THE BURRILL REPORT

Vol. 3, Issue 2

February 2013

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Focus on:
Review / Preview

2012 a Banner Year for New Drugs

Eight FDA Approvals in December Boosts 2012 to Best Performance since 1996 as Orphan Drugs Step Into the Spotlight

The U.S. Food and Drug Administration approved eight new drugs in December pushing the year's total to 39, its highest level since 1996 when the agency cleared a backlog of applications. Though December's newly approved drugs cover a broad range of conditions, the agency granted orphan drug status to six of the eight medicines. In fact, nearly half of the 39 drugs approved in 2012 had orphan drug designations.

Year In Review

Orphan drug status confers financial and other benefits to a drug's sponsor to encourage the development of drugs to treat patient populations of 200,000 or less in the United States. Drugmakers have embraced orphan drugs for a variety of reasons including the opportunity to win faster approvals and run smaller, less costly clinical trials, and for a better chance of success. The passage in 2012 of new incentives for developing rare disease drugs will only further fuel this trend, particularly as more precision

(continued on next page) »

G. Steven Burrill Offers Predictions for 2013

Sees improvements to the sector, despite global economic concerns

As 2012 came to a close, G. Steven Burrill issued his annual predictions for the life sciences in the New Year. Burrill, publisher of The Burrill Report and CEO of Burrill & Company, a global life sciences financial services firm, says the pace of change is accelerating as personalized medicine and digital health technologies alter the way doctors and patients treat, manage, and prevent disease. But global economic problems and the transition of healthcare around the world to value-based systems provide continuing challenges for life sciences companies.

For the life sciences in 2013, Burrill expects the following:

Capital Markets

While the world economy continues to improve, turmoil in the Middle East, economic instability in Europe, and political dysfunction in the United States threaten to disrupt a tenuous recovery.

Fundraising

Expect to see the financing environment improve once the fight in the United States over budget cuts and taxes is resolved. In 2013, expect the industry to raise $100 billion in capital, with financings heavily weighted to the large

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February 2013 Life Sciences Scorecard (USD M)

	2012*	2011*	Change
Global Venture Capital	**12,426**	**10,115**	**22.8%**
U.S. VC	9,460	7,764	21.8%
IPOs (38 in 2012 v. 45 in 2011)	**2,126**	**3,800**	**-44.1%**
U.S. IPOs (16 in 2012 v. 16 in 2011)	1,093	1,394	-21.6%
Global PIPEs	**5,375**	**3,220**	**66.9%**
U.S. PIPEs	1,981	1,506	31.5%
Global Follow-ons	**7,109**	**8,880**	**-19.9%**
U.S. Follow-ons	6,280	5,043	24.5%
Global Other Equity	**2,256**	**1,189**	**89.7%**
U.S. Other Equity	1,255	867	44.8%

	2012*	2011*	Change
Global Debt Offerings	**49,869**	**55,544**	**-10.2%**
U.S. Debt	39,174	35,927	9.0%
Global Other Debt	**13,389**	**10,607**	**26.2%**
U.S. Other Debt	11,890	4,924	141.5%
Total Global Public Financings	**80,124**	**83,240**	**-3.7%**
Total U.S. Public Financings	61,673	49,661	24.2%
Global Partnering	**37,663**	**38,157**	**-1.3%**
U.S. Partner/Licenser	20,560	22,943	-10.4%
Global M&A	**109,422**	**158,654**	**-31.0%**
M&A, U.S. Target	73,738	94,208	-21.7%

*YTD December31

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Year in Review

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therapies are developed to target subpopulations of patients with a given disease.

Trading activity of biotech stocks echoed the positive year for new drug approvals as life sciences stocks soared in 2012. The Burrill Select Index ended the year up 40.5 percent. That compares to a 7.3 percent increase in the Dow Jones Industrial Average, a 13.4 percent gain for the S&P 500, and a 15.9 percent rise in the Nasdaq Composite Index. An improving economy, clinical advances, new product approvals, and M&A activity drove the gains. Sarepta Therapeutics posted the biggest gain in 2012 with its shares rising 477 percent. The company reported in 2012 that its mid-stage experimental muscular dystrophy drug demonstrably improved the ability to walk for boys taking the drug.

Congress also helped biotech stocks stay on track in 2012 with smooth passage of legislation to renew the Prescription Drug User Fee Act, which provides for the U.S. Food and Drug Administration authority to collect fees from industry for reviewing products in exchange for assurances that it will act on applications in a timely manner. The legislation, approved as part of the Food and Drug Administration Safety and Innovation Act, also provided for accelerated approval paths and other incentives for drugmakers developing new therapies to treat rare disease and could help the development of personalized medicines that target small subpopulations of patients.

With a U.S. Supreme Court decision that left most of President Barack Obama's landmark healthcare reform legislation intact, and Obama's reelection, the fight over healthcare reform is shifting from efforts to repeal the legislation to fights over its implementation.

The past year also saw the passage of the Jumpstart Our Business Startups or JOBS Act, which seeks to make it easier for emerging growth companies to access capital through the public markets. The act provides exemption from compliance with costly regulations for smaller companies. It also allows companies to test investor interest before having to make sensitive information public in securities regulatory filings.

U.S. life sciences companies raised a record amount of capital in 2012 with a total of $71.1 billion in public and private financings, up from $57.4 billion in 2011, a 23.9 percent increase. When the potential value of partnering transactions are included in the numbers, the total for 2012 grows to $91.7 billion, a 13.9 percent increase over the $80.4 billion raised through financings and partnering transactions in 2011.

Global life sciences venture financings totaled more than $12.4 billion in 2012, an increase of nearly 23 percent over 2011. Venture investors, however, are moving away from early-stage financings. Companies are relying more on alternative sources of financing, including accelerators, angel capital, corporate venture sources, and private equity investment. In fact, of the top 10 private financings in 2012, all but one had significant backing from private equity firms or strategic investors.

When venture investors do fund early-stage companies, increasingly they are providing large rounds to carry a company to proof-of-concept when investments can be exited or new financing at higher valuations can be raised. While privately held therapeutics developers grabbed the largest portion of funding with a total of $5.1 billion in 2012, digital health and life sciences information technology deals showed the biggest jump in activity, with a 58.5 percent increase to $748 million.

A total of 16 life sciences companies completed initial public offerings in the United States through December 31, the same as last year. Shares of U.S. life sciences IPOs returned an average of 15.3 percent from their initial offering price through the end of 2012. Of the 16 issues, 12 came in below their target range. Overall, these companies sold their shares at an average of 23.2 percent below the median of their target price. The 12 therapeutics companies that debuted in public markets in 2012 outperformed life sciences IPOs as a whole. Those issues rose 25.9 percent for the year.

Companies in 2012 announced a total of $109.2 billion in M&A transactions, down 31.2 percent

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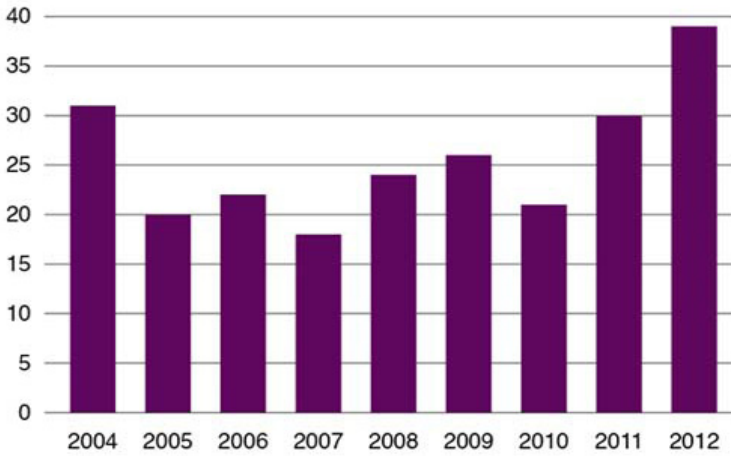
New Drug Approvals Hit 16-Year High



Source: Burrill & Company

Year in Review

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from the activity a year ago. Big Pharma and Big Biotech continue to be the most active acquirers. While generic drugs and consumer health were big areas of activity, the top deals involving innovative biopharmaceuticals in 2012 included Bristol-Myers Squibb's $7 billion acquisition of Amylin Pharmaceuticals, GlaxoSmithKline's $3 billion purchase of Human Genome Sciences, and Dainippon Sumitomo Pharma's $2.6 acquisition of Boston Biomedical, a company developing drugs to target cancer stem cells.

Global partnering deals were valued at $37.6 billion in 2012, a 1.3 percent decline over the same period a year ago. Discovery deals led the way with a total of 70 transactions, followed by preclinical (45), phase 2 (43), already marketed (40), phase 1 (28), and phase 3 (25) transactions. Most deals are back-end loaded with significant milestones tied to the achievement of sales targets for drugs that are approved and marketed. Besides AstraZeneca's $3.4 billion buy-in to collaborate with Bristol-Myers' newly acquired Amylin diabetes franchise, Allergan's agreement with Swiss biotech Molecular Partners to develop and commercialize a class of biologics aimed at treating serious eye diseases was the largest deal of the year with $62.5 million in upfront payments and a potential total value of $1.4 billion.

The U.S. Food and Drug Administration's approval of 39 new drugs and biologics represented a 14.7 percent increase from the 34 approved in 2011. These approvals included Vertex Pharmaceuticals' Kalydeco, a targeted therapy for cystic fibrosis patients who have a specific gene mutation that drives their disease. Pfizer won approval for Xeljanz, the first oral disease-modifying drug for rheumatoid arthritis in more than a decade. The year also saw the European Medicines Agency issue the first approval in the western world for a gene therapy, UniQure's Glybera, a treatment for a rare, inherited disease where patients are unable to handle fat particles in their blood plasma.

There were also some notable innovations in 2012 in the way approved drugs were made. Pfizer, along with its partner Protalix Biotherapeutics, won approval for the Gaucher disease drug Elelyso, the first drug to be manufactured using genetically engineered plant cells. Novartis, notably won approval for Flucelvax the first seasonal influenza vaccine licensed in the United States produced using cultured animal cells instead of fertilized chicken eggs.

Despite ongoing financial concerns in Europe and the United States, as well as tensions in the Middle East, the life sciences are poised for positive results in 2013. The arrival of the $1,000 genome is rapidly advancing the clinical applications of whole genome sequencing, and the promise of personalized medicine to improve care and cut costs is starting to be realized.

Emerging digital health technologies are pushing this trend further. As the demand to transition healthcare to a value-based system continues, the importance of digital health technologies will reverberate through virtually every aspect of healthcare. In 2013, these technologies will grow in importance as they empower patients to take greater control over their own health and wellness, provide real-time monitoring to improve efforts to prevent disease and improve outcomes, and help payers and providers harness vast amounts of new data, transforming it into actionable information that improves care and reduces costs.

U.S.Biotech Financings in 2012 (In USD M)

		Q1 2012	Q2 2012	Q3 2012	Q4 2012	TOTAL
PUBLIC						
	IPO	422	137	135	222	916
	Follow-on	1,954	1,464	1,298	1,276	5,992
	PIPEs	460	229	393	784	1,866
	Other Equity	441	225	147	65	878
	Debt	4,517	5,948	10,301	1,008	21,774
PRIVATE						
	VC	1,194	1,470	1,735	1,865	6,264
	PARTNERING	4,886	3,437	7,648	5,004	20,975
	TOTAL	**13,874**	**12,910**	**21,657**	**10,224**	**58,665**

Biotech includes therapeutics, tools/technology, diagnostics, industrial biotech

Excludes Big Pharma, Global Generics

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Burrill Predictions

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companies and to the use of debt.

Private Financings

Traditional venture investors will become less relevant to start-ups as they continue to migrate not only toward later-stage deals, but public company investments as well. Angel, corporate venture, disease advocacy groups, and philanthropic organizations will fill the growing gap. In order to get funding, companies will need to convince investors they have a clear path to market, ability to get paid for their products, a way to demonstrate value to customers or payers, and an exit opportunity for their investors. Larger financing rounds that get a company to proof-of-concept will become the norm, not the step financings of the past.

With growing wealth in emerging markets, investors in these parts of the world will become more prominent and new cultures of entrepreneurship will give rise to a growing number of life sciences startups outside the United States. Expect private financings to grow 20 percent in 2013.

IPOs

Bolstered with increased public market activity, the JOBS Act, and more realistic outlooks about the pricing of their offerings, the number of life sciences IPOs will grow to 25 in 2013.

Mergers & Acquisitions

Expect this number to increase by at least 20 percent with a pick-up in acquisitions of mid-cap life sciences companies and at least one Big Pharma or major biotech merger in 2013. Deals targeting drug companies that reach into Latin America, the Middle East, and Southeast Asia will also drive activity.

Partnering

Pharmaceutical companies in 2012 focused much of their partnering efforts on discovery collaborations as they worked to externalize their research operations. This trend will continue as drugmakers seek to reduce their costs and broaden their sources of innovative ideas.

Global Dealmaking

As developing countries look to grow their economies and provide for their growing populations and rising middle classes, companies will have more opportunities to take advantage of local needs to obtain capital and market access on more attractive terms. Latin America will be hot, as life sciences companies look beyond just Brazil to other countries in the region. China will continue to be a desired place for dealmaking. India will be seen as a big opportunity for bioinformatics as the country's information technology strengths and lower cost services are embraced by the life sciences. Even Russia will become a bigger player with more acquisitions than sales of companies.

Clinical trials

In an effort to reduce development costs, drugmakers will increase their use of adaptive trial designs that allow them to modify studies in ways that make use of data as it is collected, but don't compromise the validity of the study.

Reimbursement

Payers will increasingly reimburse whole genome sequencing selectively on an individual patient basis as the falling cost of sequencing drives doctors' interest in making use of the tool for diagnostic purposes.

Comparative effectiveness will become a reality for drugmakers in 2013 as they prepare to meet the growing demand of payers to demonstrate value and justify pricing of their new products. Investors will shift emphasis from a focus on whether a drug will be approved, to whether payers will see value in a product and if companies will be able to capture value.

Regulatory

We expect a total of 35 new drugs to be approved in 2013 as drugmakers take advantage of mechanisms to accelerate approval.

FDA will enter into public-private partnerships to reach earlier into the product development pipeline of both drug and device makers to work with industry to improve the tools they use to evaluate biomedical innovation.

Cooperation between regulators around the world will increase to improve post approval monitoring of regulated products.

National Institutes of Health

Regardless of what happens with sequestration, expect NIH funding to decrease in real dollars. It will force researchers that relied on grants to find alternative sources of funding and lead to new initiatives to fund academic research.

Diagnostics

As there will be increasing pressure on drugmakers and payers to define the subpopulation of patients that respond to therapies, there will be a shift in value towards diagnostics from drugs.

Sequencing

Focus in 2013 will shift from the $1,000 genome to the $100 genome. It's real. It's happening. It's the diagnostic of tomorrow.

Healthcare

A new cost-consciousness will permeate patients and providers as new value-based approaches to healthcare take hold. Patients will look past the traditional delivery of healthcare and rely on new digital tools to comparison shop for services. Providers will place a greater emphasis on cost control within their facilities as they move toward billing for outcomes rather than services.

Digital Health

Digital health technologies will grow ubiquitous as doctors and patients grow comfortable with using their everyday digital devices to manage health. As comfort levels grow, increasing sophistication will be layered on to monitor patients and share information with doctors. The convergence of wireless technologies, social media, and low-cost monitoring devices and sensors will provide consumers with new ways to take control of their own health and wellness.

Agricultural

In 2013, there will be expanded use of biopesticides and other biological tools such as RNAi to combat insects and microoganisms that damage crops. A convergence of technologies including synthetic biology, genomics, big data, and robotics will allow plant breeders to produce a new generation of products that offer greater crop yields without the stigma of producing foods that are considered genetically modified.

GMOs

Despite the defeat of California's Proposition 37, anti-GMO sentiment will continue to be a problem for the industry, particularly in Europe and increasingly in Asia.

Biorenewables

The biorenewables industry will begin to see the first commercial projects come online but until the industry starts to generate real revenues, raising capital will remain difficult and partnering will remain a critical lifeline for its growth.

Industrial Biotechnology

Advances in synthetic biology will begin to transform manufacturing of everything from fragrances to fabrics as engineered organisms produce materials traditionally derived from plants and petroleum. ■

A Banner Year for New Drugs

Drugmakers achieve payoff in leveraging orphan drug designation

BY MICHAEL FITZHUGH

In a critical year for the U.S. Food and Drug Administration, in which its policies and budget received close scrutiny, agency drug reviewers pushed through a raft of new drugs raising the year's total to 39— eight of which were approved in December—its highest level of approvals in one calendar year since 1996.

The approvals included many new cancer therapies, as well as treatments for cystic fibrosis, HIV, macular degeneration, Alzheimer's disease, blood disorders, meningitis, and Gaucher's disease.

Roche's Erivedge, approved in January 2012, became the first FDA-approved drug for late-stage basal cell cancer, the most common form of skin cancer. January also brought approval of BTG International's Voraxaze, an enzyme that lowers toxicity associated with the common chemotherapy drug, methotrexate.

Attacking a public health priority, Xtandi was approved in August 2012 to treat men with late-stage castration-resistant prostate cancer. Medivation and Astellas Pharma co-developed the drug. Meanwhile, Stivarga, Bayer's therapy for late-stage colorectal cancer, joined Zaltrap in September 2012 in the arsenal of therapies against colorectal cancer treatment capable of extending patient's lives.

Also in September, Pfizer delivered Bosulif for chronic myelogenous leukemia, a therapy that the FDA recognized as an improvement in the treatment of the leukemia based on a better understanding of the molecular basis of the disease. Pfizer also won approval for Xeljanz, the first oral disease-modifying drug for rheumatoid arthritis in more than a decade.

The 20 percent of breast cancer patients with HER2 positive cancers gained access to Roche's Perjeta in June 2012. It joined Vertex Pharmaceuticals' Kalydeco, a targeted therapy for cystic fibrosis patients who have a specific gene mutation that drives their disease, on the roster of personalized therapies approved by the FDA during the year.

There were also some notable innovations in 2012 in the way approved drugs were made. Pfizer, along with its partner Protalix Biotherapeutics, won approval for the Gaucher disease drug Elelyso, the first drug to be manufactured using genetically engineered plant cells. Novartis, won approval for Flucelvax, the first seasonal influenza vaccine licensed in the United States produced using cultured animal cells instead of fertilized chicken eggs.

In a time that the FDA is striving to project leadership, the agency's banner year of approvals give it positive momentum headed into 2013.

Drug Approvals in 2012

COMPANY	PROPRIETARY NAME	ESTABLISHED NAME	INDICATION	DATE APPROVED
Salix Pharmaceuticals; Napo Pharmaceuticals	Fulyzaq	crofelemer	HIV/AIDS patients whose diarrhea is not caused by an infection from a virus, bacteria, or parasite	12/31/12
Janssen	Sirturo	bedaquiline	Adults with multi-drug resistant pulmonary tuberculosis	12/31/12
Bristol-Myers Squibb	Eliquis	apixaban	Atrial fibrillation that is not caused by a heart valve problem	12/28/12
Aegerion Pharmaceuticals	Juxtapid	lomitapide	Homozygous familial hypercholesterolemia	12/21/12
NPS Pharmaceuticals	Gattex	teduglutide	Adults with short bowel syndrome who need additional nutrition from intravenous feeding	12/21/12
Novartis	Signifor	pasereotide	Cushing's disease patients who cannot be helped through surgery	12/14/12
Human Genome Sciences	raxibacumab	raxibacumab	Inhalational anthrax	12/14/12
Ariad Pharmaceuticals	Iclusig	ponatinib	Chronic myeloid leukemia and Philadelphia chromosome positive acute lymphoblastic leukemia	12/14/12
Exelixis	Cometriq	cabozantinib	Medullary thyroid cancer that has spread to other parts of the body	11/29/12
Pfizer	Xeljanz	tofacitinib	Rheumatoid arthritis	11/6/12
Teva Pharmaceuticals	Synribo	omacetaxine mepesuccinate	Chronic myelogenous leukemia	10/26/12
Eisai	Fycompa	perampanel	Partial onset seizures in patients with epilepsy	10/22/12
ThromboGenics	Jetrea	ocriplasmin	Vitreomacular adhesion	10/18/12

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Drug Approvals in 2012

COMPANY	PROPRIETARY NAME	ESTABLISHED NAME	INDICATION	DATE APPROVED
Bayer HealthCare	Stivarga	regorafenib	Colorectal cancer	9/27/12
Sanofi Aventis	Aubagio	teriflunomide	Multiple sclerosis	9/12/12
Mayo Clinic	Choline C 11	Choline C 11	Positron Emission Tomography imaging agent used to help detect recurrent prostate cancer	9/12/12
Pfizer	Bosulif	bosutinib	Chronic myelogenous leukemia	9/4/12
Medivation; Astellas Pharma	Xtandi	enzalutamide	Castration-resistant prostate cancer	8/31/12
Ironwood Pharmaceuticals; Forest Laboratories	Lizness	linaclotide	Irritable bowel syndrome with constipation and chronic constipation	8/30/12
Teva Pharmaceuticals	Neutroval	tbo-filgrastim	Severe neutropenia	8/29/12
Gilead Sciences	Stribild	elvitegravir, cobicistat, emtricitabine, tenofovir	HIV-1 infection in treatment-naïve adults	8/27/12
Regeneron Pharmaceuticals; Sanofi	Zaltrap	disoproxil fumarate	Colorectal cancer	8/3/12
Forest Laboratories	Tudorza Pressair	aclidinium bromide	Bronchospasm associated with chronic obstructive pulmonary disease	7/23/12
Onyx Pharmaceuticals	Kyprolis	carfilzomib	Multiple myeloma	7/20/12
Ferring Pharmaceuticals	Prepopik	sodium picosulfate	Colon cleansing	7/16/12
Astellas Pharma	Myrbetriq	mirabegron	Overactive bladder	6/28/12
Arena Pharmaceuticals	Belviq	lorcaserin	Obesity	6/27/12
Genentech; Roche; Chugai Pharmaceutical	Perjeta	pertuzumab	First-line HER2-positive metastatic or locally recurrent unresectable breast cancer	6/11/12
Protalix	Elelyso	taliglucerase alfa	Gaucher disease	5/2/12
Vivus; Mitsubishi Tanabe Pharma	Stendra	avanafil	Erectile dysfunction	4/27/12
Avid Radiopharmaceuticals	Amyvid	Florbetapir F 18	Imaging agent for PET evaluation of Alzheimer's Disease	4/10/12
Affymax	Omontys	peginesatide	Anemia	3/27/12
Discovery Laboratories	Surfaxin	lucinactant	Infant Respiratory Distress Syndrome	3/6/12
Merck	Zioptan	tafluprost	Glaucoma and ocular hypertension	2/10/12
Vertex Pharmaceuticals	Kalydeco	ivacaftor	Rare form of cystic fibrosis	1/31/12
Roche	Erivedge	vismodegib	Basal cell carcinoma	1/30/12
Pfizer	Inlyta	axitinib	Kidney cancer	1/27/12
Leo Pharma AS	Picato	ingenol mebutate	Actinic keratosis	1/23/12
BTG International	Voraxaze	glucarpidase	Toxic levels of methotrexate in blood due to kidney failure	1/17/12

