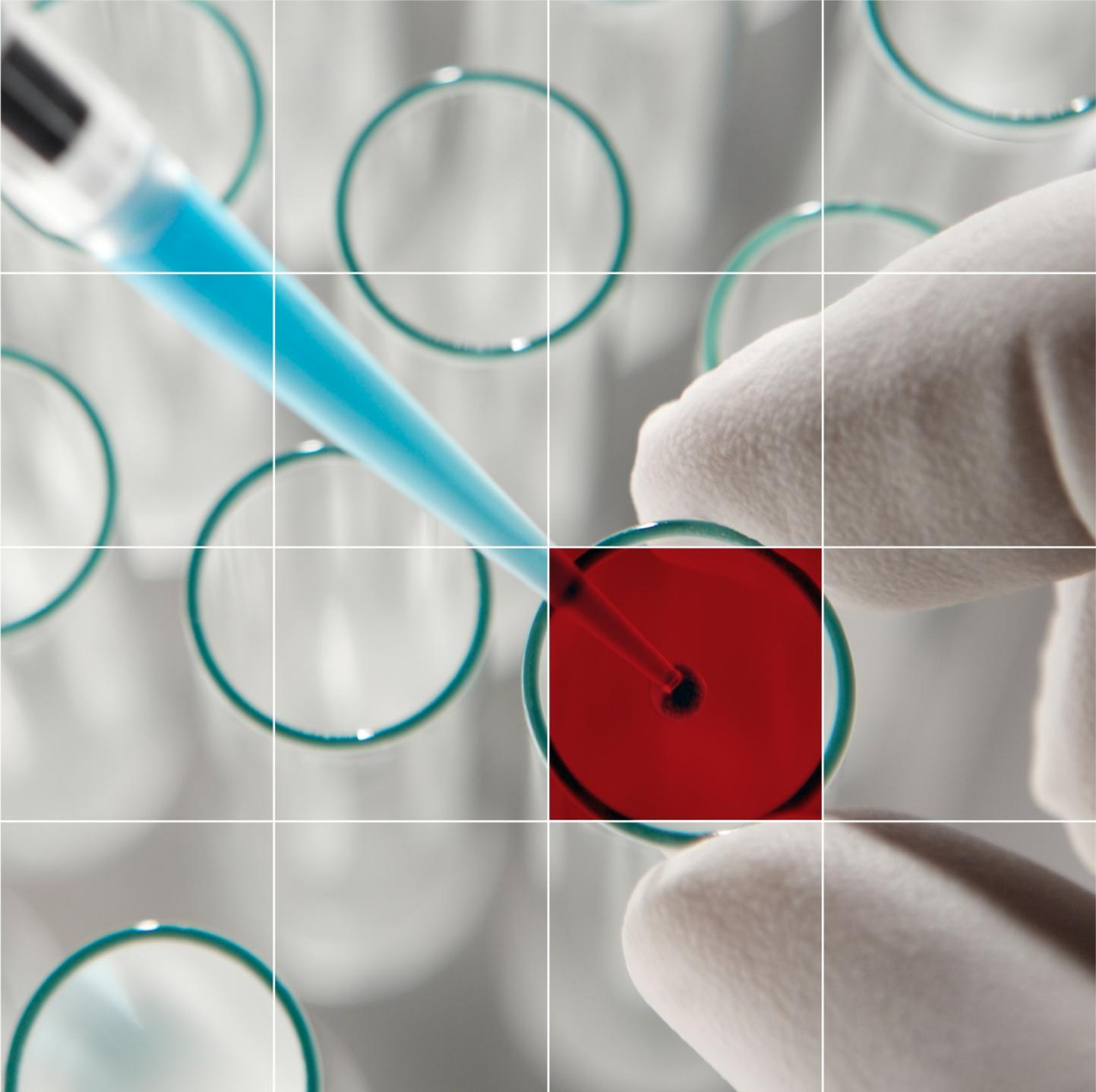


Life Sciences Outlook

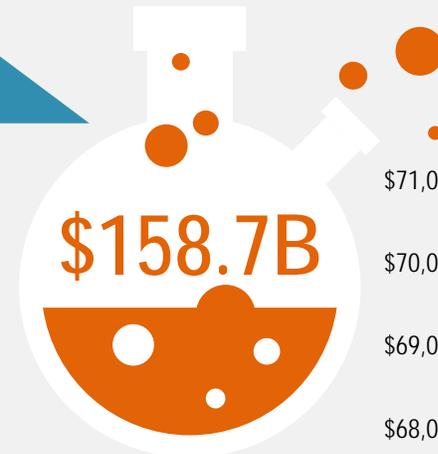


United States | 2015



Despite higher rents and labor costs, firms continue to flock to premier markets.

Despite pressures from competitors, the branded pharmaceutical industry has projected revenue of approximately \$158.7B in 2015. The industry will see continued growth, which will lead to increased real estate demand in already tightening markets.

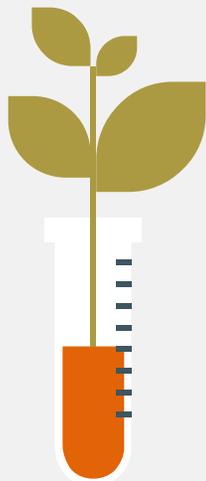


Wages are growing as life sciences firms compete for highly skilled labor.



Rents climb in life sciences markets nationwide.

