSI-566, intraspinal delivery of spinal cord stem cells	amyotrophic lateral sclerosis	Positive	Fifteen patients were treated in the trial that demonstrated no patient experienced neurological worsening from injections into either the cervical or lumbar regions of the back, nor was there any evidence of spinal cord injury. The cells also appeared to be safe with no evidence of toxicity.
Durata Therapeutics	Nasdaq: DRTX	Dalbavancin, once-weekly intravenous antibiotic	acute bacterial skin and skin structure infections including MRSA	Positive	Dalbavancin, when administered to healthy subjects as an intravenous infusion weekly for a total of up to 8 weeks, was well tolerated.
Baxter International	NYSE: BAX	Multivalent recombinant OspA Lyme borreliosis vaccine	prevention of Lyme disease	Positive	The vaccine demonstrated predominantly mild adverse reactions and no vaccine-related serious adverse events. The study in 300 healthy adults demonstrated safety and immunogenicity of the vaccine at a range of antigen doses, formulated with or without an adjuvant. Substantial antibody titers were induced against all species of Borrelia targeted by the vaccine.

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Clinical Trials for April 2013

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Medicago and Infectious Disease Research Institute	TSX: MDG	H5N1 vaccine produced in the tobacco plant relative, Nicotiana benthamiana	H5N1 immunization	Positive	H5N1 avian influenza VLP vaccine was found to be safe and well-tolerated and induced a solid immune response exceeding the three Committee for Medicinal Products for Human Use immunogenicity criteria for licensure of influenza vaccines. This study is among the first to test intradermal adjuvants and is the first time GLA has been tested intradermally.
Inovio Pharmaceuticals	AMEX: INO	Two H1N1 hemagglutinin plasmids designed against unmatched influenza strains delivered by Cellectra intradermal electroporation	universal H1N1 influenza immunization	Positive	Intradermal electroporation of DNA encoding unmatched influenza strains within different branches of the H1N1 subtype generated protective antibody levels comparable to a current FDA-approved seasonal influenza vaccine against a currently circulating influenza strain.
Collegium Pharmaceutical	Private	DETERx, extended-release, abuse-deterrent, multi-particulate oxycodone in a capsule form	chronic pain	Positive	The safety and pharmacokinetics of Oxycodone DETERx following various tampering methods was compared to two controls; Oxycodone DETERx taken as an intact capsule, and immediate release oxycodone solution. Tampered products demonstrated bioequivalent pharmacokinetics when compared with intact product. The two tampering methods were opening the capsule and chewing the contents, as well as crushing the contents.
Genentech	OTC: RHHBY	MPDL3280A, engineered antibody targeting the protein programmed death-ligand 1	various advanced cancers	Positive	Designed as a dose escalation study in 30 patients with advanced cancer, the study showed efficacy with near complete responses and sustained responses in the absence of continued therapy in at least two patients. There were no dose limiting toxicities.
Bind Therapeutics	Private	BIND-014, encapsulated nanoparticles of docetaxel targeted to prostate specific membrane antigen	advanced or metastatic solid tumors	Positive	The drug was safe and well-tolerated at the established maximum tolerated dose and showed encouraging signs of anti-tumor activity including one complete response, three partial responses and five patients with stable disease lasting at least 12 weeks. In addition, the pharmacokinetic profile of BIND-014 was substantially different from the published pharmacokinetic profile of conventional docetaxel.
Theraclone Sciences	Private	TCN-202, neutralizing antibody recognizing a broadly conserved functional epitope on human cytomegalovirus	treatment of cytomegalovirus infection	Positive	The antibody showed a strong safety and pharmacokinetic profile. No patient antibodies against TCN-202 were detected following treatment.