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2012 STATISTICS

Biggest Market Movers in 2012 by Share Price

COMPANY	TICKER	CLOSING PRICE 12/30/11	CLOSING PRICE 12/31/12	PERCENT CHANGE
ADVANCERS				
Sarepta Therapeutics	SRPT	4.47	25.8	477.18
Arena Pharmaceuticals	ARNA	1.87	9.02	382.35
Celsion	CLSN	1.70	8.19	381.76
ACADIA Pharmaceuticals	ACAD	1.08	4.65	330.56
Infinity Pharmaceuticals	INFI	8.84	35	295.93
Pharmacyclics	PCYC	14.82	57.78	289.88
3D Systems	DDD	14.40	53.35	270.49
TearLab	TEAR	1.12	4.1	266.07
Sunesis Pharmaceuticals	SNSS	1.17	4.2	258.97
Novogen	NVGN	2.01	6.95	246.63
Threshold Pharmaceuticals	THLD	1.22	4.21	245.08
Santarus	SNTS	3.31	10.98	231.72
Tekmira Pharmaceuticals	TKMR	1.50	4.96	230.67
Repros Therapeutics	RPRX	4.82	15.75	226.76
Orexigen Therapeutics	OREX	1.61	5.2501	226.09
Regeneron Pharmaceuticals	REGN	55.43	171.07	208.62
Medgenics	MDGN	2.50	7.44	197.61
Affymax	AFFY	6.61	18.99	187.29
Celldex Therapeutics	CLDX	2.60	6.71	158.08
Dyax	DYAX	1.36	3.48	155.88
DECLINERS				
Anthera Pharmaceuticals	ANTH	6.14	0.62	-89.90
Cardiome Pharma	CRME	2.63	0.3852	-85.35
Chelsea Therapeutics	CHTP	5.13	0.76	-85.19
Access Pharmaceuticals	ACCP	1.44	0.24	-83.33
Poniard Pharmaceuticals	PARD	2.13	0.36	-83.10
Tranzyme	TZYM	2.89	0.5402	-81.31
RepliCel Life Sciences	REPC.F	2.35	0.46	-80.43
Tengion	TNGN	4.70	0.99	-78.94
Telik	TELK	5.94	1.31	-77.95
Cell Therapeutics	CTIC	5.80	1.3	-77.59
PURE Bioscience	PURE	2.60	0.6151	-76.34
Gevo	GEVO	6.29	1.54	-75.52
Oncothyreon	ONTY	7.58	1.92	-74.67
Columbia Laboratories	CBRX	2.50	0.6355	-74.58
Æterna Zentaris	AEZS	9.24	2.38	-74.24
CombiMatrix	CBMX	20.00	5.28	-73.60
Ventrus Biosciences	VTUS	8.01	2.16	-73.03
Amyris	AMRS	11.54	3.12	-72.96
Opexa Therapeutics	OPXA	3.72	1.1376	-69.42
PowerVerde	PWVI	1.27	0.39	-69.29

Includes life sciences stocks with closing price of $1 or more on December 30, 2011

Biggest Market Movers in 2012 by Market Cap (USDB)

COMPANY	TICKER	MARKET CAP 12/30/11	MARKET CAP 12/31/12	PERCENT CHANGE
ADVANCERS				
Gilead Sciences	GILD	30.74	55.65	24.91
Roche Holding	SWX:ROG	136.21	156.35	20.13
Sanofi	ENXTPA:SAN	76.31	95.28	18.97
Bayer	DB:BAYN	40.69	59.42	18.73
Pfizer	PFE	166.35	184.65	18.30
Amgen	AMGN	50.93	66.15	15.21
Johnson & Johnson	JNJ	179.09	194.27	15.18
Regeneron Pharmaceuticals	REGN	5.13	15.88	10.75
Merck & Co	MRK	114.91	124.46	9.55
Novartis	SWX:NOVN	129.88	138.91	9.02
Eli Lilly and Company	LLY	45.81	54.64	8.83
Biogen Idec	BIIB	26.73	34.63	7.90
Thermo Fisher Scientific	TMO	17.01	22.97	5.96
Alexion Pharmaceuticals	ALXN	13.24	18.21	4.97
China Pharmaceutical Group	SEHK:1093	2.62	6.08	3.46
Valeant Pharmaceuticals	TSX:VRX	14.68	18.09	3.41
Watson Pharmaceuticals	WPI	7.67	10.99	3.31
Celgene	CELG	30.01	33.19	3.18
Illumina	ILMN	3.70	6.86	3.16
Pharmacyclics	PCYC	1.02	4.02	3.00
DECLINERS				
GlaxoSmithKline	GSK	72.89	64.43	-8.46
Bristol-Myers Squibb	BMY	59.72	53.80	-5.92
Teva Pharmaceutical Industries	TEVA	35.72	32.41	-3.31
AstraZeneca	AZN	38.45	36.24	-2.20
Shire	LSE:SHP	12.65	10.55	-2.10
Elan Corporation	ELN	8.09	6.07	-2.03
Endo Health Solutions	ENDP	4.03	2.99	-1.04
Questcor Pharmaceuticals	QCOR	2.59	1.56	-1.03
Warner Chilcott	WCRX	3.84	3.02	-0.83
Societe Africaine des Plantations d'Heveas	SPHC	204.46	203.95	-0.51
Alere	ALR	1.99	1.50	-0.49
MAKO Surgical	MAKO	1.05	0.59	-0.46
Salix Pharmaceuticals	SLXP	2.83	2.38	-0.45
ViroPharma	VPHM	1.93	1.50	-0.43
AVEO Pharmaceuticals	AVEO	0.74	0.35	-0.39
KiOR	KIOR	1.04	0.67	-0.37
Amyris	AMRS	0.53	0.19	-0.34
Dendreon	DNDN	1.13	0.82	-0.32
Momenta Pharmaceuticals	MNTA	0.89	0.61	-0.28
Chelsea Therapeutics	CHTP	0.32	0.05	-0.27

Includes life sciences stocks with closing price of $1 or more on December 30, 2011

U.S. IPO Review: IPOs Keep Pace

Companies find the financings they seek, but have to sell shares for less than hoped

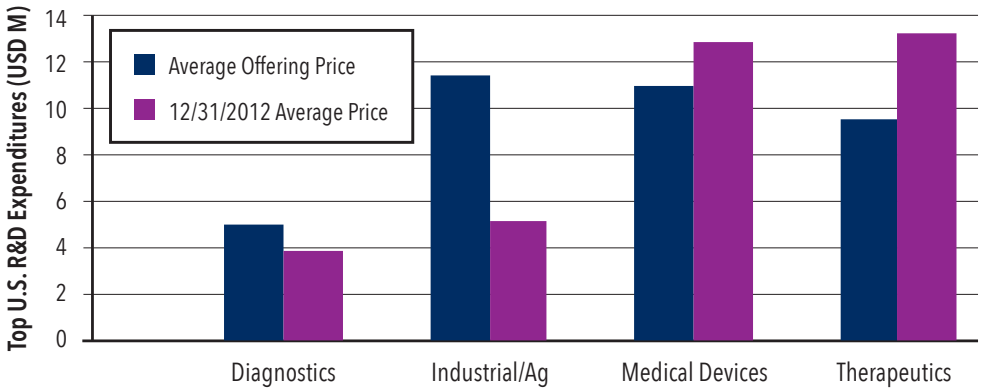
Of the 16 issues, 12 came in below their target range.

A total of 16 life sciences companies completed initial public offerings in the United States through December 31, 2012, the same as the previous year. Globally, companies raised $2.1 billion through 37 IPOs, a 44.1 percent drop over the $3.8 billion raised through 45 offerings in 2011.

In the United States, life sciences companies raised $1.1 billion in 16 offerings. Though the number of offerings in 2012 equaled the previous year, the total amount raised fell 21.6 percent to $1.4 billion.

Shares of U.S. life sciences IPOs returned an average of 15.3 percent from their initial offering price through the end of 2012. Of the 16 issues, 12 came in below their target range. Overall, these companies sold their shares at an average of 23.2 percent below the median of their target price. The 12 therapeutics companies that debuted in public markets in 2012 outperformed life sciences IPOs as a whole. Those issues rose 25.9 percent for the year.

2012 U.S. IPO Performance by Focus



Source: *Burrill & Company, S&P Capital IQ*

Performance of 2012 IPOs

COMPANY	TICKER	PRINCIPAL FOCUS	IPO DATE	CAPITAL RAISED (USD M)	OFFERING PRICE (USD)	PRICE 12/31/12 (USD)	RETURN FROM IPO
Atossa Genetics	ATOS	Diagnostics	11/8/12	4	5	3.90	-22.0
Kythera BioPharmaceuticals	KYTH	Therapeutics	10/10/12	80.96	16	30.34	89.6
Intercept Pharmaceuticals	ICPT	Therapeutics	10/10/12	86.25	15	34.24	128.3
Regulus	RGLS	Therapeutics	10/4/12	50.9	4	6.30	57.5
Globus Medical	NYSE:GMED	Med Device	8/2/12	100	12	10.49	-12.6
Hyperion Therapeutics	HPTX	Biotechnology (Primary)	7/25/12	50	10	11.28	12.8
Durata Therapeutics	DRTX	Biotechnology (Primary)	7/18/12	67.5	9	7.64	-15.1
Tesaro	TSRO	Biotechnology (Primary)	6/27/12	81	13.5	16.95	25.6
Supernus Pharmaceuticals	SUPN	Central Nervous System Drugs (Primary)	4/30/12	50	5	7.17	43.4
Merrimack Pharmaceuticals	MACK	Biotechnology (Primary)	3/28/12	100.1	7	6.09	-13.0
Ceres	CERE	BioAg	2/22/12	65	13	4.54	-65.1
ChemoCentryx	CCXI	Biotechnology (Primary)	2/8/12	45	10	10.94	9.4
Cempra	CEMP	Anti-infective Drugs (Primary)	2/3/12	50.4	6	6.40	6.7
Greenway Medical Technologies	NYSE:GWAY	Med Device	2/1/12	66.67	10	15.36	53.6
Verastem	VSTM	Biotechnology (Primary)	1/26/12	55	10	8.79	-12.1
Renewable Energy Group	REGI	BioAg	1/19/12	72	10	5.86	-41.4
AVG RETURN FOR CLASS OF 2012							**15.3**

Life Sciences Companies Raise $92.5 Billion in 2012

Sector ends year flat compared to 2011, as equities are up and debt is down

BY MARIE DAGHLIAN

Life sciences companies raised $92.5 billion of new capital globally in 2012, falling short of the $93.4 raised in 2011. But as debt offerings fell, the amount of capital raised through equity financings rose.

In all, life sciences companies raised $29.3 in equity, a 7.6 percent increase over 2011. Overall, that represented 31.6 percent of the total raised in 2012 compared to 29.1 percent of the total raised in 2011.

Globally, venture and private financings grew almost 23 percent, most of that driven by a 22 percent increase in investments in U.S. companies. Initial public offerings and secondary public offerings (follow-ons) suffered, with IPOs off by 44 percent and follow-ons down 20 percent. This reflected general risk aversion in the public markets around the world due to slower than expected economic growth in emerging markets and the United States, and the continuing European debt crisis.

Globally, debt offerings fell to $63.3 billion, down 4.4 percent. The decrease was primarily due to the relative lack of large M&A deals in the life sciences in 2012, which normally necessitate considerable debt issues by Big Pharma and Big Biotech. The biggest debt issue was completed by Abbott Labs' biopharmaceutical division AbbVie, which raised $14.7 billion ahead of its market debut in January 2013.

In the United States, life sciences financings were flat in 2012 compared with 2011, at $71.1 billion in debt and equity. U.S. life sciences companies raised $20.1 billion in equity capital, a 21 percent increase over

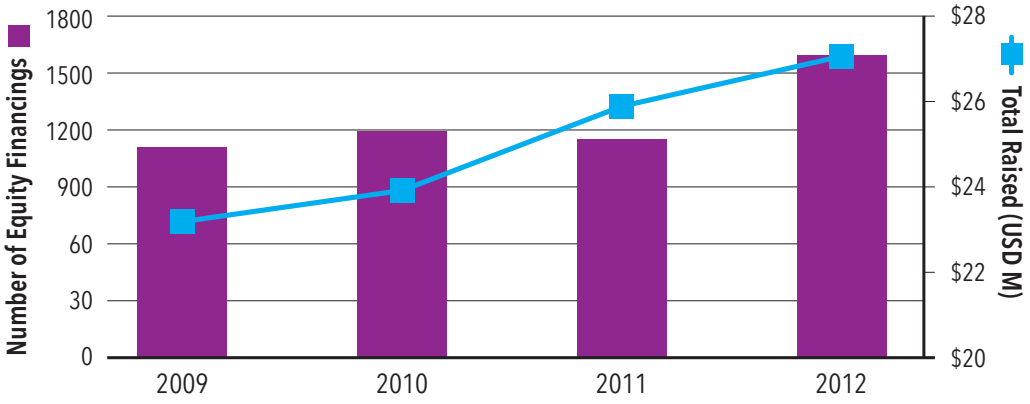
2012 Financings Review

2011. While the total amount of debt offerings and loans for U.S. life sciences companies fell 6.5 percent compared to 2011, debt capital represented the bulk of capital raised, accounting for a little more than three quarters of the total.

Capital raised through equity offerings rose in every category except for initial public offerings, which were down 21.6 percent in 2012 compared to 2011. Companies already public, however, took advantage of a strong stock market and positive clinical events to raise capital, with capital raised in follow-on offerings up 24.5 percent in 2012 compared to 2011.

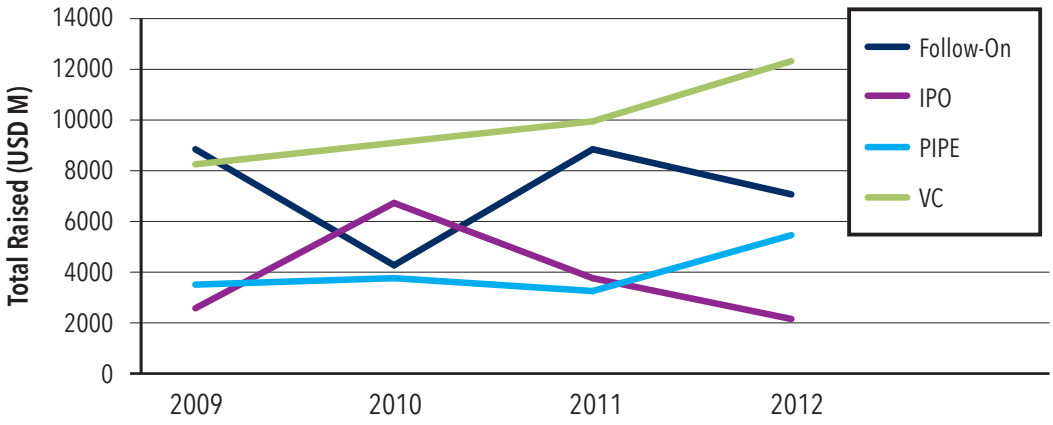
Venture financings were also a bright spot, with $9.5 billion raised by private companies in the United States. Venture investors, however, are moving away from early-stage financings and

Total Global Equity Financings



Includes: VC, IPOs, PIPEs, Follow-ons
Excludes: Debt, Contracts, Grants and Other Deals
Source: *Burrill & Company*

Total Global Equity Financings by Type, 2009 to 2012



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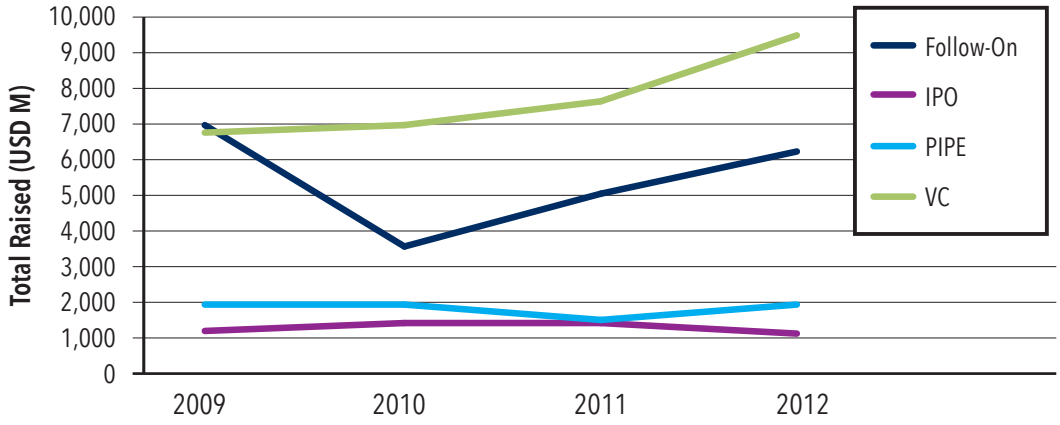
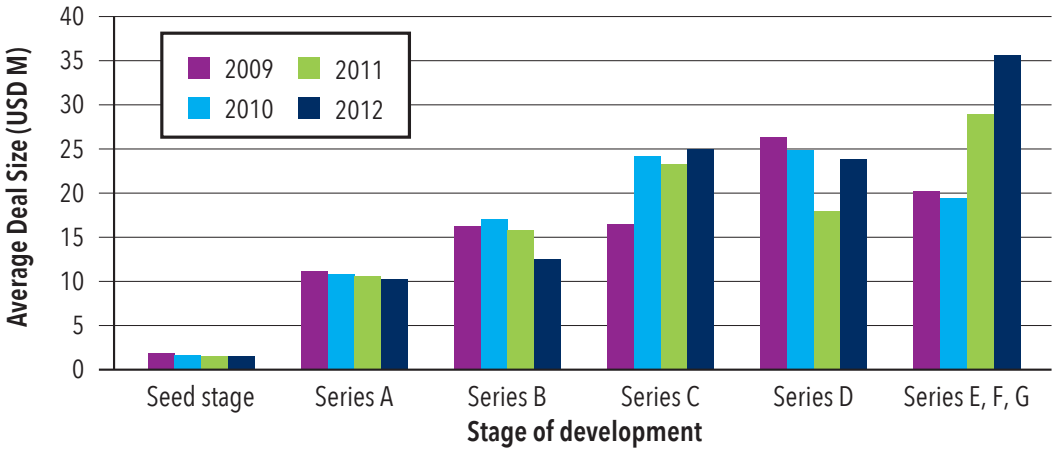
many startups are relying on alternative sources such as accelerators, angel capital, corporate venture, and private equity. Of the top 10 private company financings in 2012, all but one had significant backing from private equity firms or strategic investors.

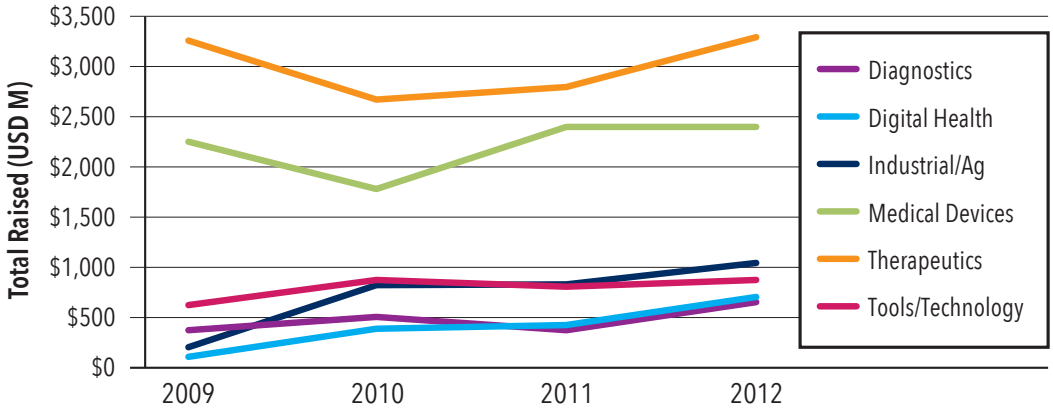
Total U.S. Equity Financings by Type, 2009 to 2012



U.S. Venture Capital Financings by Stage, 2009 to 2012



U.S. Venture Capital Financings by Category, 2009 to 2011



Life Sciences M&A Sees Fewer Billion Dollar Deals

Average therapeutic deal values fall but premiums for biotech rise

BY MARIE DAGHLIAN

Global life sciences M&A transactions fell more than 30 percent in 2012, a notable year for the low volume of multi-billion dollar deals. In fact, Nestle's $11.8 billion

2012 M&A Review

acquisition of Pfizer's infant nutrition business was the only transaction greater than $10 billion.

Overall, life sciences M&A transactions totaled $109.4 billion globally in 2012, a 31 percent drop compared to 2011. In 2011, major transactions included Sanofi's $20.1 billion acquisition of Genzyme, Johnson & Johnson's $21.6 billion acquisition or purchase of Synthes, Takeda's $13.7 billion acquisition of Nycomed, and Gilead Sciences' $11 billion purchase of Pharmasset.

