

2019 U.S. LIFE SCIENCES CLUSTERS:

Markets Positioned for 'Century of Biology'



EXECUTIVE SUMMARY

- The life sciences revolution is occurring at a record pace. In this report, CBRE identifies the U.S. market clusters leading this revolution, as well as a selection of markets emerging as the industry's next hot spots.
- **Boston-Cambridge** and the **San Francisco Bay Area** are the nation's leading life sciences clusters, according to a compilation of CBRE data.
- In **Boston-Cambridge**, lab rents are growing by double-digits, 1.9 million sq. ft. of new lab space is under construction and an abundance of talent and institutions is fueling growth.
- The **San Francisco Bay Area** benefits from a surging amount of development, world-class institutions, plentiful capital sources and leading sources of talent.
- **San Diego, New Jersey, Raleigh-Durham** and **Washington, D.C.-Baltimore** round out a second tier of primary life sciences markets in the U.S.



- Significant industry momentum in **New York City**—evidenced by more than 1.5 million sq. ft. of lab space under construction, strong municipal support and a major concentration of sought-after talent—support it as one of the nation's rising life science clusters.
- Intense competition for the **brightest talent** persists. CBRE's data shows which markets have the most scientists fueling innovation (New York and New Jersey) and where the most qualified graduates are coming from (Boston-Cambridge).
- Emerging life sciences hubs that offer a growing source of life sciences talent include **Seattle, Houston, Austin** and **Denver**. These and other markets possess premier educational and medical institutions to drive continued industry growth.
- **Venture capital** funding has surged 86% over the past year, driving employment growth, new construction and increased attention from investors.

TOP-10 LEADING U.S. LIFE SCIENCE CLUSTERS

FIGURE 1: TOP-10 LEADING LIFE SCIENCES MARKETS

1. Boston-Cambridge
2. San Francisco Bay Area
3. San Diego
4. New Jersey
5. Raleigh-Durham
6. Washington, D.C.-Baltimore
7. New York City (and surrounding areas)
8. Philadelphia
9. Los Angeles
10. Chicago

Ranked by size of laboratory inventory, size and long-term growth² in life sciences employment,³ number and concentration of key scientists,¹ size of funding sources.

Source: CBRE Research, Q4 2018.

The nation's leading life sciences clusters are identified by several criteria: laboratory inventory size, number and concentration of industry scientists,¹ NIH and venture capital funding and long-term growth² of the life sciences workforce.³ Each of these factors was standardized, allowing CBRE to compare markets against one another and showing Boston-Cambridge and the San Francisco Bay Area leading by a comfortable margin in terms of a sizeable, dynamic life sciences market poised for growth.

A second tier of markets include the life sciences clusters of San Diego, Raleigh-Durham, New Jersey and Washington, D.C.-Baltimore. A third tier of markets exhibit various sources of strength, ranging from an attractive industry size and momentum in New York City and Los Angeles to a historical preeminence in the industry in Chicago and Philadelphia.

Analyzing these markets with a greater emphasis on recent industry employment and funding trends, as well as their depth of talent and institutions, indicates stronger momentum in some, which may indicate the potential for future above-average employment and industry growth. CBRE's analysis suggests Boston-Cambridge and the San Francisco Bay Area will continue their lead. However, significant momentum, especially in New York City and Los Angeles, implies these markets will play a greater role in the industry.

TOP EMERGING LIFE SCIENCES CLUSTERS

Rapid growth in the industry is spreading to new markets across the country. The markets shown in Figure 2 are emerging as prime candidates to become leading life sciences hubs. They exhibit an attractive combination of a substantive life science workforce, including key scientists, strong recent life sciences employment growth, ample NIH funding, top-ranked schools and medical institutions, and a sizeable high-tech workforce to support future convergence between the industries.

FIGURE 2: TOP-RANKED EMERGING LIFE SCIENCES CLUSTERS

1. Seattle
2. Houston
3. Austin
4. Minneapolis
5. Denver
6. St. Louis
7. Dallas/Ft. Worth
8. Atlanta
9. Pittsburgh

Ranked on the basis of recent life sciences employment growth, number and concentration of key scientists, NIH funding, quality and quantity of (1) educational institutions providing life science graduates and (2) medical research and health services institutions, and number and concentration of high-tech workers.