Patents Announced in April 2013

COMPANY	TICKER	COMPANY DESCRIPTION	GRANTING AGENCY	PATENT NUMBER	PATENT COVERS
22nd Century Group	OTCBB: XXII	Develops technology for tobacco harm reduction products	U.S. Patent and Trademark Office	U.S. Patent No. 8,410,341	The first N-methylputrescine oxidase gene patent issued anywhere in the world, covers nucleic acids encoding MPO, methods for producing tobacco plants with either reduced or increased nicotine levels using MPO gene technology, and tobacco plants produced by the method
Acura Pharmaceuticals	Nasdaq: ACUR	The specialty pharmaceutical company develops and commercializes tamper-resistant products to combat medication abuse and misuse	U.S. Patent and Trademark Office	U.S. Patent No. 8,409,616	Broadly covers Aversion polymer matrix technology when utilized with any water soluble drug of abuse as well as opioid products in development; some claims in the patent are licensed to Pfizer for use with the Aversion technology in its Oxecta tablets
Adamas Pharmaceuticals	Private	Develops therapeutics for CNS disorders based on improvements to the aminoadamantanes class of drugs, including amantadine and memantine	U.S. Patent and Trademark Office	U.S. Patent No. 8,389,578	Composition and method for treatment of Parkinson's disease using extended-release amantadine; covers dose strength and pharmacokinetic profile
Addex Therapeutics	SIX: ADXN	Advances innovative oral small molecules against rare diseases utilizing its allosteric modulation-based drug discovery platform	European Patent Office	European Patent No. 1 765 795	Composition of matter patent for dipraglurant and other mGlu5 negative allosteric modulators in development for the treatment of levodopa-induced dyskinesia in Parkinson's disease patients and rare forms of dystonia
Antares Pharma	Nasdaq: ATRS	Develops self-injection pharmaceutical products and technologies and topical gel -based products that improve safety and efficacy profiles by minimizing dosing, reducing side effects, and improving patient compliance	U.S. Patent and Trademark Office	U.S. Patent No. 8,419,686	Focuses on the interface design between injection device and the patient; interface design is applicable to the company's entire Vibex injector device platform
Antares Pharma	Nasdaq: ATRS	Develops self-injection pharmaceutical products and technologies and topical gel -based products that improve safety and efficacy profiles by minimizing dosing, reducing side effects, and improving patient compliance	U.S. Patent and Trademark Office	Notice of Allowance	Vibex QuickShot device for fast injection of highly-viscous, small volume drug products
Catabasis Pharmaceuticals	Private	Uses its safely metabolized and targeted linker technology to conjugate two drugs that act on different components of a disease pathway to produce new chemical entities with improved safety, tolerability and efficacy	U.S. Patent and Trademark Office	U.S. Patent No. 8,173,831	Composition of matter for the CAT-1000 series conjugates of salicylate and an omega-3 fatty acid using SMART Linker technology to treat diseases of chronic inflammation such as inflammatory bowel disease and Duchenne muscular dystrophy; covers lead product CAT-1004 until 2029
Catabasis Pharmaceuticals	Private	Uses its safely metabolized and targeted linker technology to conjugate two drugs that act on different components of a disease pathway to produce new chemical entities with improved safety, tolerability and efficacy	U.S. Patent and Trademark Office	U.S. Patent Nos. 8,304,551 and 8,304,552	Composition of matter for the CAT-2000 series conjugates of niacin and an omega-3 fatty acid for treatment of severe hypertriglyceridemia; covers lead compound CAT-2003 until 2030

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Patents Announced in April 2013

COMPANY	TICKER	COMPANY DESCRIPTION	GRANTING AGENCY	PATENT NUMBER	PATENT COVERS
Celsus Therapeutics	OTCQB: MRRBY	Develops non-steroidal multi-functional anti-inflammatory drugs for the treatment of a broad array of inflammatory diseases, such as allergies, autoimmune diseases, inflammatory bowel disease, ophthalmic inflammatory conditions, and cystic fibrosis	U.S. Patent and Trademark Office	Not Available	Composition of matter and method of treatment for drug product candidates MRX-4 for the treatment of allergic rhinitis, MRX-5 for the treatment of inflammatory bowel disease, and MRX-6 for the treatment of dermatitis, and pre-clinical product candidate OPT-1 for the treatment of conjunctivitis
Elite Pharmaceuticals	OTCBB: ELTP	Specialty pharmaceutical company principally engaged in the development and manufacture of oral, controlled release products with a focus on off-patent drugs and generic versions of controlled release products	U.S. Patent and Trademark Office	U.S. Patent No. 8,425,933	Abuse resistant technology for opioid products
Entia Biosciences	OTCQB: ERGO	The food science biotechnology and nutrigenomics company identifies, validates, patents, and commercializes solutions for health, beauty, and agriculture related to the effects of oxidative stress and free radical reactions	U.S. Patent and Trademark Office and Israel Patent Office	Notice of Allowance	Use of ergothioneine and its genetic transporter in the treatment of a wide variety of diseases, including those affecting the immune and central nervous systems
GW Pharmaceuticals	AIM: GWP	Discovers, develops and commercializes novel therapeutics from its cannabinoid product platform in a broad range of disease areas	U.S. Patent and Trademark Office	Notice of Allowance	Sativex delivery device, a metered valve pump spray device for delivery of a liquid cannabis extract in propylene glycol and ethanol onto the sublingual mucosa for control of cancer-related pain
Imugene	ASX: IMU	Uses its drug delivery technology to improve the efficacy and safety of a diverse number of existing prescription and over the counter medicines	China Patent & Trademark Office	Chinese Patent No. 2006800 10802.4	Formulations and additives for bisphosphonic acids and bisphosphonates to prevent bone mass loss using Linguet, the company's proprietary drug delivery technology that enables drugs to be absorbed straight into the bloodstream when placed inside the cheek or under the tongue
Innovus Pharmaceuticals	OTCBB: INNV	Develops, in-licenses, acquires and markets prescription and consumer health products in dermatology, autoimmune, respiratory and sexual dysfunction diseases with unique packaging and presentation for better patient compliance, convenience and results	European Patent Office	Notice of Allowance	Water-based extraction and anti-microbial activity of an extract of Juglans regia, the English walnut
Islet Sciences	OTCBB: ISLT	Engaged in the research, development and commercialization of patented technologies in the field of transplantation therapy for patients with diabetes	Japan Patent Office	Notice of Allowance	Use and composition of small molecules for prevention or treatment of type 1 and type 2 diabetes, atherosclerosis, disorders associated with visceral obesity, multiple sclerosis, inflammatory bowel disease, psoriasis, rheumatoid arthritis, and Alzheimer's disease