Big Pharma continued to be the main acquirer of innovative therapeutics, but the deals in 2012 were smaller than 2011. Among the top deals of 2012 was Bristol-Myers Squibb's $7 billion acquisition of Amylin Pharmaceuticals, which gave it a complementary diabetes franchise.

GlaxoSmithKline's $3 billion acquisition of partner Human Genome Sciences was also among the more notable transactions. The deal gave GSK full control of lupus drug Benlysta and other promising compounds.

Other deals of note include Bristol-Myers Squibb's $2.5 billion purchase of Inhibitex for its Hepatitis C investigational drug that later failed in a clinical study, AstraZeneca's acquisition of Ardea Biosciences for $1.3 billion for its gout drug, and Amgen's $1.2 billion acquisition of Micromet for its BiTE technology platform and pipeline.

The average deal value for therapeutic M&A deals in 2012 with dis-

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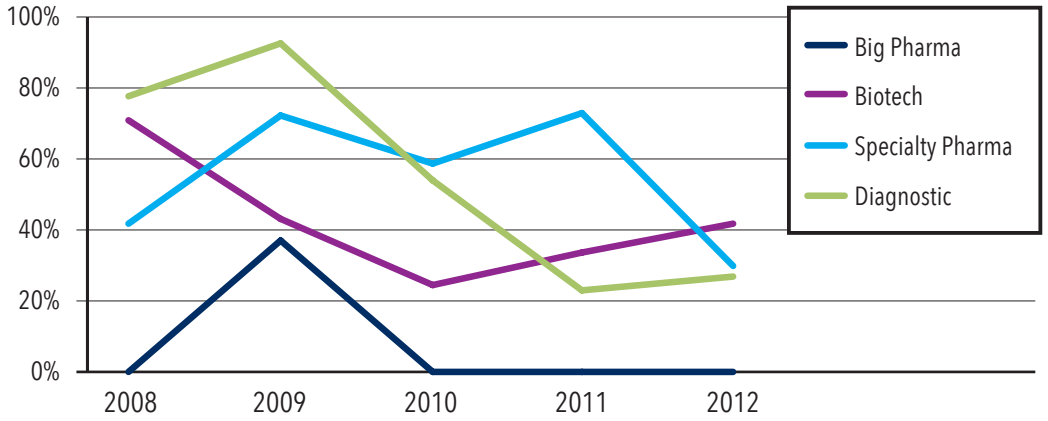
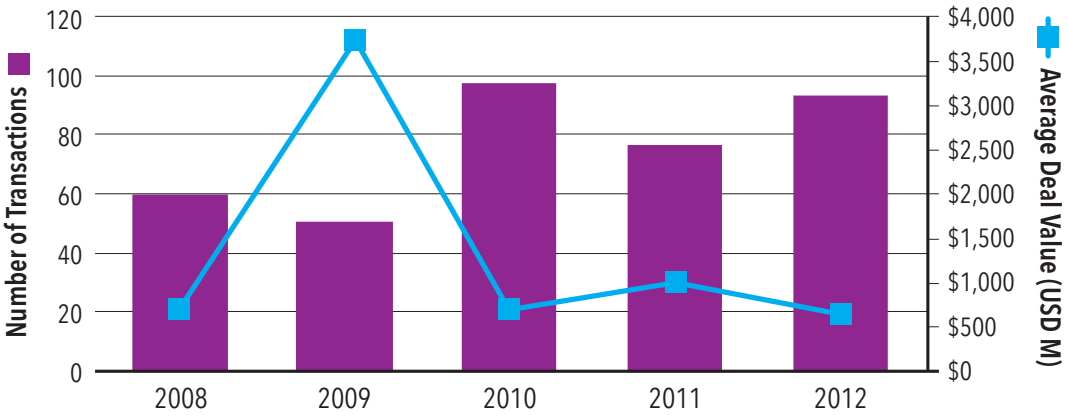
Median M&A Premiums by Target Type



Source: *Burrill & Company, S&P Capital IQ*

Therapeutic M&A, 2008 to 2012



Source: *Burrill & Company, Windhover, S&P Capital IQ*

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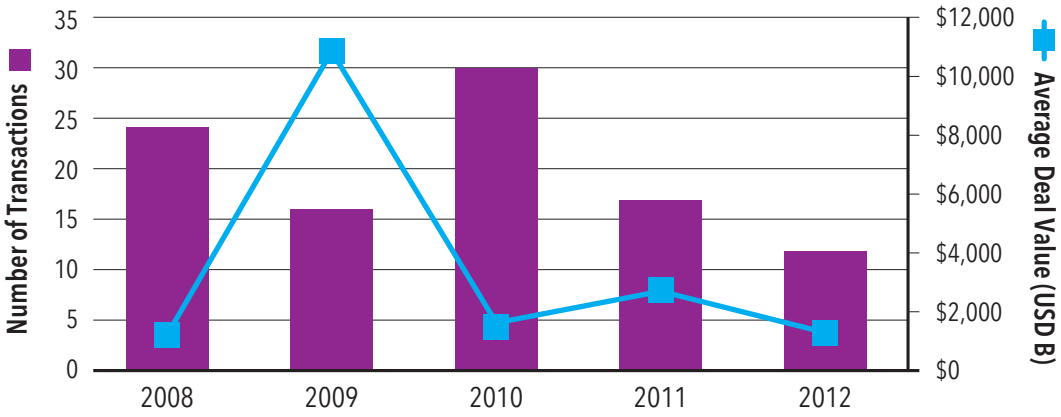
closed deal values above $20 million was $638 million, a 36.4 percent drop compared to the $1 billion average deal value in 2011. The number of deals, however, was up 22.4 percent in 2012 compared to 2011. While M&A deal volume grew in 2012 compared to 2011, average deal values fell 36.4 percent from the previous year.

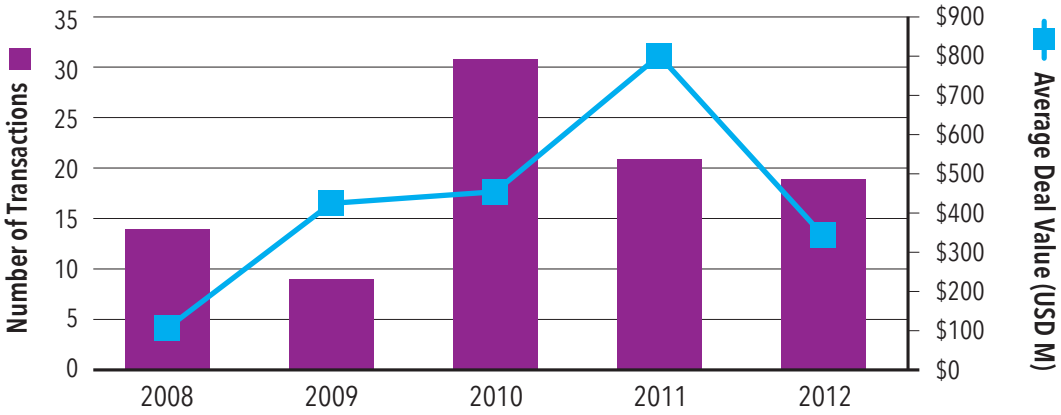
In looking at the types of premiums life sciences M&A deals are attracting, biotech and diagnostics are much more prized than specialty pharmaceuticals. Median biotech premiums are at about 42 percent while diagnostics premiums are 27 percent, rising in lock step as companies seek novel targeted therapeutics that benefit specific populations identified by diagnostics. Diagnostics are especially important in advancing clinical development of many targeted new medicines in the pipeline.

Therapeutic M&A Deals By Big Pharma



Source: *Burrill & Company, Windhover*

Therapeutic M&A Deals By Biotech



Source: *Burrill & Company*

Top M&A in 2012

ACQUIRER	TARGET	VALUE USD M	FOCUS	STAGE OF ASSET	UPFRONT	PUBLIC/ PRIVATE
INNOVATIVE THERAPEUTICS						
Bristol-Myers Squibb	Amylin	7,000	Diabetes/endocrine	Marketed		Public
GlaxoSmithKline (United Kingdom)	Human Genome Sciences	3,000	Biopharmaceuticals	Marketed		Public
Dainippon Sumitomo Pharma (Japan)	Boston Biomedical	2,600	Cancer stem cells	Phase 3	200	Private
Valeant Pharmaceuticals	Medicis Pharmaceutical	2,600	Dermatology	Marketed		Public
Bristol-Myers Squibb	Inhibitex	2,500	Infectious	Phase 2		Public
AstraZeneca (United Kingdom)	Ardea Biosciences	1,260	Gout	Phase 3		Public
Amgen	Micromet	1,160	Biopharmaceuticals	Phase 2		Public
Celgene	Avila Therapeutics	925	Biopharmaceuticals	Phase 1	350	Private
Takeda Pharmaceutical (Japan)	URL Pharma	800	Gout	Marketed		Private
Smith & Nephew (United Kingdom)	Healthpoint Therapeutics	782	Tissue regeneration	Marketed		Private
GENERICS						
TPG	Par Pharmaceutical	1,840	Generics			Public
Guangzhou Pharma (China)	Guangzhou Baiyunshan Pharma (China)	1,541	APIs; TCMs			Public
Novartis (Switzerland)	Fougera	1,525	Skincare generics			Private
Avista Capital Partners; Clessidra Capital Partners	Rottapharm (Italy)	1,100	Generics			Private
Cinven (Europe)	Mercury Pharma (United Kingdom)	732	Generics			Private
Cinven (Europe)	Amdipharm (United Kingdom)	590	Generics			Private
Sun Pharmaceuticals (India)	Taro Pharmaceuticals	571	Generics			Public
EMERGING MARKETS						
Nestle (Switzerland)	Pfizer Nutrition	11,850	Infant nutrition			Public
Watson Pharmaceuticals	Actavis Group (Switzerland)	5,617	Generics			Private
China Pharmaceutical Group (China)	Robust Sun (Hong Kong)	1,200	CNS drugs			Private
GlaxoSmithKline United Kingdom)	GSK Consumer Healthcare (India)	940	Nutraceuticals/OTC			Public
Medtronic	China Kanghui (China)	816	Orthopedic devices			Public
Amgen	Mustafa Nevzat Pharmaceuticals (Turkey)	700	Pharmaceuticals			Private
DSM (Netherlands)	Tortuga (Brazil)	578	Animal nutrition			Private
DIAGNOSTICS						
Hologic	Gen-Probe	3,720	Diagnostics			Public
Agilent Technologies	Dako (Denmark)	2,200	Diagnostics			Private
Thermo Fisher Scientific	One Lambda	925	Transplant diagnostics			Private
MEDICAL DEVICES						
Baxter International	Gambro (Sweden)	4,000	Dialysis products			Private
EQT Partners (Sweden)	BSN Medical (Germany)	2,500	Medical devices			Private

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Top M&A in 2012

ACQUIRER	TARGET	VALUE USD M	FOCUS	STAGE OF ASSET	UPFRONT	PUBLIC/ PRIVATE
Asahi Kasei Corporation (Japan)	Zoll Medical	2,210	Medical devices			Public
Boston Scientific	Cameron Health	1,350	Medical devices		150	Private
Haemonetics	Pall's blood business	551	Medical devices		536	Public
TOOLS/TECHNOLOGY/SERIVCES						
McKesson	PSS World Medical	2,100	Drug distribution			Public
Roper Industries	Sunquest Information Systems	1,415	Healthcare software solutions			Private
Fresenius Kabi (Germany)	Fenwal	1,100	Tools/Technology			Private
Corning	BD Biosciences-Discovery Labware	730	Tools/Technology			Public
Piramal Healthcare (India)	Decision Resources Group	635	Information services			Private
SAIC	maxIT Healthcare	473	Healthcare IT			Private
INDUSTRIAL/AG						
BASF (Germany)	Becker Underwood	1,020	Crop protection			Private
Syngenta (Switzerland)	Devgen (Belgium)	523	Agbiotech			Public
Bayer CropScience (Germany)	AgraQuest	500	Biopesticides		425	Private
Novozymes (Denmark)	Beta Renewables (M&G-Italy)	117	Biorenewables			
Syngenta (Switzerland)	Pasteuria Bioscience	113	Biopesticides		86	Private
OTHER						
Reckitt Benckiser (United Kingdom)	Schiff Nutrition International	1,400	Nutraceuticals			Public
BASF (Germany)	Pronova BioPharma (Norway)	844	Omega-3 fatty acids			Public

Discovery and Research Deals Lead Partnering

Pharmaceutical companies collaborate on novel drug discovery, sharing risk

BY MARIE DAGHLIAN

Discovery and research deals led life sciences partnering activity in 2012 as pharmaceutical companies looked to partner with biotechs that have novel platform technologies. Overall, potential values of partnering transactions by life sciences companies dropped 2012 even as average deal values rose.

Global partnering deals were valued at $37.6 billion, a 1.3 percent decline from 2011. Many announced deals did not disclose financial terms and of the deals with disclosed terms, many were back-end loaded, often with significant milestone payments tied to achievement of sales targets for approved and marketed drugs.

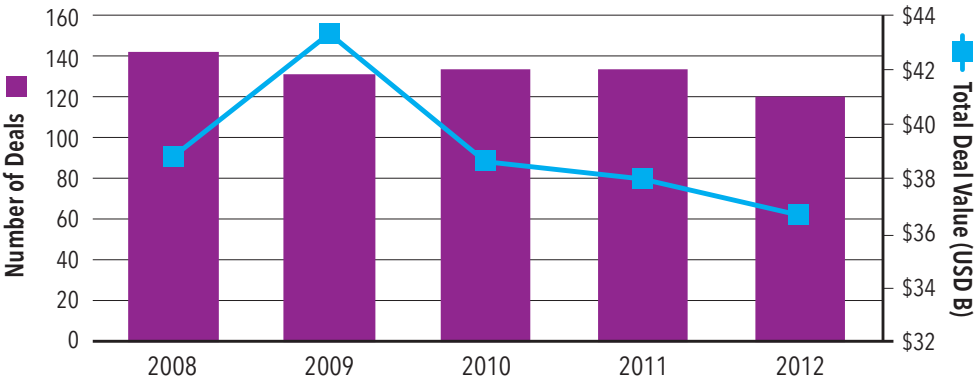
2012 Partnering Review

Among the deals with disclosed values, research and discovery deals led the way with 70 transactions, followed by preclinical (45), phase 2 (43), marketed products (40), phase 1 (28), and phase 3 (25) transactions.

Although the number of disclosed deals fell, the average potential deal values rose 8 percent to $305 million. The largest deal was AstraZeneca's $3.4 billion buy-in to collaborate with Bristol-Myers Squibb's newly acquired Amylin's diabetes franchise. Allergan's collaboration and license agreement with Swiss biotech Molecular Partners was valued at $1.4 billion with $65 million in upfront payments to develop and commercialize a class of novel biologics aimed at treating serious eye diseases.

Looking ahead, we expect to see more deals in which pharma and biotech collaborate at the early stages of research and drug discovery. These deals will be small bets for pharma and have the potential to turn into big deals for startups. On the other hand, as the paucity of late-stage deals shows, biotechs are looking for alternatives to partnering with pharma for late-stage testing, including reaching out to strategic investors around the world and identifying where they can develop their drugs and extract the most value for their companies.

Life Sciences Total Deal Value (USD B)



Source: *Burrill & Company, S&P Capital IQ, Windhover*

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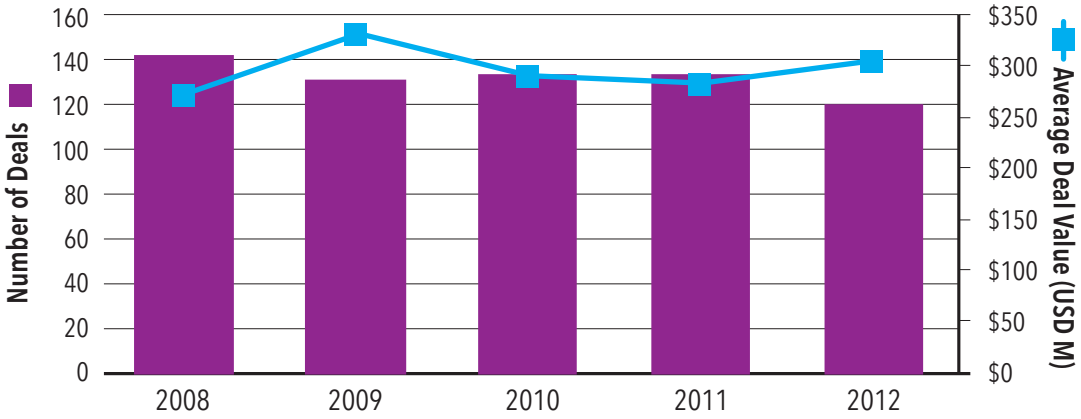
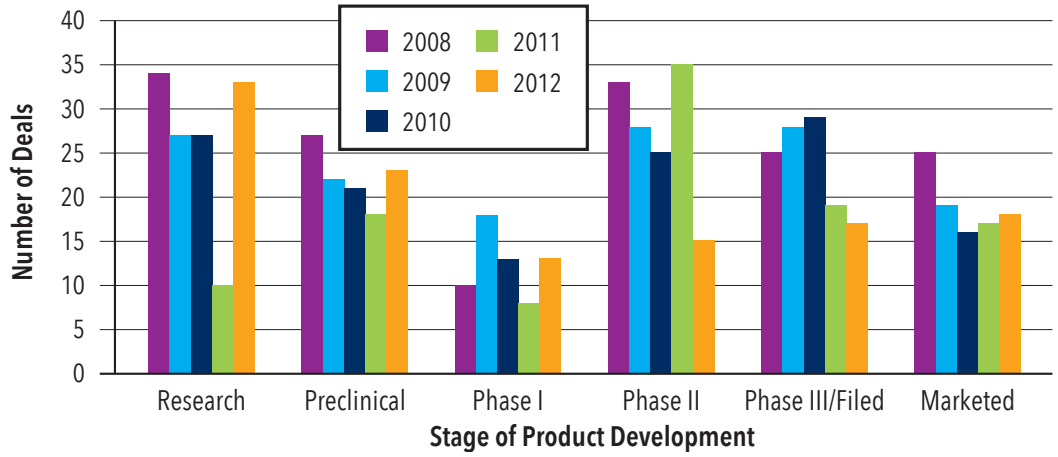
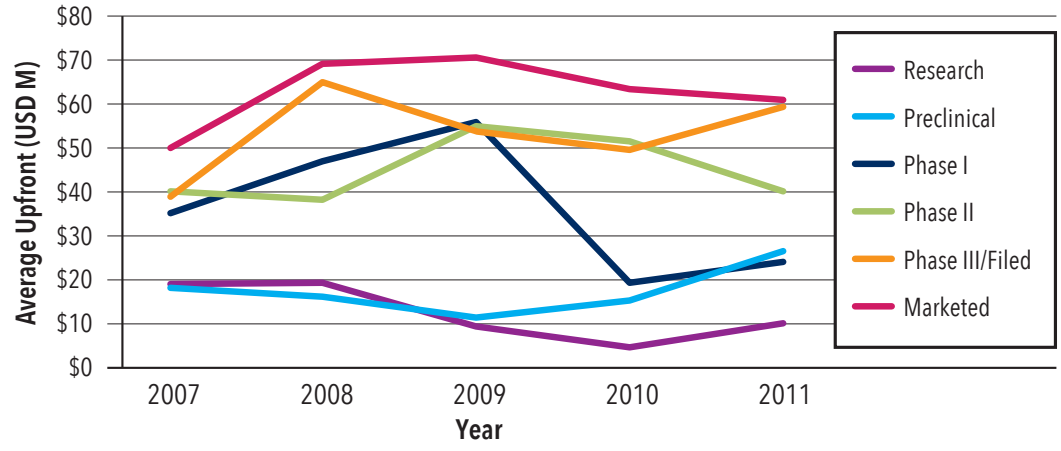
Life Sciences Alliances Average Deal Value (USD M)



Life Sciences Alliances – Number of Deals by Phase



Life Sciences Alliances – Average Upfront Payment by Phase



Source: *Burrill & Company*

Top Partnering Deals in 2012

LICENSER	LICENSEE	DEAL TYPE	DEAL VALUE USD M	UPFRONT	STAGE	PRINCIPAL FOCUS	RATIONAL/PRINCIPAL ASSET
Amylin (Bristol-Myers)	AstraZeneca (United Kingdom)	Collaboration	3,400.0		Various	Diabetes	AstraZeneca enters into a collaboration with Amylin, following its sale to Bristol-Myers Squibb, for an approximately $3.4 billion payment to Amylin. Profits and losses arising from the collaboration will be shared equally. AstraZeneca also has the option, exercisable at its sole discretion following the closing of the acquisition, to establish equal governance rights over key strategic and financial decisions regarding the collaboration, upon the payment to Bristol-Myers Squibb of an additional $135 million. Amylin's primary focus is on the research, development and commercialization of a franchise of GLP-1 agonists, for the treatment of type 2 diabetes.
Molecular Partners (Germany)	Allergan	License/collaboration	1,462.5	62.5	Discovery, preclinical	Ophthalmic	Allergan and Molecular Partners expand their existing relationship by entering into two separate agreements to discover, develop, and commercialize proprietary therapeutic designed ankyrin repeat protein products for the treatment of serious ophthalmic diseases. Molecular Partners will receive combined upfront payments of $62.5 million under the two agreements and is eligible to receive additional success-based payments, including up to $1.4 billion in aggregate development, regulatory and sales milestones, and tiered royalties up into the low double-digits for future product sales.
Galapagos (Belgium)	Abbott Laboratories	License	1,350.0	150	Phase 2	Autoimmune	Global collaboration to develop and commercialize an oral, next-generation JAK1 inhibitor in phase 2 development with the potential to treat multiple autoimmune diseases. Abbott pays $150 million upfront for rights and another $200 million to license the program if the phase 2 studies in rheumatoid arthritis meet certain pre-agreed criteria, and will take over all further development, manufacturing, and commercialization responsibilities. Galapagos is eligible for up to $1.0 billion in development and sales milestones, in addition to tiered double-digit royalties, and retains co-promotion rights in Belgium, the Netherlands and Luxembourg.
Genmab (Denmark)	Johnson & Johnson	License	1,100.0	135	Phase 2	Cancer	Genmab grants Janssen an exclusive worldwide license to develop and commercialize daratumumab, currently in phase 2 development for multiple myeloma with potential in other cancer indications as well as a backup human CD38 antibody. Genmab will receive an upfront license fee of $55 million and Johnson & Johnson Development Corporation will invest approximately $80 million to subscribe for 5.4 million new shares of Genmab at a 30 percent premium to Genmab's closing share price before the deal was announced. Genmab could also be entitled to up to $1 billion in development, regulatory and sales milestones, in addition to tiered double digit royalties. Janssen will be fully responsible for all costs of developing and commercializing daratumumab, including the costs of two ongoing phase 1/2 studies.