Top U.S. rents	2014	2015	Change Y-o-Y
Boston	\$44.10 p.s.f.	\$47.40 p.s.f.	7.4%
Raleigh-Durham	\$16.90 p.s.f.	\$19.00 p.s.f.	12.4%
San Francisco	\$31.90 p.s.f.	\$37.30 p.s.f.	16.9%
San Diego	\$25.80 p.s.f.	\$29.90 p.s.f.	15.5%
New York/ New Jersey	\$22.10 p.s.f.	\$24.00 p.s.f.	8.3%
Los Angeles	\$29.20 p.s.f.	\$30.70 p.s.f.	4.9%



Established vs. Emerging: the tradeoff between price and established infrastructure.

Cambridge, MA

#1 life sciences market in the world and home to a large concentration of some of the most well-known and innovative life sciences firms. This submarket also contains some of the top universities in the world, feeding the labor pool.

Bothell, WA

A suburb of the growing Seattle market, Bothell has seen a decline in the vacancy rate of 460 basis points y-o-y, as life sciences firms increasingly occupy lab space in this submarket. Bothell still has relatively high vacancy and will become even more active over the next year.

Average lab rent:	\$51.60 p.s.f.	Average lab rent:	\$19.00 p.s.f.
Average lab vacancy:	11.4%	Average lab vacancy:	14.1%
Current demand:	1.3 m.s.f. requirements	Current demand:	0.6 m.s.f. requirements

Implications for life sciences companies?

- Industry competition is heightening the need for highly specialized labor and driving up wages.
- Rents are growing in established life sciences markets. In other industries, this would lead to noticeable exodus to secondary markets. But most life sciences firms are doubling down on entrenched markets due to the high importance of R&D infrastructure and specific labor pools.
- However, space constraints in traditional markets are forcing some firms to consider secondary markets.

Life sciences in 2015: *An adaptive global industry*

1 Generic demand on the rise
In 2015, the life sciences industry continues to change in response to growing regulatory and demand pressures from across the globe. **As policies like the Affordable Care Act (ACA) in the United States take hold, demand for generics is growing.** Governments are using new policies to support prescribing generics in order to save money. The patent cliff is also creating an increase in generics demand, as patents continue to run out on well-known drugs like Lipitor and Plavix. This creates new production opportunities for generics firms. Generics producers are also looking abroad for new opportunities, identifying demand in emerging markets as a strategy for future growth.

3 Innovation boost means new space and labor requirements
Biopharma production, and its generic counterpart, biosimilars, has increased as firms look to new, creative drugs that will make a profit in the competitive market. Biopharma research focuses on synthesizing biological sources to create pharmaceuticals. Small and mid-size biopharma firms are ripe for M&As, as large companies look to diversify their portfolios and to create high-impact drugs that counteract revenue declines. This type of production is labor-intensive, harnessing the mental acuity of highly trained scientists, often with PhDs. **The increase in biopharma work requires highly educated employees and, therefore, real estate near elite educational institutions is more in demand.** The overall cost of operating in the life sciences sector is ticking upward due to the increase of lab rents in prime clusters, R&D costs and higher wages for skilled employees.

2 Branded pharma consolidating rapidly
The increase in generics demand is leaving branded pharmaceutical (pharma) firms looking for new revenue sources. This has also created a spike in merger and acquisition (M&A) activity as "big pharma" seeks to maximize vertical integration and enhance innovation. Though M&A activity in the life sciences sector is contributing to a disposition of real estate, **vacant lab space is often being claimed by mid-size firms and developers looking to capitalize on central location and infrastructure.**

4 Indicators of future demand point to lower vacancy and higher rents
The surge of M&A activity, evolution of products and global demographic trends all affect the demand for lab space. The industry is seeing increased development of open floorplans, which foster innovation and attract young, millennial workers. There is also a need for more specialized lab and incubator space, as firms focus on live-cultured biopharma research. Further, new small and mid-sized biopharma firms are scooping up labs across the major U.S. markets—leasing locations vacated by consolidating firms. **All this activity is reducing the amount of vacant lab stock across the major clusters and giving landlords the opportunity to push rents higher.**

U.S. cluster rankings

Rank	Cluster	Weighted score	Rank	Cluster	Weighted score
1	Greater Boston Area	72.5	10	Seattle	40.8
2	Raleigh-Durham	66.4	11	Denver	38.5
3	San Francisco Bay Area	64.3	12	New Jersey	35.8
4	San Diego	63.1	13	Suburban Maryland/Metro DC	35.5
5	New York City	60.3	14	Westchester County	31.9
6	Los Angeles/Orange County	58.3	15	Central & Southern Florida	30.3
7	Philadelphia	50.3	16	Indianapolis	29.6
8	Long Island	48.2	17	Chicago Metro	27.5
9	Minneapolis	43.5			

Life sciences employment concentration:

Weight: 25.0%

Measured as the percent of industry employment against total metro private employment.

Life sciences employment growth:

Weight: 10.0%

Life sciences establishments concentration:

Weight: 10.0%

Measured as the percent of industry establishments against total metro private establishments.