Source: CBRE Research, Q4 2018.

¹ Biomedical Engineers, Biochemists & Biophysicists, and Chemists as identified by the U.S. BLS OES.

² 2002-2017.

³ Life Sciences employment consists of the following NAICS categories: Manufacturing (pharmaceuticals and medicines) (3254), Electromedical apparatus (334510), Analytical laboratory instruments (334516), Irradiation apparatuses (334517), Surgical and medical instruments (339112, 339113), Medical, Diagnostic and Testing laboratories (54138, 6215) and R&D in the physical, engineering, and life sciences (54171) as obtained on a county level from the U.S. BLS QCEW.

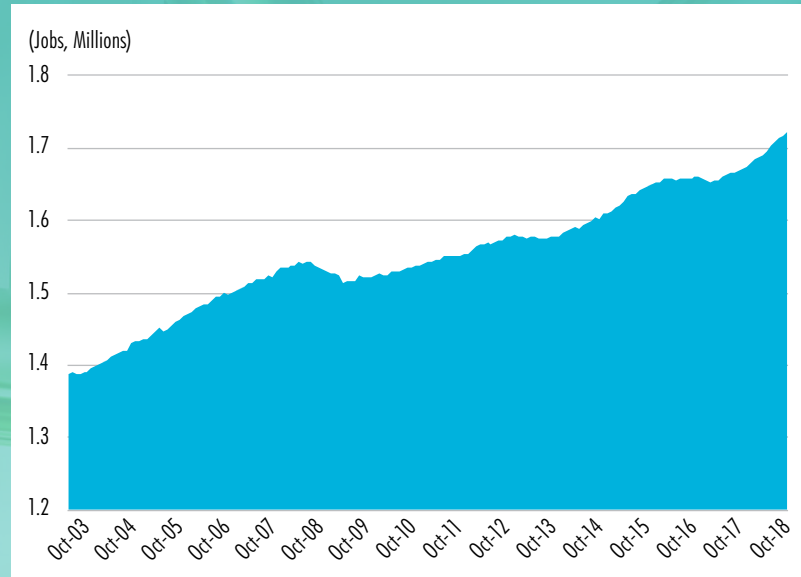
U.S. LIFE SCIENCES TRENDS

The U.S. life sciences industry is growing at the fastest pace since 2000. The 3.2% year-over-year growth rate in U.S. life sciences employment ending Q3 2018 is a strong acceleration from the slow, but temporary, growth in early 2017 and well-above the 1.7% increase in total U.S. nonfarm employment over the same period.

Employment in the industry has grown 42% over the past 20 years. All sectors of life sciences (Manufacturing, Testing Labs, R&D) are growing, but R&D continues to outperform.

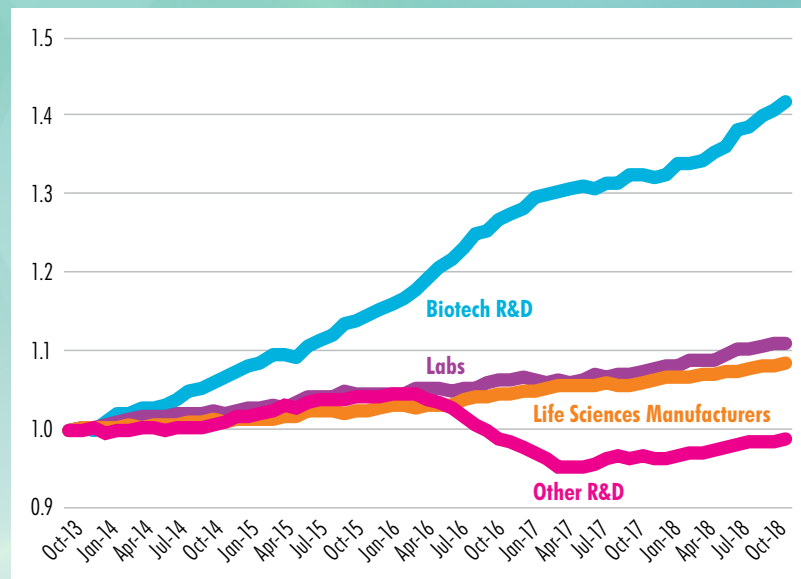
The key subsector that is driving growth, even within the larger R&D sector, is research & development in biotechnology. This subsector grew at an annual pace of 6.2% in Q3 2018, far greater than other sectors of life sciences. Biotech R&D has grown 88% over the past 20 years.