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Top Partnering Deals in 2012

LICENSER	LICENSEE	DEAL TYPE	DEAL VALUE USD M	UPFRONT	STAGE	PRINCIPAL FOCUS	RATIONAL/PRINCIPAL ASSET
MacroGenics	Servier (France)	Option and collaboration	1,100.0	20	Preclinical	Cancer	MacroGenics and Servier enter into an option agreement for the development and commercialization of Dual-Affinity Re-Targeting (DART) products directed at three undisclosed tumor targets. MacroGenics' DART technology is a proprietary, bi-specific antibody platform in which a single recombinant molecule is able to target two different antigens. MacroGenics will receive a $20 million upfront payment. MacroGenics retains full development and commercialization rights to the three pre-clinical DART programs in the U.S., Canada, Mexico, Japan, Korea and India, while Servier has the option to obtain an exclusive license covering the rest of the world for each of the programs. Prior to the exercise of Servier's option, both parties will fund and conduct specified research and development activities.
Oxford Biotherapeutics (United Kingdom)	Menarini (Italy)	Alliance	1,038.0		Discovery	Cancer biologics; ADCs	Menarini and Oxford BioTherapeutics partner to develop a portfolio of antibody-based cancer drugs. The agreement covers five of OBT's antibody and antibody drug conjugate programs. Menarini will lead the efforts in the manufacture and clinical development of each program, supported by OBT, while OBT will provide the proprietary cancer target, antibody and arming technologies. Once clinical proof of concept has been achieved, OBT will complete the clinical development and commercialise these novel antibody-based products in North America and Japan, while Menarini will develop and commercialise the products in Europe, CIS, Asia and Latin America.
Endocyte	Merck	License	1,000.0	120	Phase 3	Cancer	Merck granted worldwide rights to develop and commercialize vintafolide, currently,in a late-stage trial for platinum-resistant ovarian cancer and a mid-stage trial for non-small cell lung cancer, along with a companion diagnostic. Endocyte will get $120 million upfront and up to $880 million in milestones based on commercialization for six cancer indications. Endocyte has retained U.S. co-promotion rights and will get 50 percent share of profits in U.S. and royalties in the rest of the world.

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Top Partnering Deals in 2012

LICENSER	LICENSEE	DEAL TYPE	DEAL VALUE USD M	UPFRONT	STAGE	PRINCIPAL FOCUS	RATIONAL/PRINCIPAL ASSET
Astellas Pharma (Japan)	Janssen Biotech (J&J)	License	945.0	65	Phase 2b	Rheumatoid arthritis	Astellas grants Janssen Biotech exclusive worldwide rights to develop and commercialize, except in Japan, ASP015K, an oral, small molecule Janus Kinase (JAK) inhibitor, for immune-mediated inflammatory diseases. ASP015K is currently in Phase 2b development as a once-daily oral treatment for moderate-to-severe rheumatoid arthritis, following a successful Phase 2a study as a treatment of moderate-to-severe plaque psoriasis. In addition to an upfront payment, Janssen and Astellas have agreed to future milestone and royalty payments. Astellas will be responsible for completing the ongoing Phase 2b studies. Janssen will be responsible for all other development, clinical and regulatory filing activities in its territories. Astellas will continue development and commercialization in Japan.
Selecta Biosciences	Sanofi (France)	Collaboration	900.0		Discovery	Immunotherapeutics	Collaboration to discover highly targeted, antigen-specific immunotherapies for life-threatening allergies. Sanofi obtains an exclusive license to use Selecta's synthetic vaccine particle nanotechnology platform to develop an immunotherapy designed to abate acute immune responses against a life threatening food allergen and an option to develop two additional candidate immunotherapies for allergies each to a specific food or aeroallergen. Selecta is eligible to receive several pre-clinical, clinical, regulatory and sales milestones totaling $300 million per allergen indication for up to three immunotherapy candidates, plus royalties. Sanofi will work together with Selecta to design antigen-specific immunotherapies that meet unmet needs as defined by Sanofi for applications where Selecta's technology can offer a new therapeutic approach for life-threatening and other severe allergies.
Regulus Therapeutics	AstraZeneca (United Kingdom)	Alliance	882.0	3	Discovery	microRNA therapeutics	Regulus Therapeutics and AstraZeneca will discover, develop, and commercialize microRNA therapeutics for three exclusive targets which are currently in pre-clinical development and are focused on cardiovascular and metabolic diseases and oncology. AstraZeneca will make a $28 million payment which includes an equity investment and a $3 million upfront payment to Regulus. The three microRNA targets include Regulus' lead cardiovascular/metabolic disease program targeting microRNA-33 for the treatment of atherosclerosis. Regulus will lead preclinical development while AstraZeneca will lead and fund the clinical development and commercialization of these programs. Regulus is eligible to receive up to $509 million in development milestones and up to $370 million in commercialization milestones, plus royalties on successfuly commercialized microRNA therapeutic products by AstraZeneca.

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Top Partnering Deals in 2012

LICENSER	LICENSEE	DEAL TYPE	DEAL VALUE USD M	UPFRONT	STAGE	PRINCIPAL FOCUS	RATIONAL/PRINCIPAL ASSET
FORMA Therapeutics	Boehringer Ingelheim (Germany)	Collabo-ration	815.0	65	Discovery	Cancer	Research and development collaboration to discover and develop small molecule drugs against oncology-relevant protein-protein interactions. FORMA will receive a total of $65 million in up-front payments and research funding to screen for and optimize compounds against multiple oncology targets over the next four years, and could be eligible for up to $750 million in pre-commercial milestones for programs resulting from the collaboration.
Evotec (Germany)	Bayer Pharma (Germany)	Collabo-ration	765.6	15.6	Discovery	Endometrio-sis	Evotec and Bayer Pharma enter into a five-year, multi-target collaboration with the goal of developing three clinical candidates for the treatment of endometriosis. Both parties will contribute innovative drug targets and high quality technology infrastructures and will share the responsibility for early research and pre-clinical characterisation of potential clinical candidates in the disease area of endometriosis. Bayer will be responsible for any subsequent clinical development and commercialisation. Evotec will receive $15.6 million upfront and is eligible for development and sales based milestones up to $750 million, plus royalties.
FORMA Therapeutics	Janssen Biotech (J&J)	Collabo-ration	700.0		Discovery	Cancer	Exclusive research collaboration and license option to discover, develop and commercialize novel small molecule drug candidates that target tumor metabolism mechanisms. FORMA may receive project and milestone funding over several years of up to $700 million if development, regulatory and commercialization milestones are achieved for drug candidates successfully launched through the collaboration, plus royalties.
Selexys Pharmaceuticals	Novartis (Switzerland)	Agree-ment	665.0		Preclinical	Sickle cell disease	As part of the completion of its series A financing, Selexys grants Novartis an exclusive option to acquire Selexys and its lead asset, the anti-P-selectin antibody SelG1, following the successful completion of a phase 2 clinical study in patients with sickle cell disease. Including upfront, acquisition and milestone payments, the agreement with Novartis could reach up to $665 million.
Xenon Pharmaceuticals (Canada)	Genentech (Roche-Switzerland)	Alliance	646.0		Discovery	Personalized medicine; pain	Strategic alliance to discover and develop compounds and companion diagnostics for the potential treatment of pain. Genentech has an exclusive license to compounds and a non-exclusive license to diagnostics from Xenon for development and commercialization of products. Xenon will receive an upfront payment, research funding and is eligible to receive research, development and commercialization milestone payments, totaling up to $646 million for multiple products and indications, plus royalties on sales of products resulting from the collaboration.

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Top Partnering Deals in 2012

LICENSER	LICENSEE	DEAL TYPE	DEAL VALUE USD M	UPFRONT	STAGE	PRINCIPAL FOCUS	RATIONAL/PRINCIPAL ASSET
Isis Pharmaceuticals	Biogen Idec	Collabo-ration	630.0	30	Discovery	Neurology	Global collaboration agreement to discover and develop antisense drugs against three undisclosed targets to treat neurological or neuromuscular disorders. Isis will receive $30 million upfront and is responsible for the discovery of a lead antisense drug for each of the three undisclosed targets. Isis is eligible to receive development milestones to support research and development of each program prior to Biogenexercising its option to license each program, which extends through the completion of Phase 2 trials. Isis could receive up to another $200 million in a license fee and regulatory milestone payments per program, plus double-digit royalties on sales of drugs. Isis is responsible for development through an initial phase 2 trial. If Biogen Idec exercises its option, it will assume global development, regulatory and commercialization responsibilities.
Symphogen (Denmark)	Merck KGaA (Germany)	License	625.0	25	Phase 2	Cancer	Symphogen grants Merck KGaA exclusive worldwide rights to develop and commercialize Sym004, an investigational antibody mixture targeting the epidermal growth factor receptor, which is currently being evaluated in a phase1/2 trial for the treatment of patients with advanced KRAS wild-type metastatic colorectal cancer who have previously progressed on treatment with standard chemotherapy and a marketed anti-EGFR monoclonal antibody. Symphogen will receive $25 million upfront and is elgible for clinical, regulatory, and sales milestones, plus royalties.
Ablynx (Belgium)	Merck	License	590.0	11	Discovery	Nanobody therapeutics	Collaboration to develop and commercialise Nanobody candidates directed towards a voltage gated ion channel with the option to develop and commercialise a Nanobody to a second target. Under the terms of the agreement, Merck gains exclusive global rights to Nanobodies against the selected target, with an option for similar rights to a second target. Merck will pay Ablynx EUR6.5 million upfront and EUR2 million for research funding. Ablynx will be eligible to receive up to EUR448 million in research, regulatory and commercial milestone payments associated with the progress of multiple candidates as well as tiered royalties on any products derived from the collaboration. Ablynx will be responsible for the discovery of Nanobody candidates and Merck will be responsible for the research, development, manufacturing and commercialisation of any Nanobody product resulting from the collaboration.

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Top Partnering Deals in 2012

LICENSER	LICENSEE	DEAL TYPE	DEAL VALUE USD M	UPFRONT	STAGE	PRINCIPAL FOCUS	RATIONAL/PRINCIPAL ASSET
AiCuris (Germany)	Merck	License	580.0	144.3	Phase 2	Antiviral therapeutics	Merck is granted an exclusive worldwide license to develop and commercialize AiCuris' portfolio of investigational medicines targeting human cytomegalovirus including letermovir (AIC246), an oral, late-stage antiviral candidate being investigated for the treatment and prevention of HCMV infection in transplant recipients. AiCuris will receive €110 million upfront and is eligible for milestone payments of up to €332.5 million based on successful achievement of development, regulatory and commercialization goals for HCMV candidates, including letermovir, an additional back-up candidate as well as other Phase I candidates designed to act via an alternate mechanism, as well as royalties. Merck will be responsible for all development activities and costs. Letermovir has received Orphan Drug Status in the European Union and the United States, where it has also been granted Fast Track Designation.
Onconova	Baxter International	License	565.0	50	Phase 3	Cancer	Baxter and Onconova Therapeutics enter into a European licensing agreement for rigosertib, a novel targeted anti-cancer compound currently in a phase 3 study for the treatment of a group of rare hematologic malignancies in a Phase 2/3 study for pancreatic cancer. Baxter will obtain commercialization rights in the European Union and other countries in Europe for an upfront payment of $50 million plus up to $515 million in pre-commercial development and regulatory milestones for the two cancer indications, in addition to sales milestones and royalties. Baxter has the option to participate in the development and commercialization of rigosertib in additional indications.
Threshold Pharmaceuticals	Merck KGaA (Germany)	License	550.0	25	Phase 3	Cancer	Partnership to co-develop and commercialize TH-302, Threshold's small molecule hypoxia-targeted drug currently in phase 3 studies in patients with soft tissue sarcoma, as well as studies in other solid tumors and hematological malignancies. Merck will receive co-development rights, exclusive global commercialization rights and will provide Threshold an option to co-commercialize the therapeutic in the United States.
Zhejiang Hisun Pharma (China)	Pfizer	Joint Venture	545.0			Generics	Companies will put $545 million of assets into their branded generics joint venture, which includes off-patent drugs, manufacturing sites and cash. Hisun will contribute $295 million of these assets for a 51% stake in the JV, while Pfizer's portion will be $250 million for the remaining 49%. The new venture will be called Hisun Pfizer Pharmaceutical Co.

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Top Partnering Deals in 2012

LICENSER	LICENSEE	DEAL TYPE	DEAL VALUE USD M	UPFRONT	STAGE	PRINCIPAL FOCUS	RATIONAL/PRINCIPAL ASSET
Halozyme	Pfizer	License	515.0	8		Drug delivery technology	Halozyme grants Pfizer a worldwide license to develop and commercialize products combining its drug delivery platform based on its patented recombinant human hyaluronidase enzyem, rHuPH20, with Pfizer proprietary biologics directed to up to six targets. Targets may be selected on an exclusive or non-exclusive basis. Halozyme will receive an initial payment of $8 million, which includes the upfront fee for exclusive licenses to two specified therapeutic targets in primary care and specialty care indications and the right for Pfizer to elect up to four additional targets upon payment of additional fees.
Inhibrx	Celgene	Option and license	500.0			Antibody program	Worldwide option and license agreement with Celgene for an Inhibrx antibody program toward an undisclosed target. Deal terms not disclosed.
Sutro Biopharma	Celgene	License	500.0	N/A	Discovery	Antibody drug conjugates	Collaboration to design and develop novel antibody drug conjugates and bispecific antibodies for two undisclosed targets and to manufacture a proprietary Celgene antibody. Sutro will receive a substantial upfront payment, an equity investment in the company and payments for the completion of research, development and regulatory milestones. If all programs are successful, the deal could be worth over $500 million to Sutro. The company is also eligible to receive royalties on product sales. In the collaboration, Sutro will be responsible for product design and production of preclinical materials using the company's proprietary, cell-free protein synthesis technology.
ThromboGenics (Belgium)	Alcon (Novartis-Switzerland)	Commer-cialization agree-ment	495.0	99	Pre-NDA filing	Ophthalmic	Agreement to commercialize ocriplasmin in all markets outside the U.S. where ThromboGenics retains the rights. ThromboGenics gets $99 million upfront and is eligible for development milestones, plus royalties on net sales. Alcon and ThromboGenics will also work together and share the costs to further develop new clinical applications of the product. Ocriplasmin cis a treatment for symptomatic VMA including macular hole, a sight-threatening disease of the vitreoretinal interface. The MAA for ocriplasmin has been accepted for review in Europe and the BLA will be re-submitted in the U.S. by April 2012.

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Top Partnering Deals in 2012

LICENSER	LICENSEE	DEAL TYPE	DEAL VALUE USD M	UPFRONT	STAGE	PRINCIPAL FOCUS	RATIONAL/PRINCIPAL ASSET
Enanta Pharmaceuticals	Novartis (Switzerland)	License	440.0	34	Phase 1	Hepatitis C	Exclusive collaboration and license agreement for the worldwide development, manufacture and commercialization of Enanta's EDP-239, from its NS5A hepatitis C virus inhibitor program. NS5A is a non-structural viral protein that is essential to viral replication. Enanta will get $34 million upfront and up to $406 million in milestones, plus royalties. It retains co-detail rights in the United States. Novartis will be responsible for all costs to develop, manufacture and commercialize EDP-239 and will fund Enanta's drug discovery efforts on certain additional compounds targeting NS5A.
AC Immune (Switzerland)	Genentech (Roche-Switzerland)	License	418.0	N/A	Preclinical	Alzheimer's disease	Exclusive worldwide license agreement and multi-year joint research collaboration on antibodies to treat Alzheimer's and other diseases. Companies will work together to identify and formulate preclinical candidates. Roche will have further global development and commercialization responsibilites. AC Immune will get an undisclosed upfront payment and up to $418 million in milestones, plus royalties.
Xenon Pharmaceuticals (Canada)	Teva Pharma-ceuticals (Israel)	License	376.0	41	Phase 2	Pain	Xenon Pharmaceuticals grants Teva an exclusive worldwide license for XEN402, which specifically targets sodium channels abundantly found in sensory nerve endings, and is currently in clinical development for a variety of painful disorders. Teva will pay Xenon an upfront fee of $41 million, and development, regulatory, and sales-based milestones totaling up to $335 million, plus royalties. Xenon has an option to participate in commercialization in the United States.
Isis Pharmaceuticals	AstraZeneca (United Kingdom)	Alliance/ license	361.0	31	Phase 2	Cancer	Strategic alliance to discover and develop antisense therapeutics against five cancer targets, which includes a license to develop and commercialise ISIS-STAT3Rx, a drug Isis is currently evaluating in an early clinical trial in patients with advanced lymphomas. Isis will receive $31 million in upfront and near term payments. In exchange, Isis has granted AstraZeneca an exclusive license to develop and commercialise ISIS-STAT3Rx and a pre-clinical program as well as an option to license products developed under a separate research program. Once licensed, AstraZeneca will be responsible for all further development and commercialization. AstraZeneca will be responsible for all development of ISIS-STAT3Rx other than the conduct of the ongoing clinical trial, which Isis will complete. Isis is eligible to receive further milestone payments plus royalties.

DECEMBER STATISTICS

Life Sciences Venture Financings Hit $1.2 Billion

U.S. drug developers account for nearly half of private capital raised in December

BY MARIE DAGHLIAN

Privately-held life sciences companies raised $1.2 billion in capital globally in the last month of the year, with U.S. based companies accounting for nearly $1 billion of the total. Of that, U.S. Companies developing novel therapeutics raised more than half of that total, $572 million.

Three biotechs garnered more than $200 million of that amount during the week before Christmas to advance development of novel compounds in the clinic. Interestingly, the funding came from a diverse group of investors that included not just traditional venture capitalists, but also corporate venture, mutual funds, hedge funds, high-net worth individuals, and royalty financing.

Ultragenyx, a biotech based in Northern California and focused on treatments for rare and ultra-rare genetic disorders, closed a $75 million series B round of financing led by Adage Capital Partners, a Boston-based hedge fund and a new investor in Ultragenyx. Other firms that joined the round as new investors include T.Rowe Price and BlackRock, which, along with Jennison Associates, were also investing private client money. They were joined by the biopharma corporate Sanofi-Genzyme and Shire. Existing investors TPG Biotech, Fidelity Biosciences, HealthCap, and Pappas Ventures also participated in the transaction.

The new money comes a little more than a year after the orphan drug developer closed a $45 million first financing round. The new capital will be primarily used to advance development of Ultragenyx' lead clinical-stage programs, UX001 and UX003, both in mid-stage development. UX001 is in mid-stage development as a potential substrate replacement therapy for hereditary inclusion body myopathy, with results anticipated in 2013. Ultragenyx also intends to in-license other products to expand its pipeline.

Ultragenyx aims to be a world-class orphan drug developer. Its founder and CEO Emil Kakkis has worked for more than 18 years, 11 of which were spent at BioMarin, on the development of treatments for rare disorders. In 2009, he left BioMarin and launched the Kakkis EveryLife Foundation to accelerate biotech innovation in rare disease therapeutics.

$200 million in funding came from a diverse group of investors that included not just traditional venture capitalists, but also corporate venture, mutual funds, hedge funds, high-net-worth individuals, and royalty financing.

HealthCare Royalty Partners is providing Nuron Biotech, a specialty biologics and vaccines company, $80 million in financing, including a $30 million equity investment and a $50 million royalty agreement tied to future sales of Nuron's products. The financing will support the commercialization and expansion of Meningitec, an already marketed vaccine for the prevention of a certain type of meningitis, which the Pennsylvania biotech recently acquired from Pfizer.

The new capital will be used to support the clinical development of the company's pipeline of novel biologics and vaccines for infectious and neurodegenerative diseases, including a treatment for multiple sclerosis in late-stage development.

New Jersey-based cardiovascular disease drug developer Regado Biosciences secured $51 million in a series E funding round led by new investor RusnanoMedInvest, a subsidiary of Rusnano, Russia's state-run government investment firm. Baxter Healthcare also joined as a new investor in the financing that included participation by existing investors Edmond de Rothschild Investment Partners, Domain Associates, Quaker Partners, Aurora Funds and Caxton Advantage Life Sciences Fund.

Proceeds from the financing will support Regado's late-stage study of REG1, a member of a class of compounds called aptamers, in an anticoagulant system that consists of two agents both administered intravenously to patients experiencing arterial thrombosis while undergoing heart surgery. Patients will be enrolled at about 500 sites worldwide with enrollment expected to complete 24 months after initiation.