Life sciences venture capital funding:

Weight: 20.0%

Life sciences National Institute of Health funding:

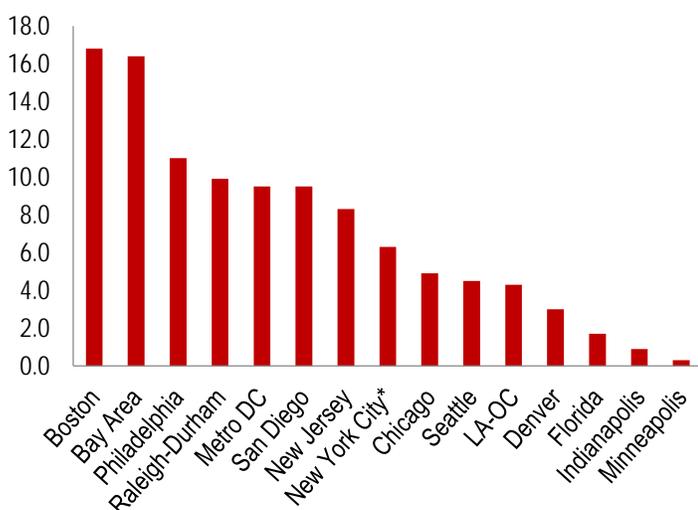
Weight: 20.0%

Life sciences patents:

Weight: 15.0%

United States life sciences clusters: *Tightening supply in the face of high demand*

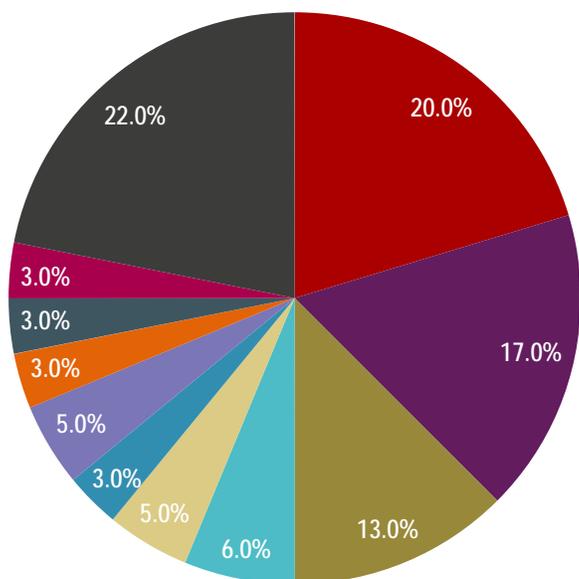
Rentable lab space (m.s.f.)



*Includes Long Island and Westchester markets

The United States life sciences industry is undergoing change as new markets, like Denver and Seattle, enter the competitive fray. Established clusters, such as Boston, remain hubs, due to deeply entrenched life sciences infrastructure and ease of access to skilled talent. Demand for life sciences products is shifting, thanks to an increased demand for generic medications, causing major players to rethink the way in which they conduct business. **The industry is characterized by continued M&A activity, as large companies seek to engage in new, diversified research and manufacturing.** The rise of small and mid-sized biopharma firms provides opportunities for large companies interested in M&As to invest in niche research. The prevalence of smaller firms has minimized the vacancy rates normally associated with increasing consolidation. In some life sciences markets, such as the Bay Area, low vacancy rates are leading developers to suburban submarkets to break ground on new developments. In the future, space restraints may push demand toward new clusters like Dallas, Houston and Portland where talent pools are available and real estate conditions are becoming increasingly favorable to life sciences companies looking to expand their footprints.

Newly approved drugs per state



A leading indicator of future demand for lab space is the FDA drug approval pipeline. For example, recently Boston saw an increase in space demand as the FDA approved seven new products for Massachusetts-based pharmaceutical firms. As big pharmaceutical companies look to increase R&D funding, specifically for orphan diseases, this indicator will continue to help us predict the future strength of some clusters. Large pharmaceutical firms have production and research facilities across several markets, so the approval of one drug could affect many different markets. **The most recently approved drugs in the pipeline are from an array of companies, though the majority of them have a strong footprint in New Jersey, California and Massachusetts.** We can reasonably expect that the bulk of real estate demand will continue to revolve around these traditional clusters. However, firms with footprints in Washington, Indiana and Connecticut also captured approvals, as secondary markets also see growth.

Industry trends:

#1: The rise of generics and biosimilars

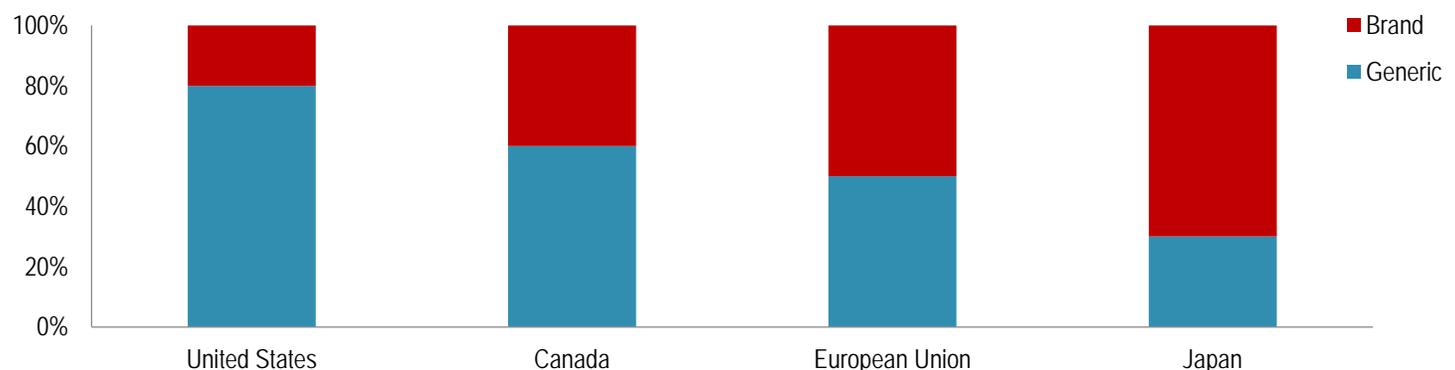
A few key trends have shifted the way in which life sciences firms conduct business. **The patent cliff—the point in which patents run out and generic replicas enter the market—continues to have a major impact on the revenue stream for large pharmaceutical firms.** Some well-known branded medications, such as Lipitor and Plavix, lost patent protection beginning in 2010 and are being replaced by generics.