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Patents Announced in April 2013

COMPANY	TICKER	COMPANY DESCRIPTION	GRANTING AGENCY	PATENT NUMBER	PATENT COVERS
KemPharm	Private	Discovers and develops safer therapies in the areas of pain, ADHD, and other CNS diseases with a focus on development of safer, abuse resistant opioid pain relievers	U.S. Patent and Trademark Office	Notice of Allowance	Compositions of benzhydrocodone, a novel opioid prodrug; indicates the unique structure and the distinct and non-obvious properties of benzhydrocodone compared to currently marketed hydrocodone products
Lithera	Private	Develops products for aesthetic medicine to address both medical and lifestyle indications with a focus on selective fat tissue reduction	U.S. Patent and Trademark Office	U.S. Patent No. 8,404,750	Broad method of use and formulation protection for the subcutaneous administration of long-acting beta2-adrenergic receptor agonists, including salmeterol xinafoate, alone and in combination with other agents including glucocorticoids, for local fat reduction; covers LIPO-202 until 2030
Medgenics	NYSE: MDGN and AIM: MEDG	Developing an innovative and proprietary platform technology, a biological Biopump, that allows patients to produce, within their bodies and on a long-term basis, their own natural human protein therapy for the treatment of a range of chronic diseases	U.S. Patent and Trademark Office	Notice of Allowance	Expands the scope of patent coverage for additional therapeutics derived from proteins expressing at least one recombinant gene product from any of the following: growth hormone, interferon beta, insulin, PDGF-BB, interleukin-1 receptor agonist, peptide YY3-36, interleukin-10, and G-CSF
Neuralstem	NYSE: CUR	Produces neural stem cells of the human brain and spinal cord in commercial quantities and differentiates these cells into mature, physiologically relevant human neurons and glia for therapy and drug discovery purposes	U.S. Patent and Trademark Office	Notice of Allowance	Methods for treating amyotrophic lateral sclerosis with expanded spinal cord stem cells, including NSI-566
Nodality	Private	Develops personalized medicine solutions to improve the efficiency of drug development for therapeutics and predictive companion diagnostics using its signaling pathway analysis at single cell resolution	U.S. Patent and Trademark Office	U.S. Patent No. 8,394,599	Methods for applying the company's Single Cell Network Profiling technology tool to correlate clinical data with functional biology; provides protection for unique biomarkers of protein activation and cell function in single cells and applications of this information in clinical management and therapeutic product development
NuPathe	Nasdaq: PATH	Develops products that provide clinical advantages over current treatments for patient populations with central nervous system diseases	U.S. Patent and Trademark Office	Notice of Allowance	Biodegradable, long-acting delivery polymer implant that delivers a dopamine modulating compound with little or no initial burst and maintains an effective plasma level for a specified period of time; covers NP201, designed to provide continuous delivery of Parkinson's disease medication for up to two months, until 2028
Oramed Pharmaceuticals	Nasdaq: ORMP	Develops technology for the oral delivery of diabetes drugs presently administered by injection	Japanese Patent Office	N/A	Core concept of the company's oral delivery solutions for drugs and vaccines currently delivered via injection; the patent has also been approved in Israel and Australia

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Patents Announced in April 2013