Venture Financings in December 2012

COMPANY	RAISED (USD M)	PRINCIPAL FOCUS	FINANCING ROUND	INVESTORS
Nuron Biotech	80.0	Therapeutics	Equity ($30) and royalty based	HealthCare Royalty Partners II
Ultragenyx Pharmaceutical	75.0	Therapeutics	Series B close	Adage Capital Partners; T.Rowe Price Associates; Jennison Associates; BlackRock; Sanfoi-Genzyme BioVentures1; Shirel; blue chip public market funds; TPG Biotech; Fidelity Biosciences; HealthCap; Pappas Ventures
Regado Biosciences	51.0	Therapeutics	Series E	RusnanoMedInvest (Rusnano); Baxter Ventures; Edmond de Rothschild Investment Partners; Domain Associates; Quaker Partners; Aurora Funds; Caxton Advantage Life Sciences Fund
23andMe	50.0	Tools/Technology	Series D	Yuri Milner; Sergey Brin; Anne Wojcicki; New Enterprise Associates; Google Ventures; MPM Capital
Moderna Therapeutics	40.0	Therapeutics	Series A	Flagship Ventures; private investors
Naurex	38.0	Therapeutics	Series B	Baxter Ventures; Savitr Capital; Adams Street Partners; Latterell Venture Partners; Genesys Capital; PathoCapital; Druid Bioventures; Northwestern University; Lundbeck; Takeda Ventures; Shire; private investors
Suneva Medical	35.2	Medical devices	Equity only	Not disclosed
Allakos	32.0	Therapeutics	Series A, tranched ($10M 1st tranche)	Novo Ventures; Alta Partners; RiverVest Venture Partners, Roche Venture Fund
Medrobotics	25.6	Medical devices	Series D, close	Not disclosed
Zafgen	21.0	Therapeutics	Series D	Alta Partners; Atlas Venture; Third Rock Ventures
Propel Fuels	21.0	Industrial/Ag	Equity and debt	Nth Power; Craton Equity Ventures; Gentry Venture Partners; CapX Partners
Marinus Pharmaceuticals	21.0	Therapeutics	Received 1st tranche of $11.4M	Rusnano; Domain Associates
Lithera	20.6	Therapeutics	Preferred stock equity financing	RusnanoMedInvest (Rusnano); Domain Associates; Alta Partners; AMOREPACIFIC Ventures; Numoda Capital Innovations
3-V Biosciences	20.1	Therapeutics	Equity only	Not disclosed
Flexion Therapeutics	20.0	Therapeutics	Series B	Novo Ventures; 5AM Ventures; Pfizer Venture Investments; Sofinnova Partners; Versant Ventures
Schroedinger	20.0	Tools/Technology		Bill Gates; other investors
Within3	20.0	Digital Health	Equity only	Easton Capital; other investors
River Vision Development	16.8	Therapeutics	Series A	SR One; Lundbeckfond Ventures; Narrow River Management
Tela Bio	16.2	Tools/Technology	Equity only	Not disclosed
Blend Therapeutics	16.0	Therapeutics	Series B	Not disclosed
NanoString Technologies	15.3	Tools/Technology	Series E	Morgan Stanley Expansion Capital; AllianceBernstein Alternative Investment Management Group; Clarus Ventures; Draper Fisher Jurvetson; OVP Venture Partners; GE healthymagination Fund; BioMed Ventures; Henri Termeer
Sweetwater Energy	14.7	Industrial/Ag	Three offerings in 2012	Not disclosed
Labrys Biologics	14.6	Therapeutics	Series A, part of $31M	Canaan Partners; Inter West Partners; Sofinnova Ventures; venBio
PatientSafe Solutions	13.3	Digital Health	Equity, part of $25.7M offering	Not disclosed

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Venture Financings in December 2012

COMPANY	RAISED (USD M)	PRINCIPAL FOCUS	FINANCING ROUND	INVESTORS
Cerulean Pharma	13.0	Therapeutics	Series D extension	CVF; Polaris Venture Partners; Venrock; Lilly Ventures; Lux Capital
goBalto	12.0	Digital Health	Series B	EDBI (Singapore's Economic Development Board); Qualcomm Ventures
Applied BioCode	11.3	Tools/Technology	Equity and debt	Not disclosed
Galera Therapeutics	11.0	Therapeutics	Series A	New Enterprise Associates; Novartis Venture Fund; Correlation Ventures
Kona Medical	10.0	Medical devices	Series C, close-equity and debt	Essex Woodlands; Domain Associates; Morgenthaler Ventures; BioStar Ventures; two large-cap strategic investors; Silicon Valley Bank
MC10	10.0	Medical devices	Series C	Medtronic; Braemar Energy Ventures; North Bridge Venture Partners; consumer health company
IntegenX	9.4	Tools/Technology	Series D extension	Domain Partners; Essex Woodlands Ventures
Tocagen	9.1	Therapeutics	Equity only	Not disclosed
EndoStim	8.2	Medical devices	Part of $12M round	41 investors including Prolog Ventures
Avelas Biosciences	7.7	Medical devices	Series A	Avalon Ventures
SurgiQuest	7.5	Medical devices	Series D	Existing investors
Soltice Biologics	7.5	Therapeutics	Series A, first tranche of $18M	venBio; Aeris Capital
Cerapedics	7.0	Therapeutics	Series C, close	MedImmune Ventures; CVF; OriMed Advisors; NGN Capital
Trevi Therapeutics	6.6	Therapeutics	Series A, part of $10M round	TPG Biotech
Avaxia Biologics	6.4	Therapeutics	Series B	Cherrystone Angels; Golden Seeds; Beacon Angels; Boston Harbor Angels; Launchpad Venture Group; Mass Medicla Angels; North Country Angels; Beta Fund; Granite State Angels; Keiretsu Forum; Maine Angels; individual investors
Esanex LLC	6.2	Therapeutics	Series A, close	Lilly Ventures; Mediaphase Venture Partners; Intersouth Parthers; Ritchie Capital Management
SynapDx	6.0	Diagnostics	Series A-1	North Bridge Venture Partners; General Catalyst Partners
Ignyta	6.0	Diagnostics	Series B, equity and debt	City Hill Ventures; Colt Ventures; institutional and individual investors; Silicon Valley Bank ($500K loan)
Thetis Pharmaceuticals	5.7	Therapeutics	Equity only	Not disclosed
Nico Corp	5.0	Medical devices	Equity only	Rose-Hulman Institute of Technology; River Cities Capital Fund; CHV Capital; Cornelius Private Investments; Twilight Venture Partners
Biomatrica	5.0	Tools/Technology		Not disclosed
Tetralogic Pharmaceuticals	5.0	Therapeutics	Debt financing	Not disclosed
LensAR	5.0	Medical devices		Aisling Capital; Florida Growth Fund
Obalon Therapeutics	5.0	Medical devices	Equity only	InterWest Partners; Domain Associates; Okapi Venture Capital
Cobalt Technologies	5.0	Industrial/Ag	Equity only	Not disclosed
Health Elements, LLC	4.0	Digital Health	Part of $15M round	Not disclosed
Angel Medical Systems	3.8	Medical devices	Equity and debt, part of $27.5M	Existing investors; strategic partners; SOAM Angel Partners
Aura BioSciences	3.2	Therapeutics	Equity only	Not disclosed

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Venture Financings in December 2012

COMPANY	RAISED (USD M)	PRINCIPAL FOCUS	FINANCING ROUND	INVESTORS
PerceptiMed	3.1	Healthcare IT	Equity only	Not disclosed
Wright Therapy Products	3.0	Medical devices	Series B close	Eagle Ventures (angel investors)
Grove Instruments	3.0	Medical devices	Series B-1, first tranche	Not disclosed
Soltice Biologics	3.0	Therapeutics	Seed stage	Not disclosed
Tau Therapeutics	3.0	Therapeutics	Private equity financing	Private investors
Aerie Pharmaceuticals	3.0	Therapeutics	Debt financing	Not disclosed
Elcelyx Therapeutics	3.0	Therapeutics	Series B extension	Morgenthaler Ventures; Kleiner Perkins Caufield & Byers; Technology Partners
Convergent Dental	2.7	Medical devices	Equity ony	Not disclosed
Relypsa	2.6	Therapeutics	Series C; 3nd tranche of $80M round	OrbiMed Advisors; 5AM Ventures; New Leaf Venture Partners; Sprout Group; Delphi Ventures; Mediphase Venture Partners; Sibling Capital
BioCision	2.5	Tools/Technology	Growth capital-equity and debt	BroadOak Capital Partners; Research Corporation Technologies
Restore Medical Solutions	2.5	Medical devices	Series A	Innova; MB Ventures
Sensus Healthcare	2.4	Medical devices	Equity only	Not disclosed
TVAX Biomedical	2.2	Therapeutics	Equity only	Not disclosed
Vertos Medical	2.1	Medical devices	Debt financing	Not disclosed
Innocoll Holdings	2.0	Therapeutics	Equity and debt	Not disclosed
Sharklet Technologies	2.0	Tools/technology	Series B	Altria Ventures (takes 12.5 percent stake)
Applied DNA Sciences	2.0	Tools/Technology	Equity, part of $7.5M offering	Not disclosed
Ortho Kinematics	2.0	Diagnostics	Series B	Not disclosed
Calithera Biosciences	2.0	Therapeutics	Part of $10.7M series C equity financing	Morgenthaler Ventures; Advanced Technology Ventures; U.S. Venture Partners; Delphi Ventures
Pervasive Health	1.6	Healthcare IT	Debt financing	Not disclosed
Linkage Biosciences	1.5	Tools/Technology	Equity only	Not disclosed
Sound Pharmaceuticals	1.5	Therapeutics	Equity only	Not disclosed
Bioconnect Systems	1.5	Medical devices	Debt financing	Not disclosed
DioGenix	1.5	Diagnostics	Series B	Nerveda LLC; existing investors
BioHorizons	1.5	Medical devices	Equity only	Not disclosed
Phraxis	1.5	Medical devices	Equity only	Not disclosed
Phaserx	1.5	Therapeutics	Debt only	Versant Ventures
Sword Diagnostics	1.3	Diagnostics	Debt only	Not disclosed
Transcriptic	1.2	Tools/Technology	Seed stage	Google Ventures; Founders Fund Angel; Mark Cuban; Naval Ravikant; crowdsourcing through AngelList and SecondMarket
nanoRETE	1.2	Diagnostics	Equity only	Not disclosed
Idx	1.1	Diagnostics	Part of $4.1M round	Not disclosed
Kinemed	1.0	Tools/Technology	Equity and debt	Not disclosed

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Venture Financings in December 2012

COMPANY	RAISED (USD M)	PRINCIPAL FOCUS	FINANCING ROUND	INVESTORS
Synbody Biotechnology	1.0	Tools/Technology		Connecticut Innovations
beBetter Health	1.0	Healthcare IT	Debt financing	Not disclosed
AFCell Medical	1.0	Medical devices	Equity only	Not disclosed
Naviscan	1.0	Medical devices	Equity only	Not disclosed
InfoBionics	1.0	Healthcare IT	Equity only	Not disclosed
Protea Biosciences	0.9	Tools/Technology	Debt financing	Not disclosed
PatientKeeper	0.9	Healthcare IT	Part of $6.25M debt offering	Flybridge Capital Partners; New Enterprise Associates; Whitney & Co
CMD Bioscience	0.9	Tools/Technology	Series A	Connecticut Innovations; LaunchCapital; Enhanced Capital Connecticut; Mohegan Tribe, individual investor
Corinthian Ophthalmic	0.8	Medical devices	Debt financing	Not disclosed
AxioMx	0.8	Tools/Technology	Seed stage	Connecticut Innovations
KeriCure	0.6	Therapeutics	Equity and debt	Not disclosed
Algaeon	0.5	Industrial/Ag	Equity only	Not disclosed
Carmell Therapeutics	0.4	Therapeutics	Debt financing	Not disclosed
Siva Therapeutics	0.4	Therapeutics	Seed stage	Angel investors
Deep Domain	0.4	Healthcare IT	Equity only	Not disclosed
Kite Pharma	0.3	Therapeutics	Equity and debt	Not disclosed
Mirabilis Medica	0.2	Medical devices	Debt financing	Not disclosed
VeraLight	0.2	Medical devices	Debt financing	Not disclosed, existing investors include CMEA and Vspring Capital
CharlestonPharma	N/A	Therapeutics	Seed stage	Sears Capital Management
TOTAL U.S. VENTURE FINANCINGS	**977.0**			
Biocartis (Switzerland)	44.5	Diagnostics	Series D	PMV (Belgium); RMM; Valiance; Debiopharm Group; Korys, the investment holding of the Colruyt family; Philips; Johnson & Johnson Development; family office of Paul Janssen; Luc Verelst; Benaruca, family investment vehicle of Pauwels; New Rhein Healthcare
Karolinska Development (Sweden)	33.0	Therapeutics	Minority stake in 13 companies	Rosetta Capital Limited
Insightec (Israel)	30.9	Medical devices	Series C	GE Healthcare, other investors
Unisense FertiliTech (Denmark)	24.0	Medical devices	Private investment	Oticon Foundation's William Demant Invest
NeRRe Therapeutics (United Kingdom)	18.4	Therapeutics	Series A	Novo A/S; Advent Venture Partners; GlaxoSmithKline
Poxel (France)	17.0	Therapeutics	Series B	Edmond de Rothschild Investment Partners; InnoBio; Omnes Capital
Hatchtech Pty (Australia)	6.3	Therapeutics		OneVentures
Cardiosonic (Israel)	6.1	Medical devices	Series B, part of $16.1M round	Not disclosed

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Venture Financings in December 2012

COMPANY	RAISED (USD M)	PRINCIPAL FOCUS	FINANCING ROUND	INVESTORS
Bicycle Therapeutics (United Kingdom)	6.0	Tools/Technology		Atlas Venture; Novartis Venture Fund; SR One; SV Life Sciences; Astellas Venture Management
Innovative Trauma Care (Canada)	3.6	Medical devices	Series A	Not disclosed
Q Chip (United Kingdom)	3.2	Tools/Technology		Disruptive Capital Finance; Finance Wales; Liimburg Ventures; angel investors
Cormorant Pharmaceuticals (Sweden)	2.6	Therapeutics	Equity only	Not disclosed
Morria Biopharmaceuticals (United Kingdom)	1.5	Therapeutics	Equity only	Not disclosed
Advanced Inhalation Technologies (Israel)	1.3	Therapeutics		Not disclosed
MiNa Therapeutics (United Kingdom)	0.4	Therapeutics	Seed stage	Angel investor

TOTAL NON-U.S. VENTURE FINANCINGS	**198.8**
TOTAL DECEMBER VENTURE FINANCINGS	**1,175.7**

Public Financings in December 2012

	COMPANY	TICKER	AMOUNT RAISED (USD M)	PRINCIPAL FOCUS
IPOS				
	TOTAL U.S. IPOS		**0.0**	
	Taiwan Liposome (Taiwan)	GreTai:4152	25.1	Therapeutics
	Theradiag (France)	Euronext: ALTER	10.7	Diagnostics
	Gene Techno Science (Japan)	Tokyo:4584	8.4	Therapeutics
	UMN Pharma (Japan)	Tokyo:4585	2.4	Therapeutics
	TOTAL NON-U.S. IPOS		**46.6**	
	TOTAL DECEMBER IPOS		**46.6**	
PIPES				
	Acadia Pharmaceuticals	ACAD	86.4	Therapeutics
	Synta Pharmaceuticas	SNTA	60.2	Therapeutics
	Amyris	AMRS	37.2	Industrial/Ag
	Nymox Pharmaceutical	NYMX	15.0	Therapeutics
	Cel-Sci	NYSE:CVM	10.5	Therapeutics

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Public Financings in December 2012

COMPANY	TICKER	AMOUNT RAISED (USD M)	PRINCIPAL FOCUS
OncoSec Medical	OTC:ONCS	7.2	Therapeutics
Aradigm	OTC:ARDM	6.0	Therapeutics
Actinium Pharmaceuticals	OTC:CTVN	5.1	Therapeutics
Tonix Pharmaceutical Holding	OTC:TNXP	3.3	Therapeutics
Arno Therapeutics	OTC:ARNI	2.2	Therapeutics
IGI Laboratories	NYSE:IG	2.0	Therapeutics
ULURU	NYSE:ULU	2.0	Therapeutics
Diagnostic Imaging International	OTC:DIIG	1.9	Diagnostics
Tonix Pharmaceutical Holding	OTC:TNXP	1.6	Therapeutics
Tamir Biotechnology	OTC:ACEL	1.0	Therapeutics
BioDrain Medical	OTC:BIOR	0.6	Medical devices
Intellicell Biosciences	OTC:SVFC	0.4	Therapeutics
ARCA biopharma	ABIO	0.3	Therapeutics
TOTAL U.S. PIPES		**242.8**	
Mayne Pharma (Australia)	ASX:MYX	19.0	Therapeutics
TiGenix (Belgium)	Euronext:TIG	8.9	Therapeutics
GeneNews (Canada)	TSX:GEN	7.7	Diagnostics
RedHill Biopharma (Israel)	TSE:RDHL	6.8	Therapeutics
Epistem Holdings (United Kingdom)	LSE:EHP	6.7	Therapeutics
Oramed Pharmaceuticals (Israel)	OTC:ORMP	5.0	Therapeutics
Karo Bio (Sweden)	SSE:KARO	4.9	Therapeutics
BioPorto Diagnostics (Denmark)	CSE:BIOPOR	1.8	Diagnostics
Allied Healthcare (Australia)	ASX:AHZ	1.8	Tools/Technology
Generex Biotechnology (Canada)	OTC:GNBT	0.8	Therapeutics
TOTAL NON-U.S. PIPES		**62.6**	
TOTAL DECEMBER PIPES		**305.3**	
FOLLOW-ONS			
Infinity Pharmaceuticals	INFI	172.5	Therapeutics
Sarepta Therapeutics	SRPT	125.0	Therapeutics
AcelRx	ACRX	47.6	Therapeutics
Derma Sciences	DSCI	36.4	Therapeutics
Galena Biopharma	GALE	24.3	Therapeutics
Cytori Therapeutics	CYTX	20.0	Therapeutics
Northwest Biotherapeutics	NWBO	13.8	Therapeutics
Durect Corporation	DRRX	12.6	Therapeutics
Lpath	LPTN	11.8	Therapeutics
NovaBay Pharmaceuticals	NYSE:NBY	7.4	Therapeutics
Kips Bay Medical	KIPS	6.5	Medical devices

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Public Financings in December 2012

	COMPANY	TICKER	AMOUNT RAISED (USD M)	PRINCIPAL FOCUS
	Arrowhead Research	ARWR	4.1	Therapeutics
	Echo Therapeutics	ECTE	3.5	Medical devices
	TOTAL U.S. FOLLOW-ONS		**485.4**	
	TOTAL DECEMBER FOLLOW-ONS		**485.4**	
OTHER EQUITY				
	Verenium	VRNM	22.5	Secured debt financing
	Cyclacel Pharmaceuticals	CYCC	20.0	Stock purchase agreement
	Cellceutix	OTC:CTIX	10.0	Three year stock purchase agreement
	BioNeutral Group	OTC:BONU	10.0	Equity purchase agreement
	La Jolla Pharmaceuticals	OTC:LJPC	2.9	Consent and waiver agreement by preferred stockholders
	TOTAL U.S. OTHER EQUITY		**65.4**	
	MagForce (Germany)	Xetra:MF6	24.6	Preemptive rights to shareholders
	Galapagos (Belgium)	Euronext:GLPG	1.8	Warrant exercise
	TOTAL NON-U.S. OTHER EQUITY		**26.4**	
	TOTAL DECEMBER OTHER EQUITY		**91.8**	
DEBT				
	Mylan	MYL	750.0	Therapeutics
	Volcano	VOLC	400.0	Medical devices
	TOTAL U.S. DEBT		**1,150.0**	
	Teva Pharmaceuticals	TEVA	2,000.0	Therapeutics
	Amarin	AMRN	100.0	Therapeutics
	Sonomax Technologies	TSX-V:SHH	3.1	Medical devices
	TOTAL NON-U.S. DEBT		**2,103.1**	
	TOTAL DECEMBER DEBT		**3,253.1**	
OTHER DEBT				
	K-V Pharmaceutical	OTC:KVPH	85.0	DIP financing
	InfuSystems Holdings	NYSE:INFU	36.5	Credit facility
	Corium International	Private	35.0	Term loan facility
	Raptor Pharmaceuticals	RPTP	25.0	1st tranche of $50M loan agreement
	SurgiQuest	Private	11.0	Credit facility
	BioSurplus	Private	1.8	Bank debt financing
	TOTAL U.S. OTHER DEBT		**194.3**	
	TOTAL DECEMBER OTHER DEBT		**194.3**	

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Grants and Contracts in December 2012

COMPANY	AMOUNT RAISED (USD M)	PRINICPAL FOCUS	FUNDING AGENCY
GRANTS			
Altravax	3.5	Antibody-inducing vaccines for HIV-1	NIH NIAID (2 grants)
Seaside Therapeutics	2.0	Autism, fragile X syndrome	Autism Speaks
Circulomics	0.8	microRNA assays	NIH SHIFT initiative
23andMe	0.6	Genetic analysis	National Institutes of Health
Acadia Pharmaceuticals	0.5	Preclinical studies of MS drug	Fast Forward (MSS); EMD Serono
Soligenix	0.5	Vaccines	NJ Technology Business Tax Credit
Genalyte	0.5	Early detection of type 1 diabetes	NIH NIDDK SBIR
General Genomics	0.4	Ancestral protein sequence reconstruction	Thiel Foundation Breakout Labs
Siva Therapeutics	0.4	Nanorod cancer drug delivery	Thiel Foundation Breakout Labs
Applied DNA Sciences	0.2	DNA identification	New York state
TOTAL U.S. GRANTS	**9.3**		
UPM Biofuels (Finland)	224.0	Wood-based biorefinery	European Union's NER300 program
CLC bio (Denmark)	1.3	Bioinformatics	EU's STATegra project
CO2 Solutions (Canada)	1.0	Enzymes for carbon capture	Dutch Ministry of Economic Affairs' International Innovation Program
BrainStorm Cell Therapeutics (Israel)	0.8	Stem cell therapies	Office of the Chief Scientist
TOTAL NON-U.S. GRANTS	**227.1**		
TOTAL DECEMBER GRANTS	**236.4**		
CONTRACTS			
Arsenal Medical	15.5	Control of intraabdominal hemorrhage	DARPA Phase II contract
Cepheid	11.0	AIDS diagnostics for Africa and Burma	USAID and US CDC
TOTAL DECEMBER CONTRACTS	**26.5**		

M&A: Baxter Builds Dialysis Portfolio with Gambro Deal

December deals mixed among medical devices, cancer, and a resurgent interest in antisense

BY MARIE DAGHLIAN

Baxter International is building out its renal care offerings with the acquisition of Sweden's Gambro, a privately held maker of dialysis products and therapies for $4 billion (26.5 billion SEK) including assumption of Gambro's debt. The deal will likely make Baxter the world's largest maker of kidney dialysis products, vaulting it past market leader Fresenius Medical Care, and giving the drugmaker a comprehensive dialysis product portfolio.