Government regulations have also shifted demand toward the development of generics. The Affordable Care Act (ACA) encourages health care providers to focus on value-based purchasing and decreasing overall cost of care. It promotes the utilization of generics to save money and increase value for patients. This is especially important in the United States as enrollment in Medicare and Medicaid increases as Baby Boomers retire. Patients who are involved in these programs are often susceptible to more chronic illness and demand cheap, tried-and-true medications, which are easily provided by generic firms. In fact, **according to Bloomberg, 86.0 percent of prescriptions in the United States are generic.**

The rise in the generic prescriptions can be seen in other “mature” life sciences markets, such as the EU, Japan and Canada. This shift is becoming especially noticeable in the historically life sciences-centric Western Europe, where recession has caused R&D funds to decline drastically over the last several years. For instance, the French government is providing doctors one-on-one guidance on prescribing lower cost medications.

Thanks to the patent cliff and demand pressure from regulators, generic spending in entrenched life sciences markets will rise by 35.0 percent to \$40 billion through 2019 according to Deloitte.

Percent branded vs. generic prescriptions filled



Source: U.S. Food and Drug Administration

This means that while the generic pharmaceutical sector is much smaller than the branded pharmaceutical segment (\$44.5B compared to \$158.7B in revenue, respectively), generics are growing at a much faster rate—4.0 percent more growth annually than branded pharma.

Further, **generics producers are increasingly looking to emerging markets, which have increasing capital to spend on medications.** India, for instance, has experienced a huge expansion in generic development and manufacturing. The expansion of generic pharmaceuticals worldwide has further served to integrate the global life sciences market. However, generics firms will have to compete internationally with branded pharmaceutical firms that are also looking to capture more market share abroad.

Although sales of generics are increasing, the sector's real estate demand will remain low. Generics companies do not demand large lab space, as they do not develop new drugs. Thus, generics have more impact on the office market than on labs, as these companies put emphasis on manufacturing, commercialization and marketing. Currently, generic pharma does not have a large domestic real estate footprint. Manufacturing mainly occurs in California, which is home to 17.9 percent of all generic manufacturing. Texas, New York, Pennsylvania, North Carolina and Florida are also popular locales for these companies. Industry establishments are often located in areas with large populations. **Despite the preference for major markets, rents for generics firms stay low—around 2.9 percent of total cost—in contrast to 4.0 percent for branded pharma.**

Industry trends:

#2: Increased consolidation and globalization

M&A activity is increasingly becoming a vehicle to grow revenue, especially amongst branded pharmaceutical and medical device manufacturers. Consolidation is largely driven by the need to adopt new business models and expand product offerings. **Some factors influencing M&A activity in 2015 include:**

- The development of orphan drugs, pharmaceuticals designed to treat rare diseases
- Biopharma R&D, which has much less generic competition than synthetic pharmaceuticals
- Operational efficiencies, which are gained by acquiring established specialized research and development

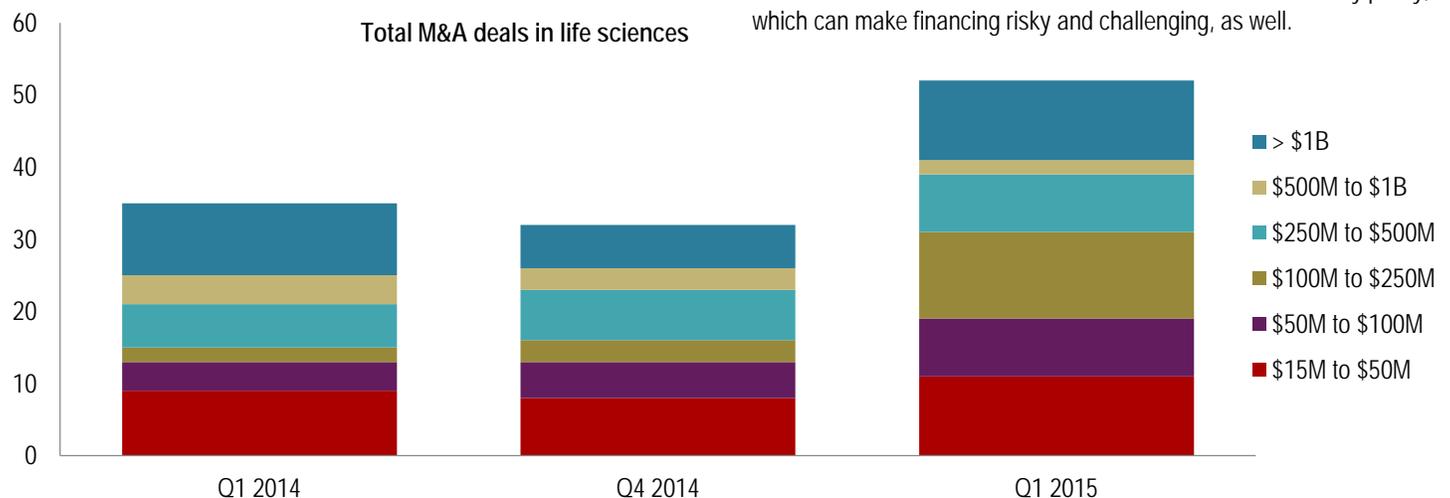
The value of M&A deals closing in the first quarter of 2015 increased 13.0 percent from the fourth quarter of 2014. The number of deals in the \$100M to \$250M range has grown exponentially, driving up the number of deals, though average values still rest below first quarter 2014 totals. **The majority of deals are in the pharmaceutical space, with \$18.7 million in deals in Q1 2014, followed closely by diagnostics deals.**

Some key deals announced in 2015 include:

- Pfizer, Inc.'s merger with Hospira, Inc., which is a provider of injectable drugs and biosimilars. This deal highlights the continued importance of branded pharma acquiring biosimilars in order to minimize competition for the industry's growing biopharma market.
- Bristol-Myers Squibb announced an agreement to acquire Flexus Biosciences, which is a biotechnology company focusing on oncology drugs located in San Carlos, CA. The transaction underscores the value of oncology drugs in the pipeline.