COMPANY	TICKER	COMPANY DESCRIPTION	GRANTING AGENCY	PATENT NUMBER	PATENT COVERS
Prima BioMed	Nasdaq: PBMD	Develops personalized bio-therapeutic products to treat cancer	Japan Patent Office	Japanese Patent No. 5192020	Methods used in the manufacture of CVac, mannose receptor-bearing antigen presenting cells for the treatment of cancer patients with dendritic cells that have been pulsed with mannan fusion protein conjugated to an antigen, including but not limited to mucin 1
Prolor Biotech	NYSE: PBTH	Develops proprietary versions of already-approved therapeutic proteins using carboxyl terminal peptide technology that stabilize the therapy in the bloodstream without additional toxicity or loss of activity	U.S. Patent and Trademark Office	Notice of Allowance	Product composition and treatment methods of long-acting CTP-enhanced coagulation factors for the treatment of hemophilia, including Factor VIIa-CTP, Factor VII-CTP and Factor IX-CTP
Repros Therapeutics	Nasdaq: RPRX	Develops new drugs to treat hormonal and reproductive system disorders	U.S. Patent and Trademark Office	U.S. Patent No. 8,377,991	Use of Androxal to improve glycemic control in type 2 diabetic men currently being treated with oral hypoglycemic agents
Starpharma Holdings	ASX: SPL	Develops dendrimer products for pharmaceutical, life science and other applications	U.S. Patent and Trademark Office	U.S. Patent No. 8,420,067	Composition of matter protection for Starpharma's dendrimer technologies for drug delivery in the U.S. until 2029; patents are not limited by disease area, route of delivery, or drug class such as small molecules, proteins, peptides and antibodies
Suven Life Sciences	Private	Designs, manufactures, and supplies bulk actives, drug intermediates, and fine chemicals to the global life science industry	China Patent & Trademark Office; Mexican Institute of Industrial Property; Intellectual Property Office of New Zealand	ZL 20088001440 and ZL 200880112735 in China; 301421 in Mexico; 591833 in New Zealand	Selective 5-HT compounds discovered by Suven in development for the treatment of cognitive impairment associated with neurodegenerative disorders like Alzheimer's disease, attention deficient hyperactivity disorder, Huntington's disease, Parkinson's, and schizophrenia
Synthetic Biologics	NYSE: SYN	Develops biologics for the prevention and treatment of serious infectious diseases	U.S. Patent and Trademark Office	U.S. Patent No. 8,372,826	Expands the company's coverage of their oral estriol product candidate, Trimesta, to include its use in combination with the leading FDA-approved multiple sclerosis drug, Copaxone
Veritas Bio	Private	Develops technologies to enable nucleic acid-based medicines in gene therapy, RNA-based drugs, RNAi, miRNA, mRNA vaccines, and DNA-based vaccines	U.S. Patent and Trademark Office	Notice of Allowance	Transfecting double-stranded RNA into skin or muscle cells under conditions used for delivery of double-stranded RNA to the liver; applicable for the rapid development of RNA therapeutics for the treatment of infectious liver diseases including Hepatitis B, C and others
Zalicus	Nasdaq: ZLCS	Discovers and develops treatments for pain	U.S. Patent and Trademark Office	U.S. Patent No. 8,409,560	Solid dispersion formulations and methods of use for a range of Z160 pharmaceutical compositions in the treatment of pain; the drug is an oral, state-dependent, N-type calcium channel blocker

Upcoming PDUFA Dates

COMPANY	TICKER	PROPRIETARY NAME	ESTABLISHED NAME	INDICATION	PDUFA DATE
Forest Laboratories	NYSE:FRX	N/A	levomilnacipran	Major depressive disorder	7/27/2013
Aveo Pharmaceuticals Astellas Pharma Kyowa Hakko Kirin	AVEO Tokyo:4503 Tokyo:4151	Tivopath	tivozanib	Advanced renal cell carcinoma	7/28/2013
ViiV Healthcare (GSK, Pifzer, Shionogi)	Private	N/A	dolutegravir	HIV infection	8/17/2013
Delcath Systems	DCTH	Melblez	melphalan	Unresectable ocular melanoma metastatic to the liver	9/13/2013
Lundbeck Otsuka Pharmaceutical	CSE:LUN Tokyo:4502	Brintellix	vortioxetine	Major depressive disorder	10/2/2013
Pfizer Ligand Pharmaceuticals	NYSE:PFE LGND	Viviant	bazedoxifene/ conjugated estrogens	Vasomotor symptoms and vulvar and vaginal atrophy associated with menopause and prevention of postmenopausal osteoporosis	10/3/2013
Forest Laboratories	NYSE:FRX	N/A	cariprazine	Schizophrenia and bipolar I disorder	11/27/2013
BioMarin Pharmaceutical	BMRN	Vimizim	elosulfase alfa	Morquio A syndrome	12/1/2013
GlaxoSmithKline Theravance	GSK THRX	Anoro Ellipta	umeclidinium bromide and vilanterol	Chronic obstructive pulmonary disease	12/18/2013