Gambro's products are used in hemodialysis and continuous renal replacement therapy, with annual sales of approximately $1.6 billion in 2011. Baxter, a global diversified healthcare company offering products and treatments for hemophilia, immune disorders, infectious disease, kidney disease, trauma, and other acute and chronic medical conditions, had $13.9 billion in revenue last year, with almost $2.5 billion derived from renal products.

The deal will likely make Baxter the world's largest maker of kidney dialysis products.

Baxter says the deal provides a number of long-term global growth opportunities. With a broad and complementary dialysis product portfolio, Baxter can accelerate product sales in established markets such as Europe, where Gambro has an extensive footprint and it can expand Gambro's reach in high-growth regions of Latin America and Asia-Pacific, where Baxter has been growing its peritoneal dialysis business. In addition, Baxter will also build upon its pipeline of investigational home hemodialysis and automated peritoneal dialysis systems by adding Gambro's next-generation monitors, dialyzers, and dialysis solutions.

Baxter expects to use its cash generated outside the United States and debt to finance the acquisition. In a conference call, Baxter said the deal would create $300 million in savings by combining manufacturing and product servicing operations.

Gilead buys YM BioSciences

Gilead is branching out from its lead position in anti-virals into cancer therapeutics with the acquisition of Canadian biotech YM BioSciences for $510 million.

The deal will give Gilead YM's lead drug candidate, CYT387, an oral selective JAK inhibitor that has shown positive results in early and mid-stage trials in patients with the bone marrow disorder myelofibrosis, plus several preclinical programs. For YM Bio, it provides a good exit for shareholders and the means and expertise to advance development of a promising therapeutic candidate.

Gilead's lead competitor in the arena is Incyte and Novartis' JAK inhibitor Jakafi, the first such drug approved in the United States last year to fight the disease. Gilead intends to begin a pivotal late-stage trial of CYT387 in the second half of 2013, after it completes the deal, which will be funded with cash on hand.

Gilead has recently been expanding its cancer R&D pipeline both internally and through external partnerships and strategic acquisitions, including a $100 million research alliance with Yale University in 2011. Gilead's lead cancer compound, idelalisib, is a first-in-class specific inhibitor of the PI3K delta isoform that is currently being studied in five late-stage trials in chronic lymphocytic leukemia and indolent non-Hodgkin's lymphoma. Gilead also has a second candidate, simtuzumab, an investigational monoclonal antibody targeting the human lysyl oxidase-like 2 protein in mid-stage development in myelofibrosis, colorectal cancer, pancreatic cancer and certain fibrotic diseases.

Biogen's antisense option

In the partnering arena, Biogen Idec exercised its third option to license Isis Pharmaceuticals' antisense candidates, this time in neurology. The companies entered into a collaboration and option agreement worth up to $630 million for Isis to discover and develop antisense drugs against three undisclosed targets to treat neurological or neuromuscular disorders. The partners are also developing antisense drugs to treat spinal muscular atrophy and myotonic dystrophy type 1, both rare diseases, under two other deals that have so far netted Isis $41 million in upfront payments and potentially another $530 million in license fees and milestones.

The latest deal fits well with Biogen Idec's early-stage research strategy, says Richard Brudnick, co-head of business development at Biogen Idec.

Antisense therapies target the proteins involved in disease processes by destroying the RNA that is involved in creating these proteins. Isis' discovery platform develops specific therapies that bind to messenger RNA and inhibit the production of disease-causing proteins.

Similar to their previous agreements, Isis will receive an upfront payment, in this case $30 million, and is responsible for the discovery of a lead antisense drug for each of the three undisclosed targets. Isis may also receive development milestone payments to support each program prior to Biogen Idec exercising its option to license each program. Biogen Idec can exercise its option at any time through the completion of mid-stage proof-of-concept trials. If it does so, Isis could receive up to another $200 million in a license fee and regulatory milestone payments per program, plus double-digit royalties on sales of drugs.

Isis will be responsible for development of the drugs through the completion of the initial mid-stage clinical trial, with Biogen Idec providing advice and assistance on research and the clinical trial design and conduct and regulatory strategy for each program. If Biogen Idec exercises its option, it will assume global development, regulatory and commercialization responsibilities.

Isis also partnered with AstraZeneca in a strategic alliance on RNA therapeu-

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tics to treat cancer. The partners will combine their efforts to discover and develop antisense therapeutics against five cancer targets, including an exclusive license to develop and commercialize ISIS-STAT3Rx, a drug in early-stage trials in patients with advanced lymphomas. It is the first drug in Isis' pipeline that incorporates its new technology, which has been developed to increase the potency of antisense drugs thereby creating opportunities for drugs to be more effective in addressing targets in a broader range of tissues, including tumors.

The partnership will leverage AstraZeneca's experience in developing targeted drugs to aid in development of STAT3Rx, which inhibits a protein that drives cancer growth, and Isis's technology, which can increase the potency of therapeutics and enable the development of drugs that could be much more effective in cancers that are difficult to address with conventional small molecules or antibodies.

Under their agreement, AstraZeneca will pay Isis $31 million in upfront and near term payments, comprising a $25 million payment on signing followed by a $6 million payment in the second quarter of 2013, assuming the research program is continuing. In addition, Isis has granted AstraZeneca an exclusive license to a preclinical program as well as an option to license products developed under a separate research program.

AstraZeneca will be responsible for all further development and commercialization. Isis will be eligible to receive development-based milestone payments, license fees for research program targets as well as royalties on sales from products that are successfully commercialized.

M&A in December 2012

ACQUIRER	COUNTRY	TARGET	COUNTRY	DEAL VALUE (USD M)	ASSET STAGE	PRINCIPAL FOCUS
Baxter International	United States	Gambro AB	Sweden	4,000.0	Marketed	Dialysis products
Guangzhou Pharma	China	Guangzhou Baiyunshan Pharma	China	1,541.0	Marketed	APIs; TCMs
Gilead Sciences	United States	YM BioSciences	Canada	510.0	Phase 2	Cancer
Amgen	United States	deCODE Genetics	Iceland	415.0		Genetics
The Medicines Company	United States	Incline Therapeutics	United States	390.0	Pre-NDA	Needleless pain management
Linden Capital Partners	United States	Young Innovations	United States	314.0	Marketed	Dental supply/ service
American Capital	United States	Cambridge Major Laboratories	United States	212.0		CRO/APIs
Warburg Pincus	United States	JHP Pharmaceuticals	United States	195.0		Sterile injectables
Vivalis	France	Intercell	Germany	174.0		Vaccines
ShangPharma Parent	Cayman Islands	ShangPharma	China	173.0		CRO
Ambu	Denmark	Consort Medical's King Systems	United Kingdom	170.0		Medical devices
AssuraMed	United States	Invacare unit	United States	150.0		Medical supplies
Halma	United Kingdom	MicroSurgical Technology	United Kingdom	100.0		Medical devices
Recordati	Italy	Lundbeck's non-core products	Denmark	100.0		Neurology; cardiovascular
Novartis	Switzerland	Vivacta	United Kingdom	90.0		Diagnostics
Parexel International	United States	Liquent	United States	72.0		Regulatory services software
BioRad Laboratories	United States	AbD Serotec (Morphosys	Germany	69.8		Tools/Antibodies
Coherent	United States	Lumera Laser	Germany	52.0		Medical devices
Perrigo Company	United States	Cobrek Pharmaceuticals	United States	45.0		OTC drugs

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M&A in December 2012

ACQUIRER	COUNTRY	TARGET	COUNTRY	DEAL VALUE (USD M)	ASSET STAGE	PRINCIPAL FOCUS
Novartis	Switzerland	Dendreon manufacturing facility	United States	43.0		Biomanufacturing
Volcano Corporation	United States	Crux Biomedical	United States	42.1	Marketed	Medical devices
Pernix Therapeutics	United States	Somaxon Pharmaceuticals	United States	25.0	Marketed	Insomnia
Jiangxi Boya Bio-Pharmaceutical	China	Zheijiang Haikang Biologicals	China	18.5		Blood products
Pharmascience	Canada	Helix Biopharma unit	Canada	8.5		Cancer
Viratech	United States	Cancer.im	United States	6.2		Cancer social network
InnoKeys Pte	Singapore	YM BIoSciences' assets	Canada	2.0		Cancer
Galderma Pharma	Switzerland	Spirig Pharma	Switzerland	N/A		Dermatology
DuPont Industrial Biosciences	United States	Verdezyne technology	United States	N/A		Biomass conversion
Sun Pharmaceutical Industries	India	URL Pharma's generics (Takeda)	Japan	N/A		Generics
Retrophin	United States	Desert Gateway	United States	N/A		Reverse merger
Sanofi	France	Dosch Pharma's animal health unit	India	N/A		Animal health
Opko Health	United States	Silcon Comercio	Brazil	N/A		Pharmaceuticals; diagnostics
Covidien	Ireland	CV Ingenuity	United States	N/A		Vascular devices
Access Genetics	United States	Quest Diagnostics unit	United States	N/A		Saliva-based testing lab

Partnering in December 2012

COMPANY/ LICENSER	COMPANY/ LICENSEE	DEAL TYPE	POTENTIAL DEAL VALUE (USD M)	UPFRONT PAYMENT (USD M)	ASSET PHASE	PRINCIPAL FOCUS
Isis Pharmaceuticals	Biogen Idec	Collaboration	630.0	30	Discovery	Neurology
Halozyme	Pfizer	License	515.0	8		Drug delivery technology
Sutro Biopharma	Celgene	License	500.0	N/A	Discovery	Antibody drug conjugates
Xenon Pharmaceuticals (Canada)	Teva Pharmaceuticals (Israel)	License	376.0	41	Phase 2	Pain
Isis Pharmaceuticals	AstraZeneca (United Kingdom)	Alliance/license	361.0	31	Phase 2	Cancer
MD Anderson Cancer Center	GlaxoSmithKline (United Kingdom)	Collaboration/ license	335.0		Preclinical	Cancer immunotherapeutics

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Partnering in December 2012

COMPANY/ LICENSER	COMPANY/ LICENSEE	DEAL TYPE	POTENTIAL DEAL VALUE (USD M)	UPFRONT PAYMENT (USD M)	ASSET PHASE	PRINCIPAL FOCUS
Titan Pharmaceutials	Braeburn Pharmaceuticals	License	305.0	15.75	NDA on file	Opoid addiction
Claris Lifesciences (India)	Otsuka Pharmaceutical, Mitsui & Co (Japan)	Joint Venture	190.3			Injectibles
Evotec (Germany)	Janssen Pharmaceuticals (J&J)	License	175.0	2	Preclinical	Depression
Phenex Pharmaceuticals (Germany)	Janssen Biotech (J&J)	Collaboration	135.0	N/A	Discovery	Autoimmune; inflammatory
Bristol-Myers Squibb	The Medicines Company	License	115.0	115	Marketed	Bleeding control
Pacira Pharmaceuticals	Aratana Therapeutics	License	43.5	1		Animal health
ImmunoGen	Amgen	License	35.0	1		TAP technology
Optimer Pharmaceuticals	AstraZeneca (United Kingdom)	Agreement	23.0	1	Marketed	C difficile infection
Takeda Pharmaceuticals (Japan)	Infinity Pharmaceuticals	License amendment	15.0		Phase 2	PI3K in cancer
Myriad Genetics	Sanofi (France)	Collaboration	10.0			Diabetes biomarkers
PositiveID	Boeing	License	2.5	2.5		Biothreat detection
Kinex Pharmaceuticals	PharmaEssentia (Taiwan)	License	N/A		Phase 2	Dermatology
Merck Serono (Merck KgAa-Germany)	Neopharma (United Arab Emirates)	Partnership	N/A			Branded generics
Galena Biopharma	Teva Pharmaceuticals (Israel)	License	N/A		Phase 3	Cancer immunotherapy
Metabolon	Syngenta (Switzerland)	Agreement	N/A			Agbiotech
Strides Arcolab (India)	Eli Lilly	License	N/A			Generic cancer drugs
PeptiDream (Japan)	Novartis (Switzerland)	Collaboration extension	N/A		Discovery	Macrocyclic drugs
Genmab (Denmark)	Kyowa Hakko Kirin (Japan)	License	N/A			Bispecific antibody technology
Appistry	A*STAR (Singapore)	Partnership	N/A			Genomic analysis
Genovax (Italy)	Mediolanum Farmaceutici (Italy)	License	N/A		Phase 1	Cancer vaccine
Two Blades Foundation	DuPont Pioneer	License	N/A			Crop technology
Biomax Fuels (India)	Middle East Environment Protection Co (Saudi Arabia)	Joint venture	N/A			Biofuels

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Partnering in December 2012

COMPANY/ LICENSER	COMPANY/ LICENSEE	DEAL TYPE	POTENTIAL DEAL VALUE (USD M)	UPFRONT PAYMENT (USD M)	ASSET PHASE	PRINCIPAL FOCUS
Seegene (South Korea)	DuPont	License	N/A			Food safety testing
Dalian Wanchun Biotech (China)	Shanghai Fosun Pharma (China)	Joint Venture	N/A		Phase 2	Cancer
Sirtex Medical (Australia)	SingHealth (Singapore)	Collaboration	N/A			Cancer nanomedicine
Catalent Pharma Solutions	UMN Pharma (Japan)	Agreement	N/A			Biosimilars
Memory Dx	Amarantus BioScience	License	N/A			Alzheimer's diagnostic
Vaxxas (Australia)	Merck	Collaboration	N/A			Vaccine delivery
Progenics Pharmaceuticals	MedImmune (AstraZeneca-United Kingdom)	Partnership	N/A			Bacterial infections
Dominion Diagnostics	LifeGen	License	N/A			Genetic addiction test
Handok Pharmaceuticals (South Korea)	Teva Pharmaceuticals (Israel)	Joint Venture	N/A			Pharmaceuticals
GE Healthcare	Merck	Collaboration	N/A			Alzheimer's imaging agent
Cellular Dynamics International	GE Healthcare	License	N/A			Stem cell assays
Arrowhead Research	Shire (United Kingdom)	License	N/A	N/A	Discovery	Peptide drug conjugates
WuXi PharmaTech (China)	PRA	Joint Venture	N/A			CRO
MedVantx	McKesson Medical-Surgical	Co-promotion	N/A			Drug adherence program
GlycoVaxyn (Switzerland)	GlaxoSmithKline (United Kingdom)	Collaboration	N/A			Anti-bacterial vaccines
Cevec Pharma (Germany)	Yuhan (South Korea)	License	N/A			Cell expression technology
Roche (Switzerland)	Guangzhou Techpool Bio-Pharma (China)	License	N/A		Marketed	Bone cancer
Humedica	Pfizer	Alliance	N/A			Clinical bioinformatics
4SC (Germany)	BioNTech (Germany)	License	N/A	3.3	Preclinical	Cancer
Naton Medical (China)	OSA Niaga; Straits Orthopedics (Malaysia)	Joint venture	N/A			Orthopedic devices
VaxInnate	Emergent BioSolutions	License	N/A			Pandemic flu vaccine

Company/Academic/Non-Profit Partnerships in December 2012

COMPANY	COUNTRY	ACADEMIA/NON-PROFIT	COUNTRY	PRINCIPAL FOCUS
10 major pharma companies	US/Eeurope	23 universities	US/Europe	iPS stem cell bank
GenoSpace	United States	Multiple Myeloma Research Foundation	United States	Bioinformatics partnership
Roche	Switzerland	US Centers for Disease Control and Prevention	United States	HIV diagnostics partnership
GlaxoSmithKline	United Kingdom	Fred Hutchinson Cancer Research Center	United States	Muscular dystrophy drug development partnership
Teva Pharmaceuticals	Israel	Bill & Melinda Gates Foundation	United States	Infectious disease drugs for developing countries
Eisai	Japan	University College London	United Kingdom	CNS drug discovery alliance
Bristol-Myers Squibb	United States	Multiple Myeloma Research Foundation	United States	Personalized medicine initiative
Cellectis	France	University College London	United Kingdom	Leukemia treatments
H3 Biomedicine	United States	Sage Bionetworks	United States	Cancer genomics research partnership
AstraZeneca	United Kingdom	Fudan University	China	Cardiovascular research

PIPELINE

Clinical Trials for December 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
PHASE 3					
Isotechnika Pharma	TSX: ISA	voclosporin	non-infectious uveitis	Failed	The study did not meet its primary endpoint of change from baseline in vitreous haze. Lux does not expect to move forward with a regulatory submission for non-infectious uveitis in the U.S. and Europe.
The Medicines Company	Nasdaq: MDCO	oritavancin	acute gram-positive bacterial skin and skin structure infections	Positive	Treatment was non-inferior to vancomycin in the efficacy analyses for early clinical evaluation endpoints, 48 to 72 hours, required by the U.S. FDA, and later endpoints, 7 to 14 days after end of treatment, required by the European Medicines Agency.
Novartis Pharmaceuticals	NYSE: NVS	canakinumab, human monoclonal antibody against IL-1 beta	systemic juvenile idiopathic arthritis	Positive	In two phase 3 trials, canakinumab provided substantial symptom relief in young patients with systemic juvenile idiopathic arthritis, delayed disease flare recurrence, and allowed patients to substantially reduce or discontinue use of corticosteroids.
Medivir	OMX: MVIR	simeprevir, a protease inhibitor, in combination with pegylated interferon and ribavirin	genotype 1 hepatitis C patients	Positive	Simeprevir achieved viral cure rates of 79 percent to 81 percent in the three pivotal phase 3 trials.
Amicus Therapeutics and GlaxoSmithKline	Nasdaq: FOLD and NYSE: GSK	migalastat	Fabry disease in patients with genetic mutations amenable to chaperone monotherapy	Mixed	The number of patients who demonstrated a 50 percent or greater reduction in interstitial capillary GL-3, determined by paired kidney biopsies from baseline and month six, was not significant but a trend to decreasing values was noted.
Oncothyreon	Nasdaq: ONTY	L-BLP25, formerly referred to as Stimuvax	unresectable, locally advanced stage IIIA or stage IIIB non-small cell lung cancer	Failed	The primary endpoint of an improvement in overall survival was not met but treatment effects were seen in certain sub-populations and further analyses are planned to explore the potential benefit-risk profile in these patients.
Novo Nordisk	NYSE: NVO	IDegLira or Tresiba, in addition to metformin	type 2 diabetes patients inadequately controlled on insulin in combination with 1 to 2 oral anti-diabetic agents	Positive	The trial met its primary endpoint of superiority in HbA1c reduction compared to stand-alone therapy with Tresiba; patients treated with IDegLira also lost approximately 2.5 kg. IDegLira is a fixed-ratio combination of insulin degludec, a once-daily basal insulin analogue, together with liraglutide, the once-daily human GLP-1 analogue.
Allon Therapeutics	TSX: NPC	davunetide	progressive supranuclear palsy	Failed	The study failed co-primary outcome measures of improvements on the progressive supranuclear palsy rating and the Schwab and England activities of daily living scales, and showed no effect on a series of secondary and exploratory endpoints. Allon will reduce its ongoing operating expenses and staff.

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Clinical Trials for December 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Vanda Pharmaceuticals	Nasdaq: VNDA	Tasimelteon, melatonin agonist	Non-24-hour disorder in totally blind individuals	Positive	The primary endpoint to reset the melatonin rhythm as compared to placebo was met; the drug also significantly improved sleep and wake parameters of total sleep time and timing of sleep. There is no approved treatment for non-24, affecting a majority of individuals that lack light perception and are unable to reset the body clock located in the suprachiasmatic nucleus of the hypothalamus.
AcelRx Pharmaceuticals	Nasdaq: ACRX	Sufentanil NanoTab PCA System	acute and breakthrough post-surgical pain	Positive	Delivery was non-inferior to intravenous patient-controlled morphine, for the primary endpoint of patient global assessment of method of pain control, over a 48-hour study period.
Eli Lilly	NYSE: LLY	Tabalumab, monoclonal antibody that inhibits membrane-bound and soluble B cell activating factor	moderate-to-severe rheumatoid arthritis in patients wtih inadequate response to methotrexate therapy	Failed	One of three ongoing phase 3 trials was stopped due to insufficient efficacy; Lily will suspend enrollment of patients in the rehumatoid arthritis program until analysis from other rehumatoid arthritis studies in different patient populations is complete in early 2013.
Novartis Pharmaceuticals	NYSE: NVS	Tasigna compared to Gleevec	Philadelphia chromosome-positive chronic myeloid leukemia in newly diagnosed patients and in patients with residual disease after long-term Gleevec treatment.	Positive	Results from two separate studeis were positive. In the complete molecular response trial, follow-up data showed statistical significance between Tasigna and Gleevec groups in number of patients with undetectable BCR-ABL message, a molecular marker for leukemia, at 24 months, a doubling since the 12-month analysis. In the four-year newly diagnosed patients trial, more than three times as many patients achieved early response of reduction in BCR-ABL message levels; overall survival was similar but fewer CML-related deaths occurred in the Tasigna versus Gleevec groups.
AMAG Pharmaceuticals	Nasdaq: AMAG	Intravenous ferumoxytol	iron deficiency anemia in patients that failed or could not tolerate oral iron treatment	Positive	Safety and efficacy data from each of the trials and direct correlation between increases in hemoglobin and improvement in patient-reported fatigue will be the foundation for a supplemental new drug application in the U.S. for additional indications.
Eisai	OTC: ESALF	Eribulin mesylate	locally advanced or early-stage metastatic breast cancer in patients that have previously received at least two chemotherapies	Failed	Eribulin mesylate versus capecitabine study did not meet the co-primary endpoints for overall survival or progression-free survival. The majority of the patients received study treatment as their first or second-line chemotherapy for metastatic disease, a different population than what was studied for FDA approval.
PHASE 2					
Novo Nordisk	NYSE: NVO	Anti-NKG2D, Monoclonal antibody against NK cells	Crohn's disease	Failed	Trial halted following an interim futility analysis.
Sol-Gel Technologies	Private	Silica-based microencapsulated benzoyl peroxide	mild-to-severe rosacea	Positive	The study successfully demonstrated that the delivery system can provide a safe and effective first-in-class treatment. Topical benzoyl peroxide, a treatment for acne, has not been used for treatment of rosacea because it causes a high degree of skin irritation.