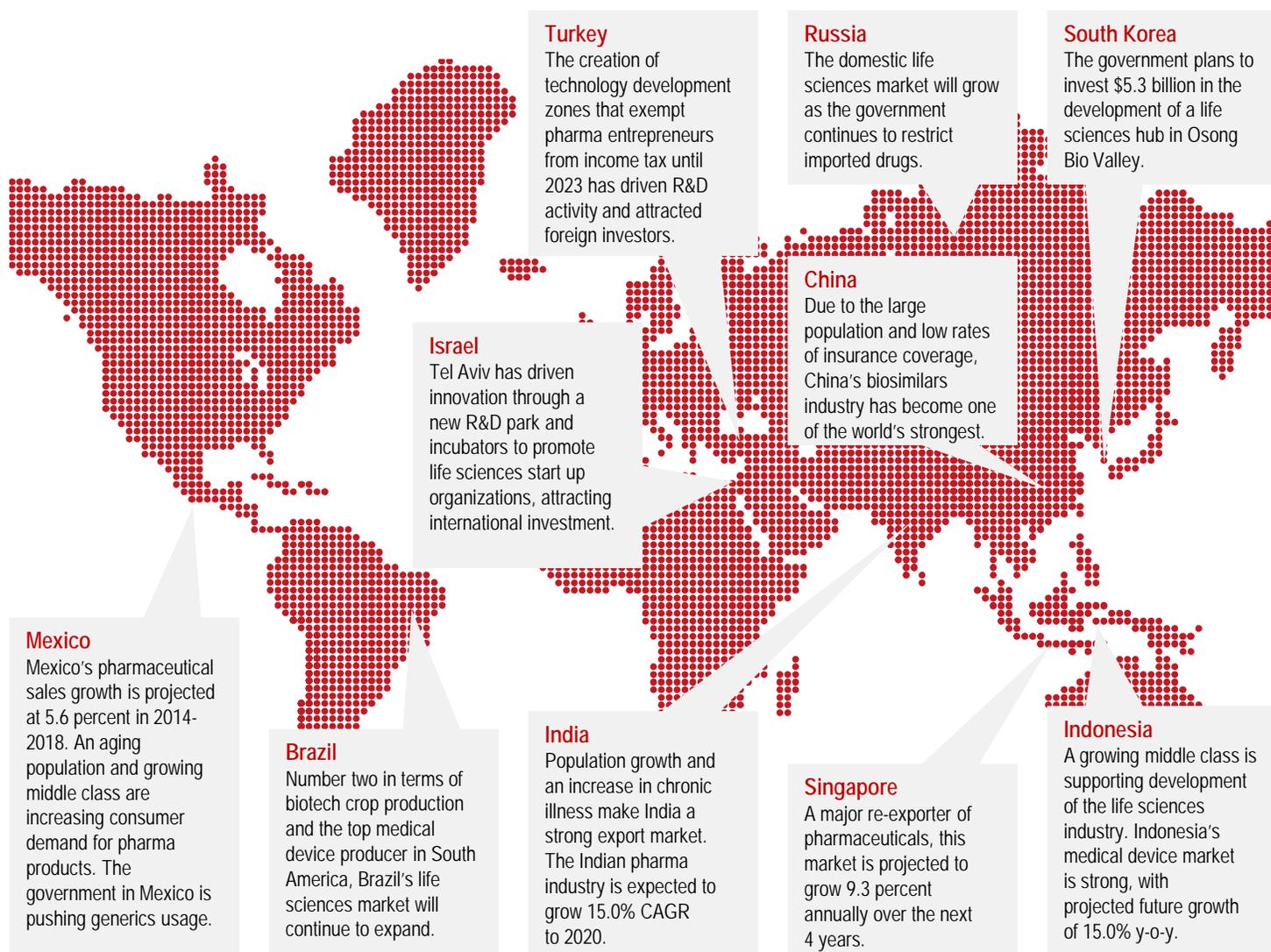
Globalization is another key strategy for big biopharma firms looking to counteract the trend of increased generic demand.

Emerging markets have seen growth in the life sciences industry over the past several years, in tandem with increased chronic disease. These markets have commercial potential in the long run, though it may take up to 20 years for some of these countries to have competitive buying power in the market. Still, projected medical sales in 2020 may reach \$175.8B in China, \$57.3B in Brazil and \$45.1B in Russia; investment in these markets, though high risk, presents strong opportunities for embattled big pharma firms in entrenched markets. Device manufacturing firms also see opportunity in emerging markets in the form of lower cost labor and increased demand for new, innovative devices. **Emerging markets provide the chance to grow at a lower cost but they also present real estate challenges.** Lack of market transparency and unfamiliar regulations can make assessing facility options, lease negotiations, and lab design difficult to navigate. Emerging markets sometimes do not have consistent fiscal and monetary policy, which can make financing risky and challenging, as well.