New Drug Approvals in April 2013

UNITED STATES

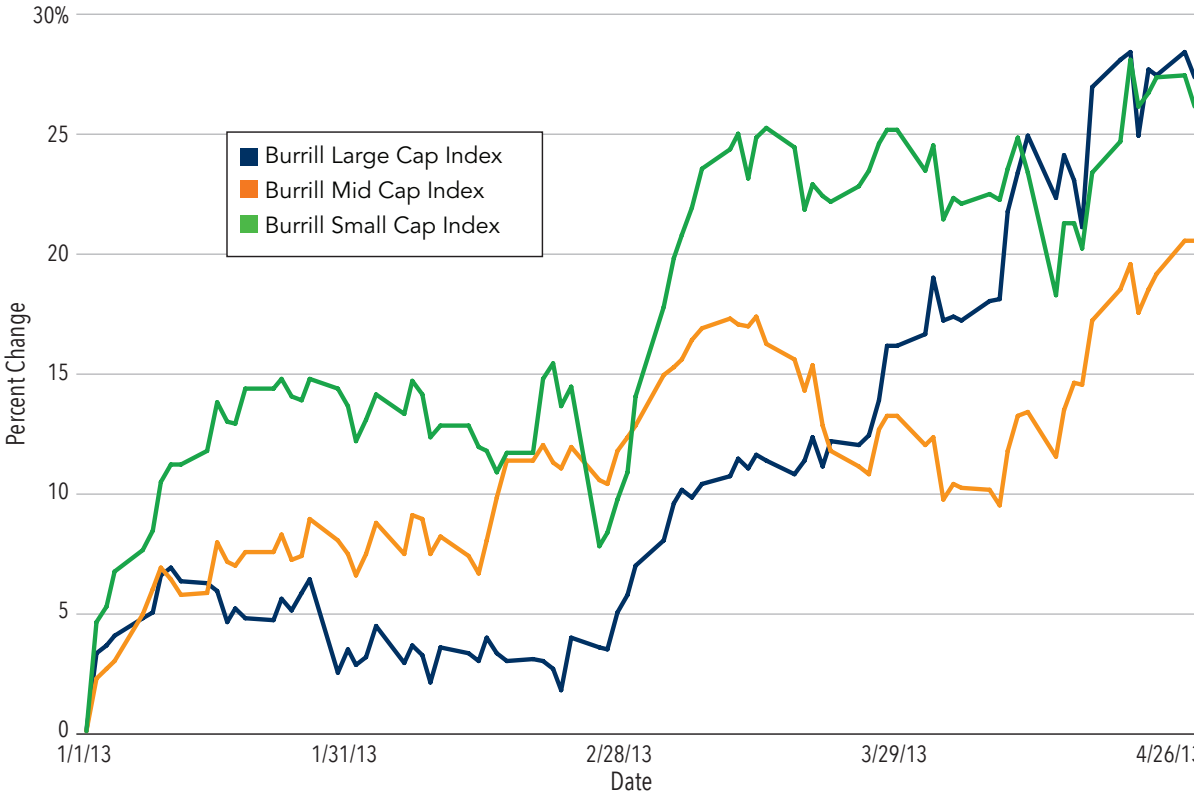
The U.S. Food and Drug Administration's Center for Biologics Evaluation and Research approved CSL Behring's Kcentra for the urgent reversal of vitamin K antagonist anticoagulation in adults with acute major bleeding. The agency's Center for Drug Evaluation and Research did not approve any new molecular entities in April.

EUROPE

The European Medicines Agency did not publish any new authorizations/approvals for new medicines in the European Union during April.