FIGURE 3: TOTAL U.S. LIFE SCIENCES EMPLOYMENT
Fastest Industry Growth Since 2001



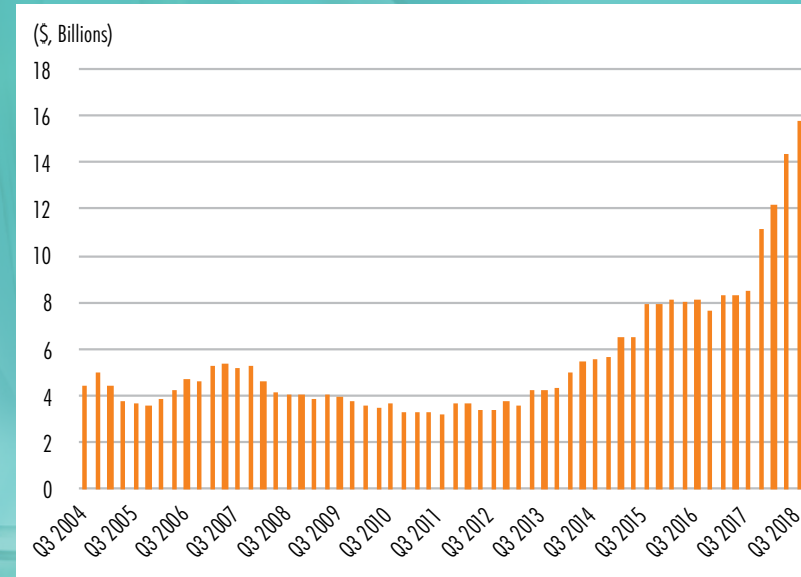
Source: U.S. BLS, CBRE Research, Q4 2018.³

FIGURE 4: EMPLOYMENT BY LIFE SCIENCES SEGMENT & U.S. TOTAL



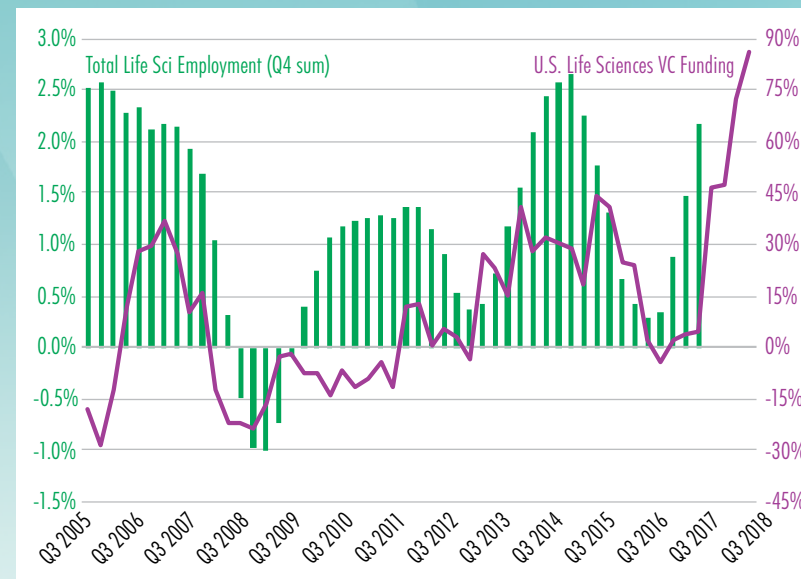
Source: U.S. BLS, CBRE Research, Q4 2018.
Note: Indexed to employment levels in October 2013.

FIGURE 5: U.S. LIFE SCIENCES VENTURE CAPITAL FUNDING



Source: PWCMoneyTree, CBRE Research, Q4 2018.
Note: 4-quarter rolling sum of Biotechnology, Drug Development, Drug Discovery, Disease Diagnosis, and Pharma/Drugs.