Source: U.S. Food and Drug Administration

Global clusters to watch



The majority of development in emerging markets is occurring in Asia, as populations continue to grow and age. Further, many Asian countries are seeing rapid GDP growth, opening the door for higher purchasing power per capita, and providing impetus for investment by life sciences firms. **Rates of chronic illness, like diabetes, are rising in many Asian countries, most notably in India. This provides a potential new market for both branded pharma and generics.**

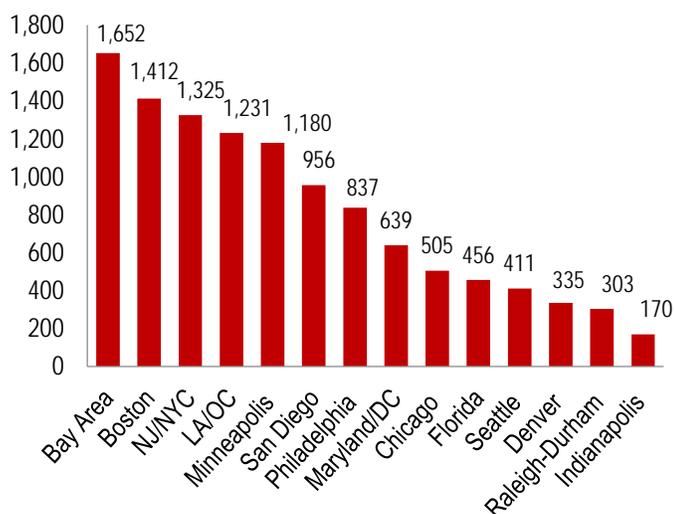
Central and South America are also expanding rapidly, as new safety measures and more stable governments arise, supporting economic openness and expansion in this region. Brazil, as one of the fastest growing economies in the world, has massive market potential. As other countries in this region, most notably Colombia, experience increasing stability and market liberalization, **we can expect that life sciences firms will move more production facilities to Central and South America, taking advantage of low-cost land and labor.**

Industry trends:

#3: Space that enables productivity and innovation

R&D productivity in life sciences has declined in recent years; however, trends indicate we are in the midst of a turnaround. According to a Deloitte study, the 2013 net present value of the life sciences sector jumped 46.0 percent from 2012, with **newly approved products reaching a sales potential of \$24.4 billion**.

Number of U.S. patents in 2013 (most recent available data)



Source: U.S. Patent Office

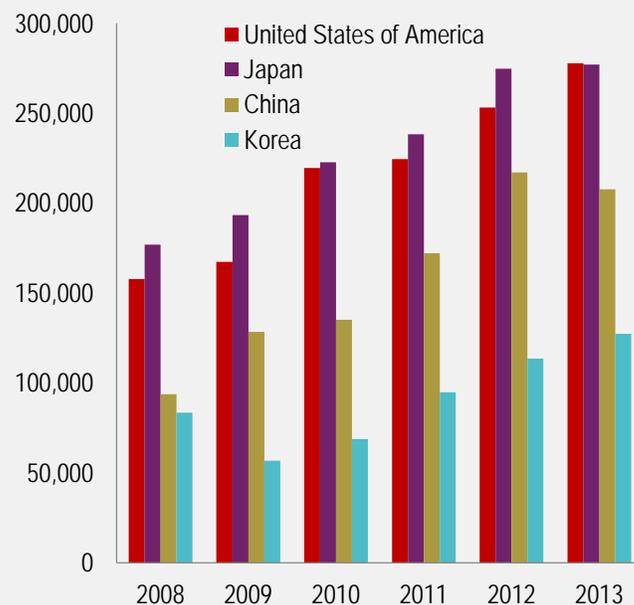
The level of innovation stemming from a market is one way to measure that cluster's productivity. **A center for innovation, the Bay Area continues to lead the nation in life sciences patents, with 1,652 total in 2013.** Boston and the New York/New Jersey markets are a close second and third. Life sciences patents in 2013 were overwhelmingly in the medical field, as firms try to compete with generics by pursuing the development of highly specialized, or orphan, drugs. **To foster an innovative environment, life sciences firms are modifying traditional lab configurations to provide more options for teamwork and collaboration.**

Biogen has made the transition toward open floorplan design to meet the preferences of millennial workers in its office portfolio. The company designed an innovative new office that includes amenities to improve the quality of life for employees, including on-site daycare and a fitness center. **The space is focused on collaboration and improving the well-being of employees.** We expect other life sciences firms to follow this model as the ability to create and innovate increasingly becomes a differentiator in the market.

Firms are also investing in more state-of-the-art lab space to conduct highly specialized biopharma research. **In order to retain top talent, companies are offering new infrastructure and lab equipment.** Working in the biopharma and biosimilar sphere is highly cost-intensive, but can reap rewards in the form of lucrative, niche drugs that can replace traditional drugs under pressure from generics.

The competition to innovate is global. Three of the top four global clusters for patent approvals were in Asia in 2013. Japan, previously the number one country in the world for patent approval, dropped behind the United States in 2013. China also saw a slump in innovative patents. Korea, however, saw more patents than ever as the government continues to develop the country's biopharma industry through the formation of research parks across the country. Europe has fallen far behind the United States and Asian markets in terms of patent development due to an economic crisis and cuts to R&D funding.