INDICES

Burrill Small-, Medium-, and Large-Cap Indices, April 2013



PERFORMANCE OF INDEX COMPONENTS

LARGE CAP
Percent change April 2013

INDEX	9.7%
VRTX	39.7%
REGN	22.0%
BIIB	13.7%
AMGN	1.7%
NYSE:VRX	1.4%
ELN	-0.8%

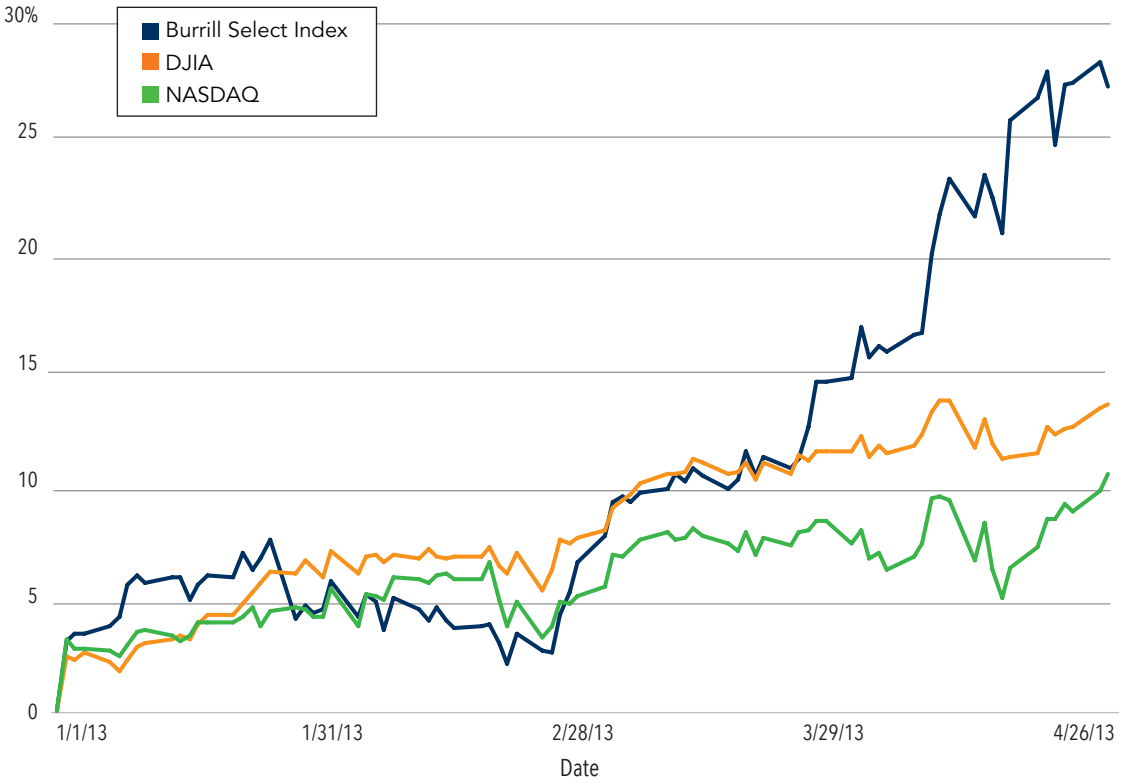
MID-CAP
Percent change April 2013

INDEX	6.4%
THRX	42.9%
ALKS	29.2%
VVUS	20.8%
SQNM	-9.2%
QGEN	-5.7%
QCOR	-5.5%

SMALL-CAP
Percent change April 2013

INDEX	0.8%
ISIS	32.2%
CLVS	30.5%
ARRY	21.2%
AFFY	-34.5%
AVEO	-30.5%