FIGURE 6: MORE LIFE SCIENCES GROWTH ON THE WAY; VC Funding Precedes Growth by About a Year



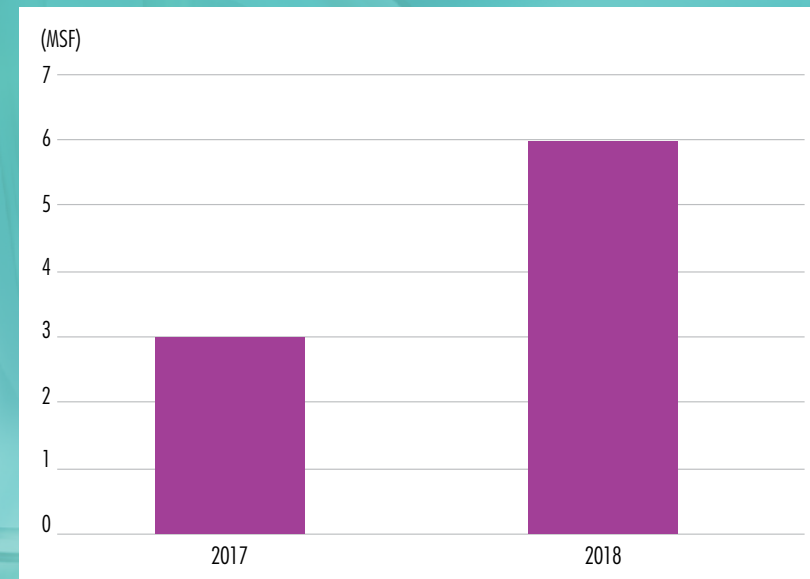
Source: U.S. BLS, CBRE Research, PWCMoneyTree, Q4 2018.
Note: Year-over-year changes in 4-quarter rolling sum of VC funding in Biotechnology, Drug Development, Drug Discovery, Disease Diagnosis, and Pharma/Drugs and 4-quarter average of Total Life Sciences Employment. Life Sciences Employment growth lagged by 4 quarters.

An abundance of capital allocated to the life sciences industry is helping fuel strong growth. The \$15.8 billion in annual life sciences venture capital funding through Q3 2018 was an 86% increase from the prior year. Though most of that funding was directed to companies in Massachusetts and California, capital allocated to companies in these states has waned over the past few years as investors seek greater opportunities elsewhere. About half of all funding is being allocated to biotechnology pursuits, clearly helping drive that subsector's astonishing growth.

The relationship between life sciences venture capital funding and employment growth is quite strong. As Figure 6 shows, new venture capital funding to the industry precedes increases in employment by about one year. Based on the recent surge in funding, employment should continue growing over the next year, supporting commercial real estate demand.

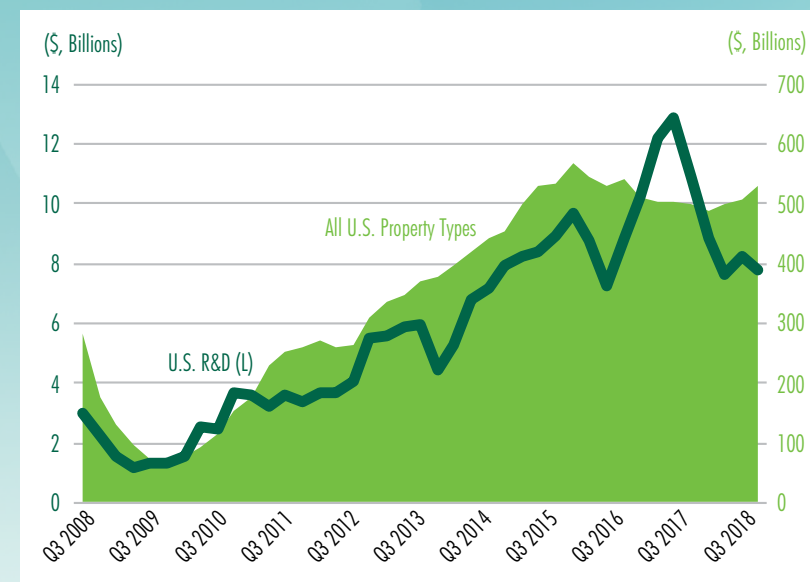
WHERE TALENT IS CONCENTRATED

FIGURE 7: SQ. FT. OF LIFE SCIENCES LABS UNDER CONSTRUCTION IN TOP-5 MARKETS



Source: CBRE Research, Q4 2018.
Note: Includes Boston-Cambridge, San Francisco Bay Area, San Diego, New Jersey and Raleigh-Durham.