Top patents per life sciences firm



Source: OECD

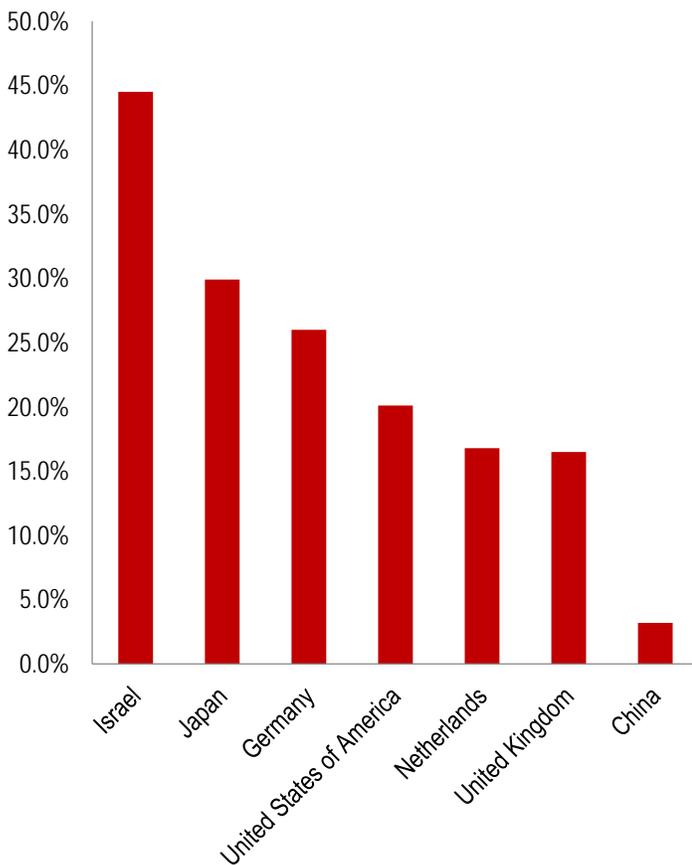
Industry trends:

#4: Following the talent

To satisfy the demand for biopharma and orphan drugs, firms need to attract specialized labor, often with PhDs. **Faced with a limited labor pool from which to draw, proximity to centers of higher education are an important requirement for many life science clusters.** Companies must also be mindful that the labor pool for life sciences is an international one, as many students achieve bachelor's degrees and above in other countries.

Education in global life sciences hubs

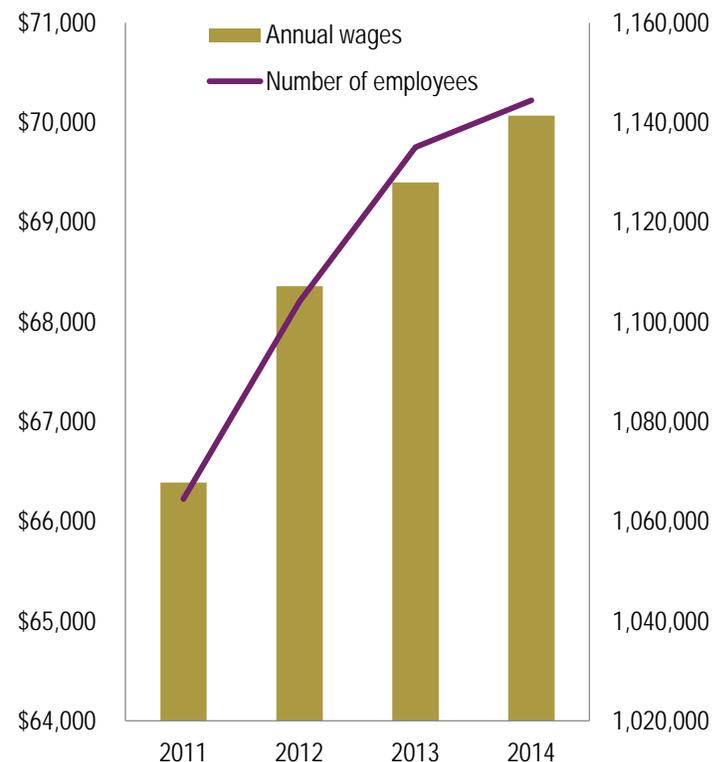
(Percent of population with bachelor's degree)



Source: UNESCO

The competition for highly skilled labor is putting upward pressure on wages in the life sciences sector. In the United States, average annual wages for life sciences jumped 6.0 percent, from just over \$66,000 to over \$70,000, between 2011 and 2014. Due to the size of the available labor pool and advanced educational requirements of life sciences companies, we expect wages will continue to increase. This keeps the cost of doing business high for life sciences companies and places expense management in areas such as real estate under greater scrutiny. **Lab rents went up 3.1 percent on average between 2013 and 2014, which, combined with higher wages, creates a balancing act between cost management and attracting and retaining high-value talent.** We expect companies will invest in technology to make research less labor-intensive—a long-term strategy for the sector.

Wage and employment growth in life sciences



Source: Bureau of Labor Statistics

Real estate outlook

As we have discussed, M&A activity and industry consolidation have provided opportunities for emerging firms to leverage some of the resulting higher quality infrastructure and specialized facility vacancies including lab, pilot plant and manufacturing space. Many older pharma properties, however, are selectively being redeveloped or repurposed for alternative uses. Still other firms are remaining in their existing lab space, despite acquisitions, as they use existing infrastructure for highly specific research. As such, vacancy rates in key markets remain low; Cambridge, a highly concentrated life sciences cluster in the Boston metro area, is resting at 89.8 percent occupied. The Los Angeles market is seeing occupancy rates of near 100.0 percent. **Due to the high occupancy rates in these markets, developers are opening up new submarkets to lab space.** For instance, Boston's Seaport District gained its first large life sciences tenant in history recently when Vertex Pharmaceuticals leased 1.1 million square feet of space.