RIGL	-29.6%

Burrill Biotech Select Index, April 2013

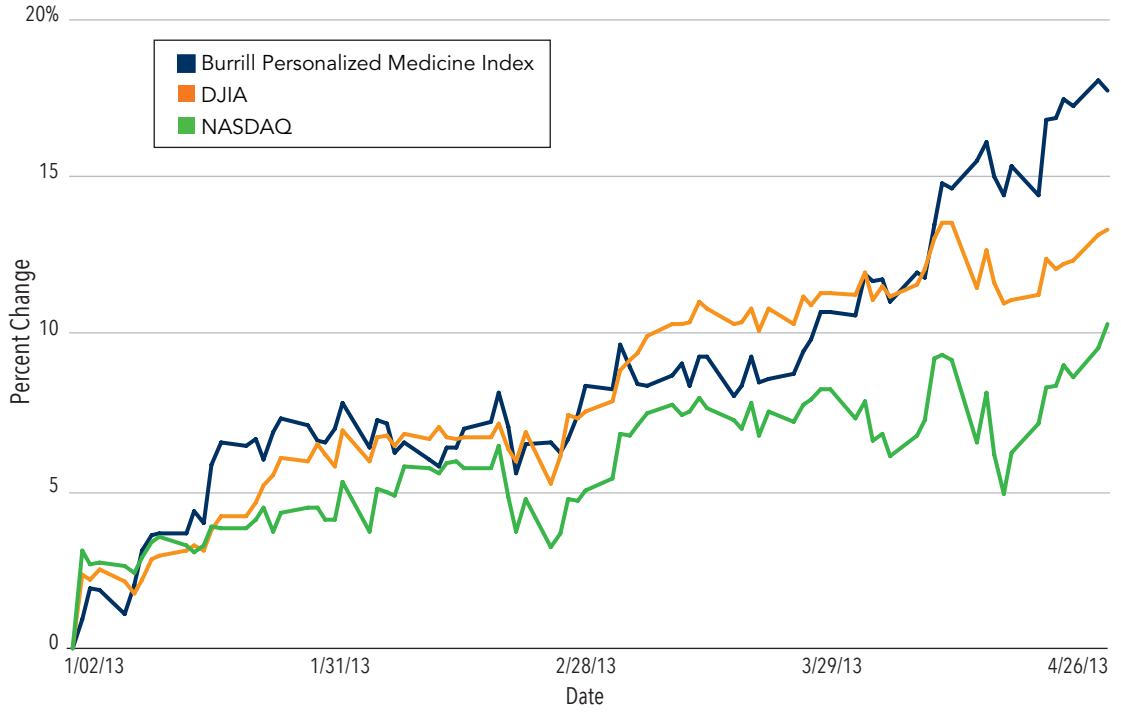


BURRILL BIOTECH SELECT INDEX

Percent change April 2013

INDEX	11.2%
THRX	42.9%
VRTX	39.7%
CLVS	30.5%
AMGN	1.7%
QGEN	-5.7%
DGX	-0.2%

Burrill Personalized Medicine Index, April 2013

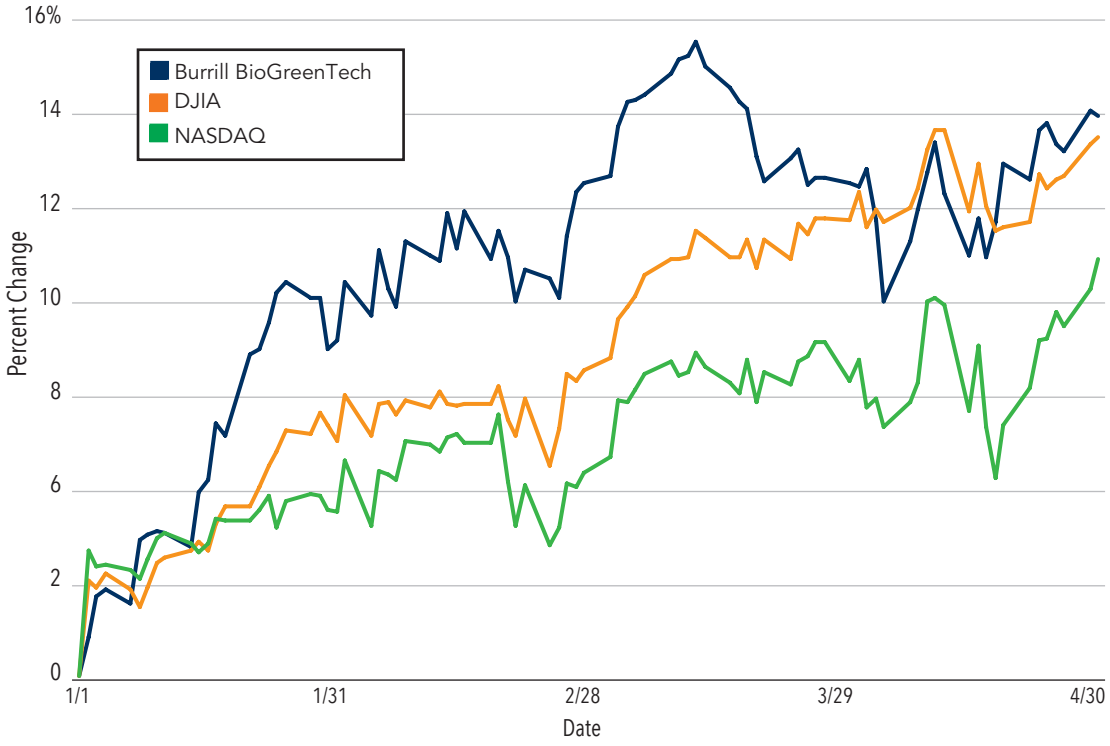


BURRILL PERSONALIZED MEDICINE INDEX

Percent change April 2013

INDEX	6.3%
ILMN	19.8%
LIFE	14.0%
ECYT	11.6%
AFFX	-22.9%
QGEN	-5.7%
EXAS	-4.7%

Burrill BioGreenTech Index, April 2013