FIGURE 8: U.S. PROPERTY SALES VOLUME



Source: Real Capital Analytics, Q4 2018.
Note: 4-quarter rolling sum.

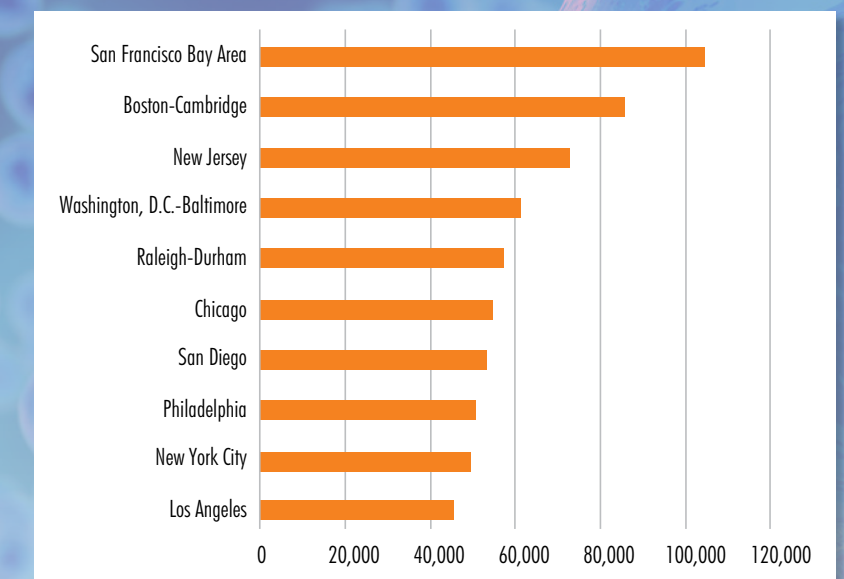
Current and anticipated life sciences employment growth is supporting ongoing construction of laboratory space in most markets. In the top-five life sciences markets, the amount of lab space under construction has jumped 101% in 2018 (Figure 7). Though the 6.0 million sq. ft. of lab space under construction is still a relatively small percentage of total office space under construction in these markets, the influence of labs on supply-and-demand dynamics is growing. Through Q3 2018 in the San Francisco Bay Area, 26% of all office demand came from life science tenants, but only 16% of current construction is lab space.

The strong employment growth and market fundamentals have attracted more investor interest in lab buildings. For the year ending Q3 2018, approximately \$7.8 billion in lab/R&D properties transacted, down from a surge of portfolio trades in 2016 and 2017, but still in line with record levels in all other property types. Pricing for lab/R&D properties, however, has been particularly strong. Over the past three years, cap rates for lab/R&D properties have been on par or below those of conventional offices, a trend opposite to most historical cap rate data.

Finding the best talent in today's market is challenging. Figure 9 shows where the largest pools of life sciences talent exist among U.S. markets, as defined by persons employed by life sciences companies. Focusing on the top-10 largest markets, the data shows the life sciences industry is highly concentrated in two main regions: the Northeast Corridor stretching from Boston-Cambridge to Washington, D.C., and California.