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Clinical Trials for December 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Pherin Pharmaceuticals	Private	Administration of pherines by intranasal spray	social anxiety disorder symptoms	Positive	Significant benefits in the acute treatment of symptoms of social phobia were seen based on pherines action on peripheral receptors from nasal chemosensory neurons that connect to the brain's hypothalamic-limbic system. Based on the positive study results, Pherin has met with the U.S. FDA to plan a phase 3 pivotal study.
Naurex	Private	GLYX-13, partial agonist of the NMDA receptor	depression	Positive	A single administration produced statistically significant reductions in depression scores in subjects who had failed treatment with one or more antidepressant agents. Reductions were evident within 24 hours and persisted for an average of seven days.
AOP Orphan Pharmaceuticals	Private	Mono-pegylated Interferon alpha-2b	myeloproliferative disorders, in particular polycythemia vera	Positive	The overall response rate exceeded 90 percent and after one year all patients were completely independent from phlebotomies. Based on these data AOP Orphan will initiate a phase 3 trial to support EMA approval.
Immunomedics	Nasdaq: IMMU	Epratuzumab, antibody against CD22, in combination with chemotherapeurics clofarabine and cytarabine	adult patients with relapsed or refractory acute lymphocytic leukemia	Positive	The mutli-center study conducted by the Southwest Oncology Group of the National Cancer Institute showed that among the 32 eligible patients evaluated, overall complete response rate was 50 percent and the null response rate was 10 percent.
Sanofi	EURONEXT: SAN and NYSE: SNY	SAR302503, JAK2 inhibitor	intermediate or high-risk primary or secondary myelofibrosis	Positive	The primary endpoint of change in spleen volume, assessed by MRI with independent central review, was met.
Puma Biotechnology	NYSE: PBYI	Neratinib in combination with temsirolimus	HER2+ metastatic breast cancer with disease progression on trastuzumab	Positive	Treatment with the combination of neratinib and temsirolimus resulted in clinical benefit in 7 of the 8 patients with reduced PTEN expression and in 6 of the 7 patients with absent PTEN expression.
Celldex Therapeutics	Nasdaq: CLDX	CDX-011, antibody-drug conjugate that targets and binds to GPNMB	glycoprotein NMB-expressing, advanced, heavily pretreated breast cancer and triple negative breast cancer	Positive	Progression free and overall survival benefits were demonstrated in the subgroup of patients with triple negative disease that also highly expressed GPNMB, and strong trends towards benefits were seen in all patients with high GPNMB expression. GPNBM promotes the migration, invasion and metastasis of breast cancer and is highly expressed in triple negative breast cancers.
YM BioSciences	NYSE: YMI and TSX: YM	CYT387, JAK1/2 inhibitor	myelofibrosis	Positive	Significant, durable responses in transfusion dependency, splenomegaly, and constitutional symptoms were observed in this 166 patient phase 1/2 study across the six study sites. The percentage of patients requiring transfusions decreased substantially, from 44 percent at baseline to below 10 percent at week 40 of treatment.
Pfizer	NYSE: PFE	PD0332991 in combination with letrozole	estrogen receptor positive, HER2-negative breast cancer	Positive	Median progression free survival of patients on the combination arm was 26 months compared to 7.5 months for letrozole alone; tumor shrinkage was observed in 70 percent of patients and stable disease for a minimum of 6 months in 44 percent of patients.

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Clinical Trials for December 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Astellas Pharma and Ambit Biosciences	TSE: 4503	Quizartinib, FLT3 inhibitor	relapsed or refractory acute myeloid leukemia	Positive	The oral monotherapy treatment gave a composite complete response, CRc, in 50 percent of FLT3-ITD positive patients; in FLT3-ITD negative patients the CRc rate was 32 percent. CRc is a combined indicator of remission, platelet, and hematological responses. Adverse events, most commonly progressive disease, caused treatment discontinuation in 22 percent of patients.
Celator Pharmaceuticals	Private	CPX-351, cytara-bine: daunorubicin, liposome injection	acute myeloid leukemia with multiple-risk factors	Positive	The primary endpoint of complete response plus complete response with incomplete recovery of neutrophils or platelets was met. Patients with two or three risk factors treated with CPX-351 had rates of response and 60-day mortality that were similar to those with only no or one risk factor.
Biotie Therapies	Private	Tozadenant, adenosine A2a antagonist	Parkinson's disease patients with levodopa end of dose wearing off	Positive	The study met its primary endpoint of a statistically significant decrease in off time in treated versus placebo groups, as well as demonstrating efficacy across multiple secondary endpoints that included improvements on clinician- and patient-assessed global impression scores.
Celgene	Nasdaq: CELG	Lenalidomide	previously treated mantle cell lymphoma	Failed	The primary endpoints of the study, overall response rate, and duration of response, as well as secondary endpoints including complete response and progression-free survival were not met.
Array BioPharma	Nasdaq: ARRY	ARRY-520 plus low-dose dexamethasone	triple-refractory multiple myeloma	Mixed	Overall survival of 19 months and progression free survival of 3.7 months was observed in patients taking ARRY-520 alone and a clinical benefit rate of 50 percent was observed in heavily pre-treated multiple myeloma patients taking ARRY-520 plus dexamethasone. The study points towards potential identification of a selection marker to identify patients that have the best chance to benefit from the drug.
Aeterna Zentaris	Nasdaq: AEZS	Perifosine, an oral AKT inhibitor, in combination with sorafenib	relapsed/refractory lymphomas	Mixed	Combination of perifosine and sorafenib was well tolerated by heavily pretreated lymphoma patients. Promising clinical response activity was observed in relapsed/refractory HL patients, suggesting that this subgroup could represent the target population for future studies. A significant correlation between clinical response and reduced Erk and Akt phosphorylation, a measure of kinase activation, was observed following 2 months of therapy.
Celgene	Nasdaq: CELG	Pomalidomide plus low dose dexamethasone	refractory multiple myeloma	Positive	Patients on combination therapy lived a median 3.6 months without their disease worsening, compared with 1.8 months for patients taking a high dose of the steroid alone. The 455-person study, from the third and final phase of clinical trials consisted of participants who had already taken Celgene's Revlimid or Takeda's Velcade. Based on the pomalidomide overall survival data, the monitoring committee recommended patients in the other arm of the trial without worsening disease be switched to the Celgene drug group.

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Clinical Trials for December 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
XBiotech	Private	MABp1, monoclonal antibody against IL-1	acne vulgaris	Positive	Improvement in lesions over the course of therapy was observed, with up to 42 percent reduction in the number of lesions seen at eight weeks of treatment.
Unigene Laboratories	OTC: UGNE	Oral parathyroid hormone analog	osteoporosis	Positive	The study demonstrated once-daily treatment with 5 mg of orally delivered PTH results in a significant and clinically relevant mean increase in bone mineral density at the lumbar spine of 2.2 percent at week 24 as compared to baseline. Results were published in the journal Bone.
Celgene	Nasdaq: CELG	Lenalidomide in combination with rituximab	non-Hodgkin lymphoma	Positive	In this study, an overall response rate was observed in 90 percent of patients with an estimated three-year progression free survival benefit in 78 percent of patients.
Celgene	Nasdaq: CELG	Lenalidomide in combination with rituximab-CHOP	aggressive B-cell lymphomas	Positive	Treatment resulted in an overall response rate of 98 percent and one-year progression-free survival benefit in 73 percent of patients.
Celgene	Nasdaq: CELG	Enalidomide in combination with ofatumumab	elapsed/refractory B-cell non-Hodgkin lymphoma	Positive	Patients in this trial with follicular lymphoma demonstrated an overall response rate of 83 percent and a one-year progression-free survival benefit of 67 percent.
AstraZeneca	NYSE: AZN	Ostamatinib, SYK kinase inhibitor	rheumatoid arthritis	Mixed	Two primary objectives, a superiority comparison to placebo at six weeks and a non-inferiority analysis against adalimumab monotherapy at 24 weeks were established. The study met the first but not the second objective, as all fostamatinib monotherapy doses were inferior to adalimumab monotherapy at week 24.
Flexion Therapeutics	Private	FX006, intra-articular, sustained release formulation of triamcinolone acetonide	osteoarthritis of the knee	Positive	Maintained therapeutic concentrations in the knee joint significantly longer than the most commonly prescribed immediate release steroid, triamcinolone acetonide
Idera Pharmaceuticals	Nasdaq: IDRA	IMO-3100, Toll-like receptors 7 and 9 antagonist	moderate-to-severe plaque psoriasis	Positive	improvements in Psoriasis Area Severity Index scores of 35 percent to 90 percent from baseline at the completion of a randomized, double-blind, placebo-controlled phase 2a clinical trial of two dose levels of IMO-3100 administered for four weeks, with a four-week follow-up period. None of the 12 placebo-treated patients had improvement in this range;results of this trial provide clinical proof-of-concept for the mechanism of action of selective TLR inhibition in patients with psoriasis and potentially other autoimmune and inflammatory disorders.

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Clinical Trials for December 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
CSL Behring	Private	Prophilactic treatment with fibrinogen concentrate	hemostatic therapy in bleeding patients undergoing aortic replacement surgery	Positive	The primary endpoint was the total number of units of allogeneic blood components (red blood cells plus fresh frozen plasma plus platelet concentrate) given to patients between administration of study medication and 24 hours thereafter. Patients who received fibrinogen concentrate required fewer allogeneic blood product transfusions than patients receiving placebo (a median of 2 units in the fibrinogen concentrate group compared with 13 units in the placebo ($p<0.001$)). In the fibrinogen concentrate group, 45 percent (13 out of 29 patients) avoided transfusion entirely, whereas all 32 placebo patients required transfusion ($p<0.001$). to assess the ability of fibrinogen concentrate to improve clotting and reduce the need for transfusion following elective aortic replacement surgery with cardiopulmonary bypass.
Transcept Pharmaceuticals	Nasdaq: TSPT	Low dose formulation of ondansetron, serotonin 5-HT3 receptor antagonist	obsessive compulsive disorder	Failed	The data from the trial showed that TO-2061 did not meet the primary efficacy endpoint to demonstrate an improvement in OCD symptoms versus placebo.
Biotie Therapies	Private	Nepicastat, dopamine beta hydroxylase inhibitor	post-traumatic stress disorder	Failed	Treatment with nepicastat was not effective in relieving PTSD-associated symptoms when compared to placebo.
Galena Biopharma	Nasdaq:GALE	NeuVax, neli-pepimut-S, the immmunodominant extracellular do-main nonapeptide of HER2	early-stage, node-positive breast cancer with low/ intermediate HER2 expression	Positive	There was a 5.6 percent recurrence rate with NeuVax versus 25.9 percent recurrence rate in the control arm in a 60 month trial. Disease free survival for NeuVax at 94.4 percent vs. 74.1 percent Control—a recurrence reduction of 78.4 percent in the target patient population.
PHASE 1					
Upsher-Smith Laboratories	Private	Intranasal midazolam	seizure clusters in epilepsy	Positive	Results were consistent with findings in healthy volunteers. They demonstrated that peak concentrations of midazolam were rapidly achieved, resulting in a rapid onset of pharmacodynamic effects. Additionally, both midazolam and its major metabolite were rapidly eliminated, which may have limited the incidence of adverse effects.
Profectus BioSciences	Private	Vesicular stomatitis virus-vectored HIV vaccine	HIV Vaccine	Positive	Demonstrated the safety and immunogenicity The recombinant version used in this clinical study is able to replicate in human cells, but has been attenuated (weakened) so as not to cause illness in animals or humans. that there was a vaccine take in all vaccine recipients across all dose levels, and that no rVSV entered the blood stream or was shed in saliva or urine.
ProNAi Therapeutics	Private	SMARTICLES delivery technology for PNT2258, anti-Bcl-2 cancer drug	Bcl-2-driven tumors such as diffuse large B-cell lymphoma, follicular lymphoma and chronic lymphocytic leukemia	Positive	The study showed statistically significant, dose-dependent, and specific knockdown of the Bcl-2 gene with suppression of protein levels up to 60 percent without material side effects as seen with other anti-Bcl-2 drugs or nucleic acid cancer drugs in development.

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Clinical Trials for December 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Galena Biopharma	Nasdaq: GALE	NeuVax, nelipepimut-S, the immmunodominant extracellular domain nonapeptide of HER2	early-stage, node-positive breast cancer with low/ intermediate HER2 expression	Mixed	NeuVax was safe and tolerable, and demonstrated a durable response out to 60 months. The landmark analysis at 60 months showed a non-significant trend of recurrence reduction among all patients at any dose. Multiple dose response analyses underscore the efficacy of the vaccine with statistical significance only among the optimally-dosed and boosted patients. Treatment assignment was based on HLA type, with HLA-A2/ A3 patients vaccinated and HLA-A2/A3 negative patients followed prospectively as controls for recurrence.
Isis Pharmaceuticals	Nasdaq: ISIS	ISIS-PTP1BRx, ISIS-GCGRRx, ISIS-GCCRRx with various targets	metabolic disorders, including type 2 diabetes	Positive	In all three phase 1 studies, the drugs were safe and well tolerated with early data to support a unique mechanism of action for each drug. ISIS-PTP1BRx targets protein tyrosine phosphatase-1B and is designed to increase the body's sensitivity to insulin, ISIS-GCGRRx targets the glucagon receptor and is designed to reduce the effects of glucagon on glucose production in the liver, while ISIS-GCCRRx targets the glucocorticoid receptor and is designed to reduce the effects of glucocorticoids on liver glucose production and fat storage in the liver and fat tissues.
ImmunoGen	Nasdaq: IMGN	IMGN910, cancer-cell killing agent attached to lorvotuzumab, the CD56-binding antibody, in combination with lenalidomide and dexamethasone	CD56-expressing relapsed or relapsed/refractory multiple myeloma	Positive	Sixty-four percent of patients had a clinical response of minimal response or better, to treatment and another 31 percent had stable disease.
Biothera	Private	Combination therapy of Imprime PGG, alemtuzumab and rituximab	high risk, chronic lymphocytic leukemia	Positive	All subjects in a phase 1 study of high risk, chronic lymphocytic leukemia responded to the combination therapy with 64 percent achieving a complete response.
Baxter International	NYSE: BAX	BAX 326, recombinant factor IX	bleeding episodes in hemophilia B	Positive	Results from the study in previously-treated patients with severe or moderately severe hemophilia B showed that twice-weekly prophylactic treatment with BAX 326 achieved a reduced median annualized bleed rate of 1.99 with 43 percent of patients experiencing no bleeds. The impact of prophylaxis with BAX 326 also translated into statistically significant improvements in physical health-related quality of life.
Merrimack Pharmaceuticals	Nasdaq: MACK	MM-302, nanotherapeutic encapsulation of doxorubicin with anti-HER2 antibody fragments attached to its surface	advanced HER2 positive breast cancer	Positive	Of the 22 evaluable patients in this heavily pretreated patient population, 12 achieved stable disease and two achieved a partial response, resulting in a clinical benefit rate of 64 percent. One of the patients who achieved a partial response had complete regression of their target lesion.

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Clinical Trials for December 2012

COMPANY	TICKER	DRUG	INDICATION	RESULT	NOTES
Celldex Therapeutics	Nasdaq: CLDX	CDX-301, potent hematopoietic cytokine known as Flt3L	expansion and differentiation of hematopoietic progenitor and stem cells for transplant and cancer immunotherapy	Positive	Short-term dosing of five days in healthy volunteers resulted in significant mobilization of dendritic and stem cells, with the highest levels of mobilization achieved at the maximum dose.
PDC Biotech	Private	PDC31, allosteric modulator octapeptide of the prostaglandin F2a receptor	preterm labour	Positive	PDC31 infusion was associated with a dose-dependent relief of pain, as well as a reduction in intrauterine pressure. In addition, the drug was well tolerated with no dose limiting toxicities. This study was designed to evaluate safety as well as provide proof-of-concept for the ability of the compound to inhibit excessive uterine contractility.
NovaDigm Therapeutics	Private	NDV-3, recombinant glycoprotein vaccine containing a candidal surface antigen, the agglutinin-like sequence 3 protein	cross-kingdom vaccine against both fungal and bacterial pathogens	Positive	A single dose of the NDV-3 vaccine was safe, well-tolerated and induced strong antibody and T-cell immune responses in healthy adults. Results were published in the journal *Vaccine*.

Patents Announced in December 2012

COMPANY	TICKER	COMPANY DESCRIPTION	GRANTING AGENCY	PATENT NUMBER	PATENT COVERS
Amarin Corporation	Nasdaq: AMRN	A biopharmaceutical company focused on the commercialization and development of therapeutics to improve cardiovascular health	U.S. Patent and Trademark Office	U.S. Patent No. 8,298,554	This patent covers the pharmaceutical composition of Amarin's Vascepa (icosapent ethyl) capsules, comprising not less than 96 percent EPA, an ultra-pure omega-3 fatty acid.
Amarin Corporation	Nasdaq: AMRN	A biopharmaceutical company focused on the commercialization and development of therapeutics to improve cardiovascular health	U.S. Patent and Trademark Office	U.S. Patent Nos. 8,793,727 and 8,293,728	These patents cover the use of Amarin's Vascepa capsules.
Precision BioSciences, Inc.	Private	A biotechnology company focused on developing and commercializing therapeutics and services based on its ability to enable site-specific genome modifications within a living organism	U.S. Patent and Trademark Office	Notice of Allowance	The notice covers materials and substitutions used for the creation of enzymes capable of modifying endogenous locations within a complex genome. These materials and substitutions constitute an important aspect of Precision's genome engineering technologies, known collectively as the Directed Nuclease Editor or DNE.
MediciNova Inc.	Nasdaq: MNOV Jasdaq: 4875	A biopharmaceutical company that acquires and develops small-molecule therapeutics for the treatment of diseases with unmet need with a commercial focus on the U.S. market	European Patent Office	Notice of Allowance	The notice covers the use of ibudilast (MN-166) for the treatment of progressive forms of multiple sclerosis.

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Patents Announced in December 2012

COMPANY	TICKER	COMPANY DESCRIPTION	GRANTING AGENCY	PATENT NUMBER	PATENT COVERS
Tobira Therapeutics, Inc.	Private	A biopharmaceutical company focused on development and commercialization of antiviral compounds for treatment of HIV infection	U.S. Patent and Trademark Office	U.S. Patent No. 8,183,273	A composition of matter patent for a broad family of compounds with activity against chemokine receptors CCR5 and CCR2.
InDex Pharmaceuticals	Private	An immunology focused biopharmaceutical company that discovers and develops treatments in disease states with a high unmet medical need together with companion diagnostics	Japan Patent Office	N/A	The patent covers the use of a broad range of oligonucleotides for the treatment of steroid resistance in patients afflicted with inflammatory conditions.
iBio, Inc.	NYSE: IBIO	The company develops and offers product applications of its iBioLaunch and iBioModulator platforms, providing collaborators support for implementation of its technology for both proprietary and biosimilar products.	U.S. Patent and Trademark Office	Notice of Allowance	The allowance covers antigens comprising Yersinia pestis F1 protein fused to the thermostable iBioModulator protein, as well as vaccine compositions and a method for producing a protective immune response to the antigen. The invention was developed by scientists at the Fraunhofer USA Center for Molecular Biotechnology, iBio's research collaborator.
iBio, Inc.	NYSE: IBIO	The company develops and offers product applications of its iBioLaunch and iBioModulator platforms, providing collaborators support for implementation of its technology for both proprietary and biosimilar products.	U.S. Patent and Trademark Office	U.S. Patent No. 8,277,816	Patent broadens protected uses of iBio's proprietary iBioLaunch platform and covers compositions of matter and methods of producing and formulating anthrax vaccines.
Concert Pharmaceuticals, Inc.	Private	A clinical stage biotechnology company applying their deuterated chemical entity platform to create small molecule drugs	U.S. Patent and Trademark Office	U.S. Patent No. 8,263,601	This patent covers the composition of matter and pharmaceutical compositions of CTP-499, the company's lead drug candidate in development for the treatment of diabetic nephropathy, currently in phase 2 clinical testing.
AnaptysBio, Inc.	Private	A therapeutic antibody company with platform technology in the use of somatic hypermutation in combination with additional technologies for the discovery and optimization of antibodies	U.S. Patent and Trademark Office	U.S. Patent No. 8,288,160	This patent broadly covers the use of in vitro somatic hypermutation in eukaryotic cells for the discovery and optimization of antibodies. Previous patents covered prokaryotic cells.
Biohit Oyj	NASDAQ: BIOBV	A globally operating biotechnology company that develops, manufactures and markets diagnostic tests and analysis systems for the early detection and prevention of diseases of the gastrointestinal tract	U.S. Patent and Trademark Office	U.S. Patent No. 8,227,513	Invention comprises food compositions, to which one or more acetaldehyde-binding compositions are added. The purpose of the compositions is to reduce the amount of detrimental acetaldehyde in the area of the mouth, the pharynx, the esophagus, the stomach, and the small and large intestines, and through this, to reduce the risk of developing cancers in these areas.
Immunovative Therapies, Ltd.	Private	ITL specializes in the development of novel immunotherapy drug products that incorporate living immune cells as the active ingredients for treatment of cancer and infectious disease.	U.S. Patent and Trademark Office	Notice of Allowance	The allowance of product claim broadly covers ITL's lead immunotherapy drug candidate AlloStim. The active ingredient is intentionally mis-matched CD4+ Th1 T-cells with natural killer cell activity.