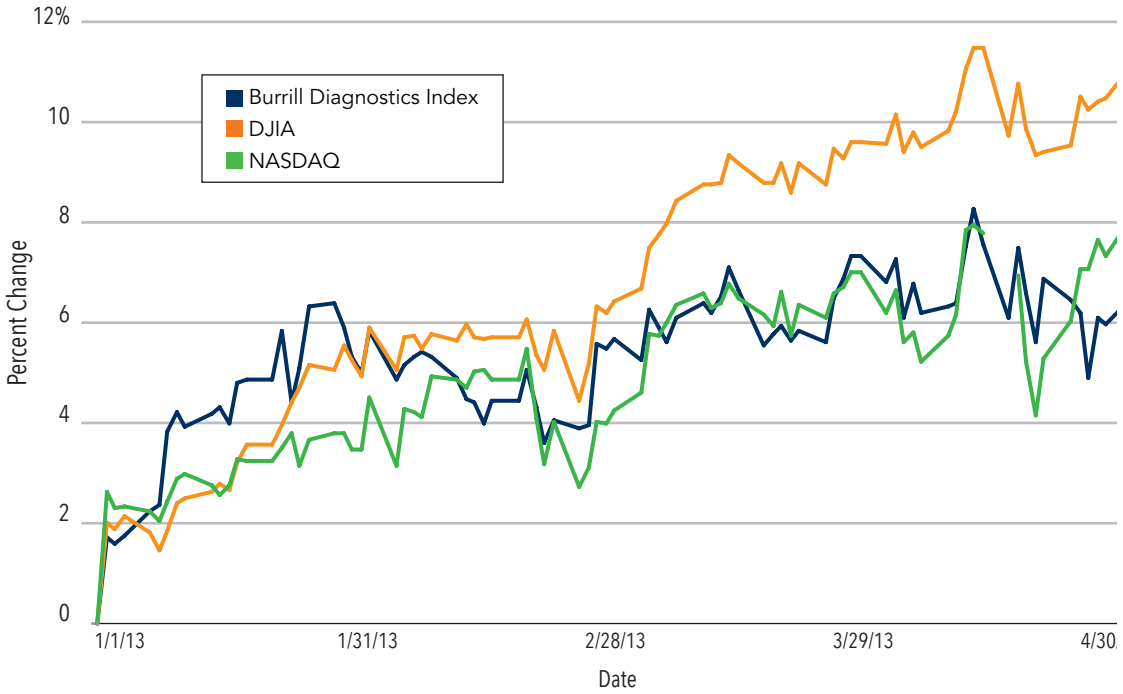


BURRILL BIOGREENTECH INDEX

Percent change April 2013

INDEX	1.4%
SZYM	16.7%
NYSE: DD	10.9%
GPRE	9.4%
GEVO	-17.6%
RTK	-11.9%
AMRS	-11.7%

Burrill Diagnostics Index, April 2013

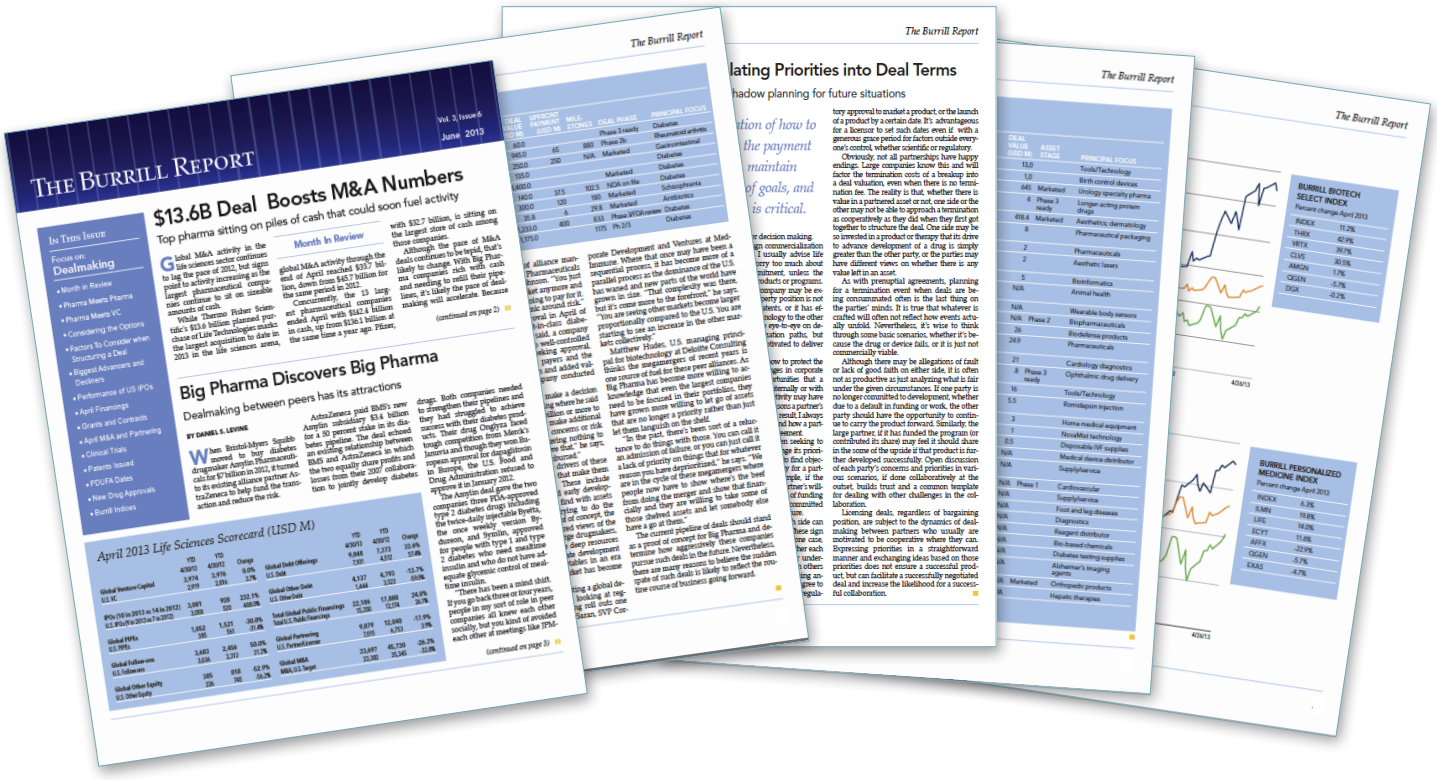


BURRILL DIAGNOSTICS INDEX

Percent change April 2013

INDEX	-1.1%
GNMK	20.4%
MYGN	9.6%
GHDX	7.4%
BGMD	-15.4%
HOLX	-9.9%
SQNM	-9.2%

The Burrill Report



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