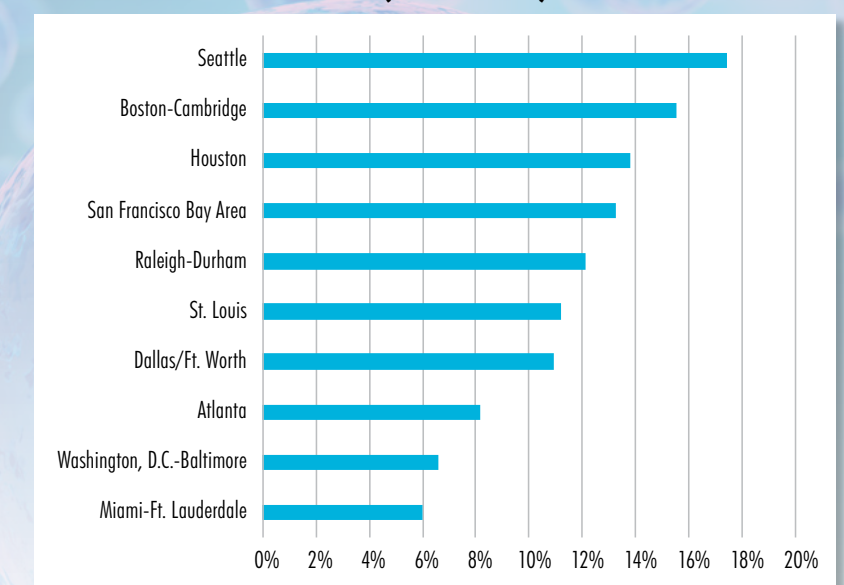
Most of the growth over the past three years has occurred in smaller life sciences markets like Seattle, Houston, St. Louis and Dallas/Ft. Worth. Nonetheless, these markets, which are a fraction of the size of Boston-Cambridge and the San Francisco Bay Area, have comparable recent growth, reflecting their remarkable strength.

FIGURE 9: LARGEST LIFE SCIENCES MARKETS BY EMPLOYEES



Source: U.S. BLS, CBRE Research, Q4 2018.
Footnote: Employment defined as the following NAICS categories Manufacturing (Pharmaceuticals and medicines (3254), Electromedical apparatus (334510), Analytical laboratory instruments (334516), Irradiation apparatuses (334517), Surgical and medical instruments (339112, 339113)), Medical, Diagnostic, and Testing laboratories (54138, 6215), and R&D in the physical, engineering, and life sciences (54171).

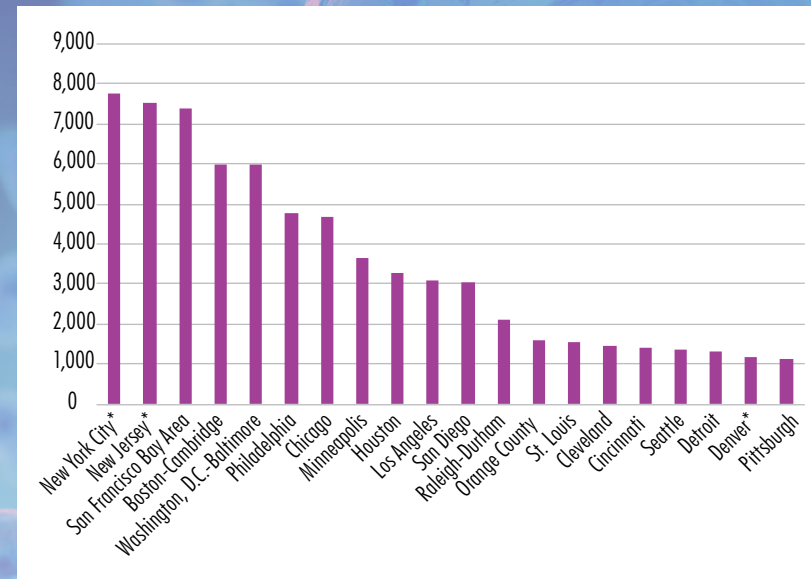
FIGURE 10: TOP-10 FASTEST-GROWING LIFE SCIENCES MARKETS (2014-2017)



Source: U.S. BLS, CBRE Research, Q4 2018.
Note: Change in Life Sciences Employment 2014-2017.

WHERE NEW TALENT CAN BE FOUND

FIGURE 11: KEY SCIENTISTS BY MARKET (NUMBER OF JOBS)
Biomedical Engineers, Biochemists, Biophysicists and Chemists by Market



Source: U.S. BLS, CBRE Research, Q4 2018.

*New York City data reflects entire New York MSA (including parts of Northern New Jersey); New Jersey data only reflects Newark Metro Division and Trenton MSA. Denver data does not include Boulder MSA, which would increase life sciences employment in this market significantly.