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Patents Announced in December 2012

COMPANY	TICKER	COMPANY DESCRIPTION	GRANTING AGENCY	PATENT NUMBER	PATENT COVERS
Immunovative Therapies, Ltd.	Private	ITL specializes in the development of novel immunotherapy drug products that incorporate living immune cells as the active ingredients for treatment of cancer and infectious disease.	U.S. Patent and Trademark Office	U.S. Patent No. 8,273,377	The patent covers the method to utilize immune cells from a normal donor to elicit an anti-tumor mechanism that mimics the Graft vs. Tumor effect of non-myeloablative allogeneic stem cell transplants, known as "Mini-Transplants" without the toxicity of Graft vs. Host Disease.
SkyePharma	Private	A specialist drug delivery company developing oral and inhalation products	U.S. Patent and Trademark Office	Notice of Allowance	The notice covers delayed-release formulation of low-dose prednisone. The pharmacokinetic profile of the drug RAYOS has approximately a four-hour lag time compared to immediate-release prednisone formulations.
InteRNA Technologies	Private	A cancer therapeutics company based on a broadly applicable proprietary technology platform for the rapid identification and validation of therapeutic miRNAs	U.S. Patent and Trademark Office	Notice of Allowance	These allowable product claims protect miRNA-3157, homologues, precursors and mimics thereof.
ConfometRx	Private	ConfometRx focuses on G protein coupled receptor (GPCR) structural characterization and analysis and has exclusive rights to the patented T4-lysozyme protein fusion stabilization technology used to solve thirteen GPCR structures.	U.S. Patent and Trademark Office	N/A	This patent prevents overseas use of the proprietary T4-lysozyme fusion technology of analyzing G protein coupled receptor crystal structures and selecting GPCR modulators.
StemCells, Inc.	Nasdaq: STEM	StemCells, Inc. is engaged in the research, development, and commercialization of cell-based therapeutics and tools for use in stem cell-based research and drug discovery.	U.S. Patent and Trademark Office	U.S. Patent No. 8,283,164	The patent broadly covers purified populations of human liver cells, including StemCells' human liver engrafting cells, hLEC. The patent claims cells independent of tissue source and has potential relevance to those deriving liver cells from iPS or ESC platforms.
Bend Research Inc.	Private	A contract research organization with capabilities in formulation science, dosage form development, process development and engineering, manufacturing, biotherapeutics, and analytical sciences	U.S. Patent and Trademark Office	U.S. Patent Nos. 8,257,741 and 8,263,128	The patents protect compositions and processes for making spray-dried dispersions, SDDs, that enhance the absorption of low-solubility drugs. The patents cover SDDs made with an active pharmaceutical ingredient and hydroxypropyl methylcellulose acetate succinate.
Immune Design	Private	A biotechnology company using molecular immunology to develop therapeutic vaccines for the treatment of infectious and malignant disease	U.S. Patent and Trademark Office	U.S. Patent Nos. 8,273,361 and 8,273,345	The first patent broadly claims technologies of GLA, a synthetic Toll Receptor 4 agonist, and covers any antigen-containing vaccine that incorporates GLA as an adjuvant. The second covers ID-LV, a novel vector engineered to selectively target human dendritic cells for delivery of cancer antigens.

Upcoming PDUFA Dates

COMPANY	TICKER	PROPRIETARY NAME	ESTABLISHED NAME	INDICATION	PDUFA DATE
Raptor Pharmaceutical	RPTP	Procysbi	cysteamine	Nephropathic cystinosis	2/1/2013
Hemispherx Biopharma	HBY	Ampligen	rintatolimod	Chronic fatigue syndrome	2/2/2013
Celgene	CELG	N/A	pomalidomide	Refractory/relapsed multiple myloma	2/10/2013
Dynavax	DVAX	Heplisav	hepatitis b adult vaccine	Hepatitis B prevention	2/24/2013
Genentech (Roche) ImmunoGen	RHHBY IMGN	N/A	Trastuzumab emtansine (T-DM1)	HER2-positive, unresectable locally advanced or metastatic breast cancer in patients who have received prior treatment with Herceptin and a taxane chemotherapy	2/26/2013
QuatRx Pharmaceuticals Shionogi	Private Tokyo:4507	Ophena	ospemifene	Vulvar and vaginal atrophy due to menopause	2/26/2013
Aegerion Pharmaceuticals	AEGR	N/A	lomitapide	Homozygous Familial Hypercholesterolemia	2/28/2013
Biogen Idec	BIIB	BG-12	dimethyl fumarate	Multiple sclerosis	3/1/2013
Johnson & Johnson	NYSE:JNJ	Invocana	canagliflozin	Type 2 diabetes	3/1/2013
Pharmaxis	ASX:PXS	Bronchitol	mannitol	Cystic fibrosis	3/18/2013
Navidea Biopharmaceuticals	NAVB	Lymphoseek	Technetium Tc 99m Tilmanocept	Lymphatic mapping	4/30/2013
GSK Theravance	GSK THRX	FF/VI	fluticasone furoate and vilanterol	Chronic obstructive pulmonary disease	5/12/2012
Orexo	SSE:ORX	Zubsolv	Combination: buprenorphine/naloxone	Opioid dependence	7/6/2013
Aveo Pharmaceuticals Astellas Pharma Kyowa Hakko Kirin	AVEO Tokyo:4503 Tokyo:4151	Tivopath	tivozanib	Advanced renal cell carcinoma	7/28/2013
Lundbeck Otsuka Pharmaceutical	CSE:LUN Tokyo:4502	Brintellix	vortioxetine	Major depressive disorder	10/2/2013

New Drug Approvals in December 2012

	COMPANY	PROPRIETARY NAME	ESTABLISHED NAME	INDICATION
UNITED STATES				
	Salix Pharmaceuticals Napo Pharmaceuticals	Fulyzaq	crofelemer	HIV/AIDS patients whose diarrhea is not caused by an infection from a virus, bacteria, or parasite
	Janssen	Sirturo	bedaquiline	Adults with multi-drug resistant pulmonary tuberculosis (TB)
	Bristol-Myers Squibb	Eliquis	apixaban	Atrial fibrillation that is not caused by a heart valve problem
	Aegerion Pharmaceuticals	Juxtapid	lomitapide	Homozygous familial hypercholesterolemia
	NPS Pharmaceuticals	Gattex	teduglutide	Adults with short bowel syndrome (SBS) who need additional nutrition from intravenous feeding
	Novartis	Signifor	pasereotide	Cushing's disease patients who cannot be helped through surgery
	Human Genome Sciences	raxibacumab	raxibacumab	Inhalational anthrax
	Ariad Pharmaceuticals	Iclusig	ponatinib	Chronic myeloid leukemia and Philadelphia chromosome positive acute lymphoblastic leukemia
EUROPE				
	Astellas Pharma	Betmiga	mirabegron	Overactive bladder syndrome

* List only includes New Molecular Entities

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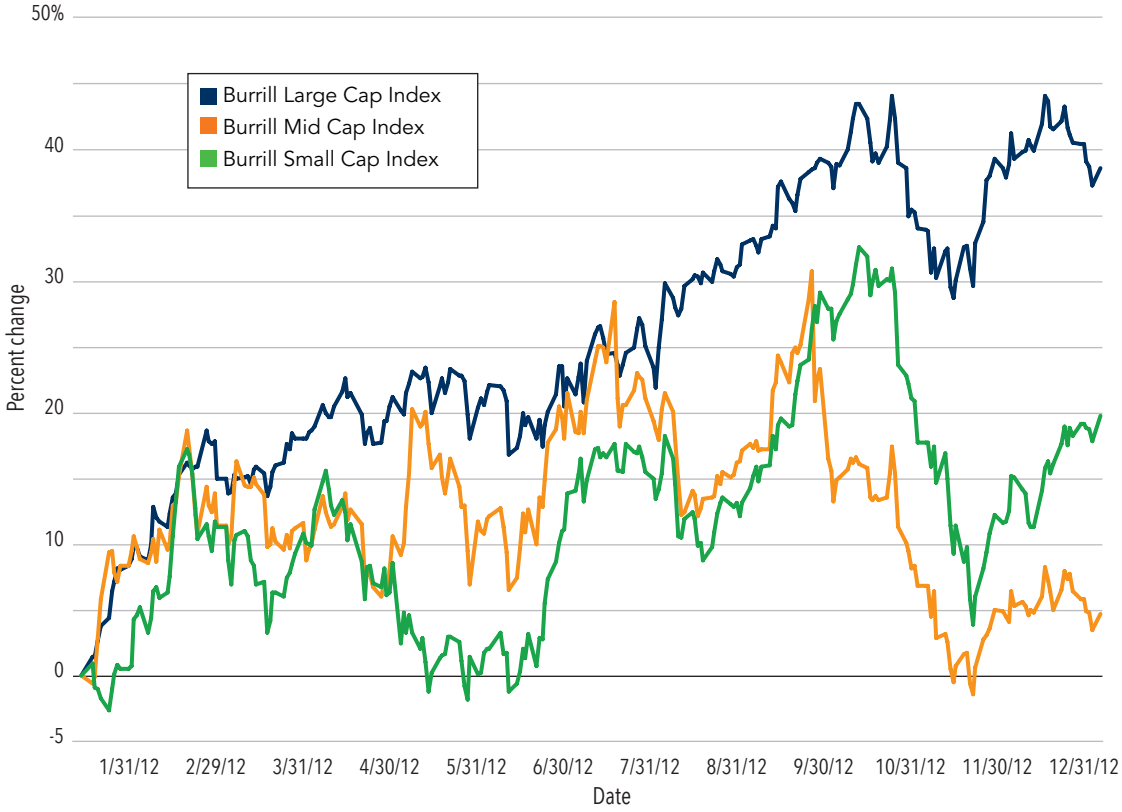
INDICES

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



PERFORMANCE OF INDEX COMPONENTS

LARGE CAP
Percent change December 2012

Index	-0.5%
VRX	8.1%
VRTX	5.3%
ELN	2.3%
BMRN	1.4%
REGN	-3.1%
AMGN	-2.9%

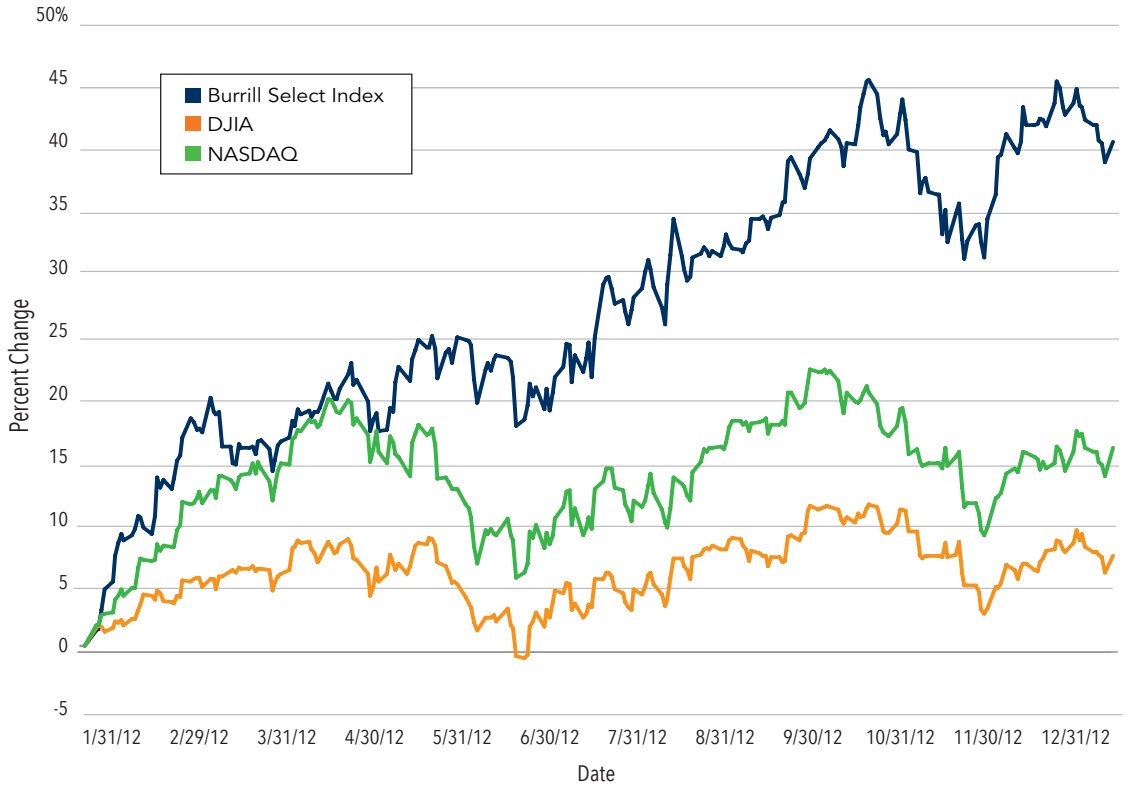
MID-CAP
Percent change December 2012

Index	-0.6%
VVUS	18.8%
PCYC	8.9%
CBST	3.5%
QCOR	3.2%
ARIA	-14.2%
SGEN	-8.5%
VPHM	-8.2%
INCY	-5.6%

SMALL-CAP
Percent change December 2012

Index	4.1%
INFI	38.1%
AVEO	23.8%
DNDN	18.9%
CHTP	-59.4%
AFFY	-22.3%
RIGL	-21.7%
HZNP	-10.0%
PTIE	-21.5%
OSIR	-20.5%

Burrill Biotech Select Index, December 2012

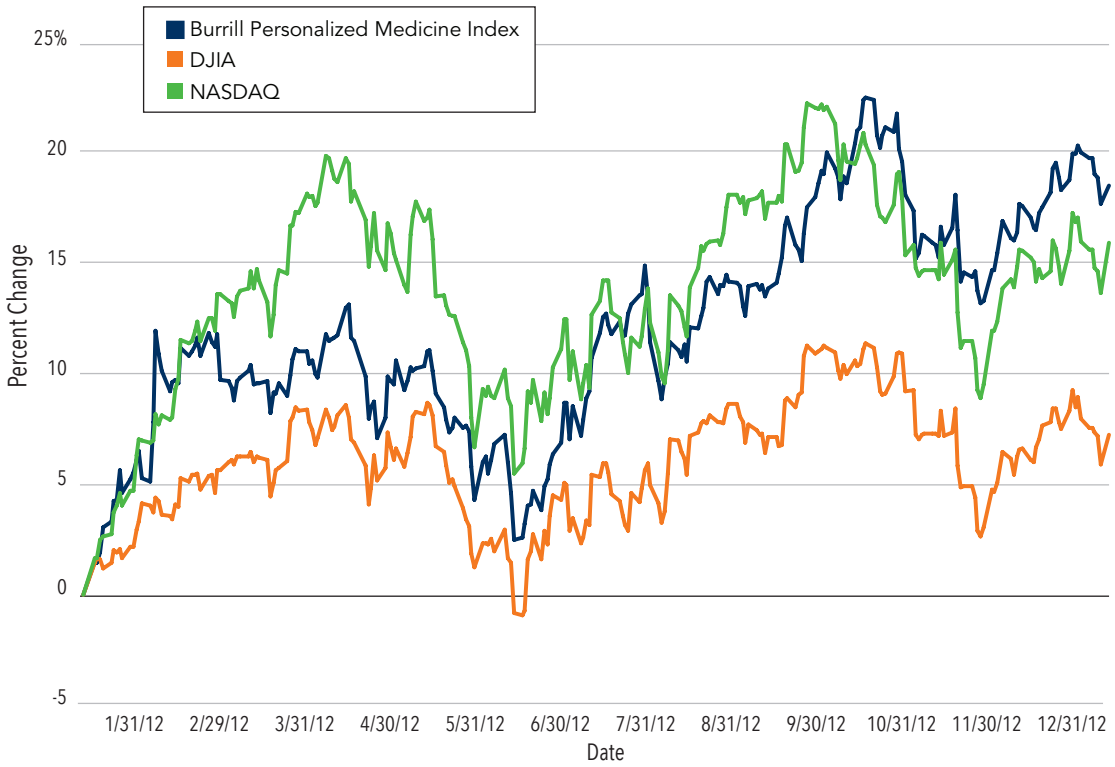


BURRILL BIOTECH SELECT INDEX

Percent change December 2012

Index	-0.9%
DNDN	18.9%
VRTX	5.3%
SGMO	4.9%
CLVS	4.0%
SGEN	-8.5%
EXEL	-6.4%
MYGN	-5.1%
REGN	-3.1%

Burrill Personalized Medicine Index, December 2012

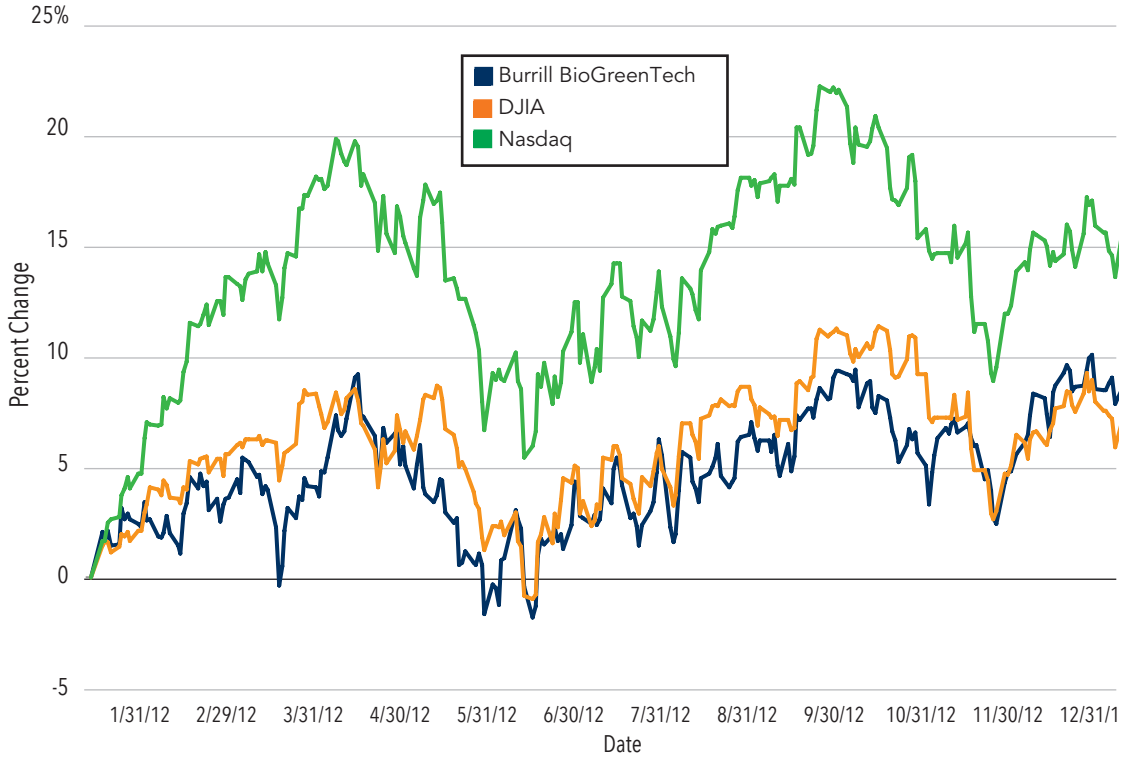


BURRILL PERSONALIZED MEDICINE INDEX

Percent change December 2012

Index	0.8%
EXAS	8.0%
ILMN	3.5%
MYGN	-5.1%
AFFX	-4.8%
ECYT	-4.2%

Burrill BioGreenTech Index, December 2012

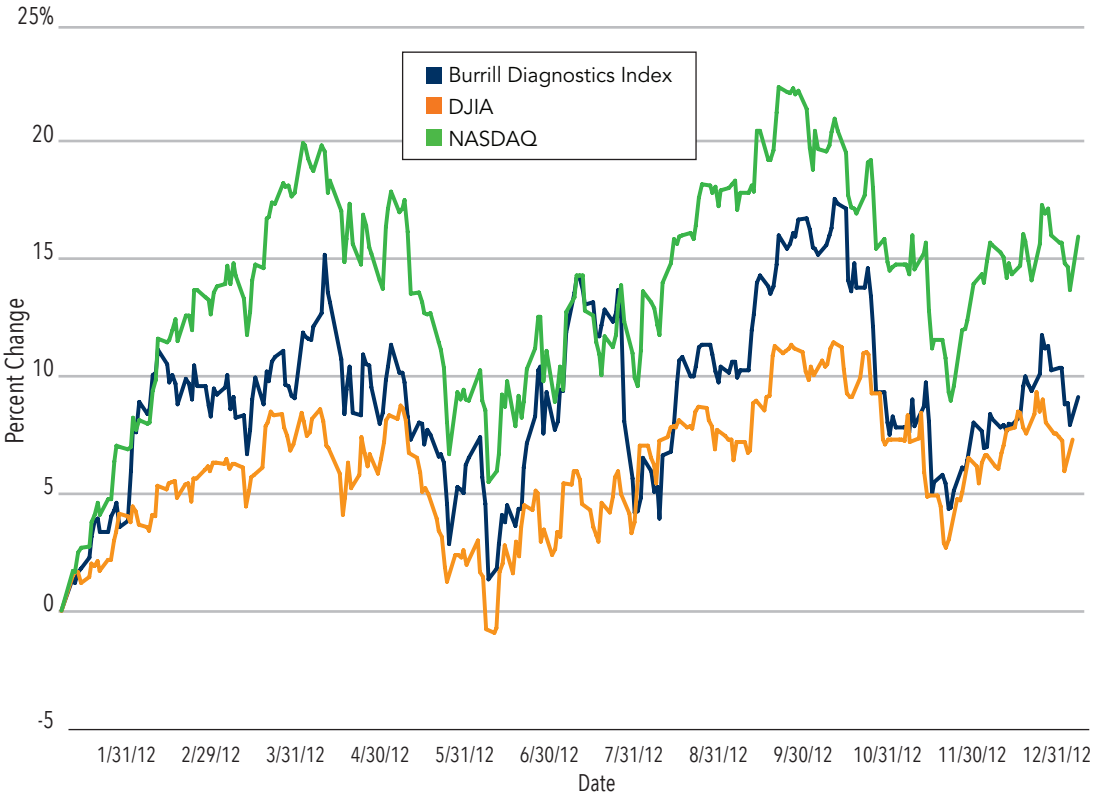


BURRILL BIOGREENTECH INDEX

Percent change December 2012

Index	0.3%
MBLX	31.0%
AMRS	10.2%
CZZ	6.8%
SZYM	5.4%
CERP	-75.0%
SYNM	-14.1%
RTK	-6.7%
GEVO	-3.8%

Burrill Diagnostics Index, December 2012



BURRILL DIAGNOSTICS INDEX

Percent change December 2012

Index	0.8%
BGMD	59.3%
EXAS	8.0%
QDEL	6.5%
HOLX	4.9%
GNMK	-9.1%
MYGN	-5.1%
SQNM	-3.3%