Some markets are seeing high occupancy rates as a result of very little rentable stock. **Indianapolis and Minneapolis have high rates of owner-occupied (rather than leased) space, making it difficult for these clusters to attract new firms.** In Indianapolis, for example, vacancy rests at 4.4 percent, with no major blocks of lab space (over 100,000 square feet) available. Minneapolis has nearly no available space for rent in some of its submarkets, as firms like Bayer complete huge built-to-suit properties in the area. Ample swaths of developable land make these markets generally more affordable to construct large lab facilities, which attract owner-occupiers looking for custom space.

Rising rents will continue to affect the bottom line for pharmaceutical firms. The average rent for lab space in major markets across the United States is \$24.30 per square foot, up from \$23.60 in 2014. This low-level rent growth is exacerbated in some key life sciences markets. **San Francisco has experienced exceptionally high levels of rent growth, a 16.9 percent increase in the last year, though it remains less expensive to rent lab space in San Francisco than in Boston, the most expensive market by \$10.00 p.s.f.** However, many other markets still have relatively low rent costs. Philadelphia, strategically located near several major domestic clusters, has rent of just \$13.80 p.s.f.; Denver also has relatively low rent. These markets will continue to attract smaller firms, especially biopharma companies that must pay a premium for labor and need to reduce costs by renting in secondary markets. Suburban submarkets also provide lower cost options for fledgling and small, specialized firms. However, the majority of life sciences demand, at least in the short term, continues to revolve around established clusters, such as Cambridge and San Francisco, despite rent growth.

In 2015, rents are increasing in all the major U.S. lab markets



Source: JLL Research

How costs compare in key life science markets

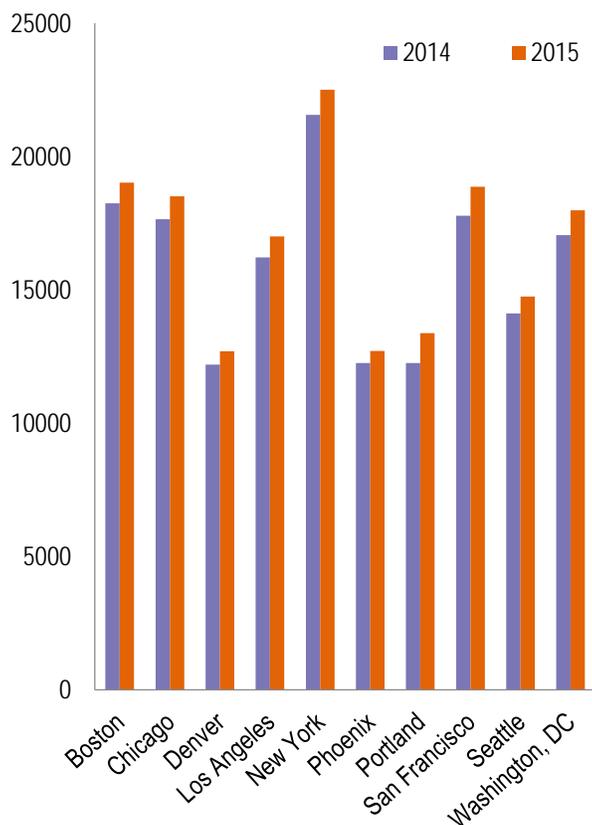
	2014	2015	Change Y-o-Y
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Raleigh-Durham	\$16.90 p.s.f.	\$19.00 p.s.f.	12.4%
San Francisco	\$31.90 p.s.f.	\$37.30 p.s.f.	16.9%
San Diego	\$25.80 p.s.f.	\$29.90 p.s.f.	15.5%
New York/ New Jersey	\$22.10 p.s.f.	\$24.00 p.s.f.	8.3%
Los Angeles	\$29.20 p.s.f.	\$30.70 p.s.f.	4.9%

Source: JLL Research

Real estate outlook

An increase in demand for rental properties is also fueled by rising construction costs across the United States. As construction labor wages continue to rise, thanks to a dearth of available laborers, the cost of developing large, built-to-suit lab space continues to climb. While some smaller markets, like Minneapolis and Indianapolis, have lower construction costs, many companies prioritize a presence in markets like New York City and Boston. **The large cost to develop in core markets will inspire firms to rent more space in the future, rather than construct new buildings.** This will further tighten the rental market in hub locations and push demand out to secondary markets, including lower cost suburban areas.

Cost of construction in major markets (ENR Construction Index)



RLB Comparative Cost Index tracks the bid cost of construction, including: labor, materials, contractor, and overhead costs.

Source: JLL Research, RLB

Construction and renovation costs are especially important as both big pharma and generics looking to invest in biosimilars rethink lab space design. The focus on biopharma and biosimilars requires lab equipment to become more specialized. Labs need to be built with incubator space to grow organic material used in these experiments. The newest equipment and work stations are also vital to attract employees.

Landlords of second-generation and older lab facilities will need to invest in renovations and upgrades to attract tenants and maintain occupancy levels.

Looking toward 2016, we expect the following trends to drive location strategies and space design in life sciences markets:

- M&A consolidation creates some opportunity for small and mid-sized firms to relocate from incubators in secondary markets and secure space in tightening primary life sciences clusters.
- Rising competition from generics will force branded pharma to invest in talent, technology and facilities that enable innovation.
- Big pharma will continue to acquire new small firms, and this will require them to renovate older facilities to meet the needs of millennial employees or seek out new space that does.
- Advances in medicine and global demographic trends point to an overall expansion of the life sciences industry. Without a boom in new lab construction, lab rents will be pushed upward in key markets. Large firms may start to consider lower cost secondary markets to develop build-to-suit lab space. But over the short term, we expect the traditional clusters to be the most active from a leasing perspective.



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