Beyond the broader definition of talent as persons employed by life sciences companies, an analysis of where key scientists—such as biomedical engineers, biochemists, biophysicists and chemists—are located is shown in Figure 11. From this perspective, not only is the talent more concentrated in the Northeast Corridor, but especially so in New York City and New Jersey. On the west coast, the San Francisco Bay Area is the clear locus of talent for key scientists fueling innovation in the industry.

The sources of new talent to the industry, measured by the quantity and quality of graduates in biological and biomedical sciences, demonstrates why some markets maintain a lead in the industry. Figure 12 reveals markets that may have greater demand for lab space because of unusually large talent pools being produced each year.

CBRE evaluates and ranks markets by various factors, including the size of the talent pool they produce, the level of expertise and sophistication in the graduates they produce (number of Ph.D.s), and the quality of academic institutions (as ranked by U.S. News & World Report). By these measures, many of the usual suspects rise to the top of the rankings: Northeast Corridor markets, California and Raleigh-Durham.

However, some major markets with smaller presence of the life sciences industry are creating a surprising amount of new talent each year, including Atlanta, Dallas/Ft. Worth, Sacramento and Pittsburgh. At the same time, some tertiary markets that are dominated by a major university have an impressive supply of talent, but only a minor life sciences presence. These markets include Ann Arbor, Michigan; Madison, Wisconsin and Columbus, Ohio.

FIGURE 12: TOP-20 MARKETS FOR NEW LIFE SCIENCES TALENT

Rank	Market	Biological & Biomedical Sciences Degrees in 2016-2017 Academic Year		Rankings of Biological Sciences (2018) Programs in Top 100	
		Total Graduates	Doctorates	In Top 10	In Top 100
1	Boston-Cambridge	4,359	408	2	5
2	San Francisco Bay Area	2,590	293	3	3
3	Washington, D.C.-Baltimore	4,539	351	1	5
4	New Jersey	2,911	138	1	3
5	New York City	4,608	382		8
6	Los Angeles	3,779	246	1	3
7	Raleigh-Durham	2,214	337	1	3
8	San Diego	2,719	114	1	2
9	Philadelphia	3,009	269		1
10	Atlanta	2,033	144		2
11	Dallas/Ft. Worth	2,120	129		2
12	Chicago	3,133	221		3
13	Houston	1,282	255		3
14	Minneapolis	1,877	108		1
15	Sacramento	1,884	151		1
16	Pittsburgh	1,243	101		2
17	Ann Arbor	1,213	124		1
18	Columbus	1,347	106		1
19	Denver	1,667	117		1
20	Madison WI	1,321	147		1

Source: Integrated Postsecondary Education Data System (IPEDS) (2016-2017), U.S. News & World Report (2018), CBRE Research, Q4 2018.

LEADING HEALTH SERVICES CLUSTERS

FIGURE 13: TOP TOTAL LIFE SCIENCES GRADUATES BY SCHOOL

Rank	Institution Name	Market	Total
16	University of California-San Diego	San Diego	1,870
18	University of California-Davis	Sacramento	1,591
18	University of California-Los Angeles	Los Angeles	1,529
na	University of South Florida-Main Campus	Tampa	1,370
18	University of Wisconsin-Madison	Madison, WI	1,321
39	University of Minnesota-Twin Cities	Minneapolis	1,296
23	University of Washington-Seattle Campus	Seattle	1,252
27	The University of Texas at Austin	Austin	1,186
73	University of Florida	Gainesville, FL	1,149
39	Ohio State University-Main Campus	Columbus	1,136
73	Rutgers University-New Brunswick	New Jersey	1,127
62	Texas A & M University-College Station	College Station, TX	1,099
1	University of California-Berkeley	San Francisco Bay Area	1,086
23	University of Michigan-Ann Arbor	Ann Arbor, MI	1,073
46	Michigan State University	Lansing-East Lansing, MI	1,067
33	University of Colorado Boulder	Denver	926
46	University of Arizona	Tucson, AZ	893
6	Johns Hopkins University	Washington, D.C. - Baltimore	891
85	Boston University	Boston-Cambridge	868
62	Arizona State University-Tempe	Phoenix	867

Source: Integrated Postsecondary Education Data System (IPEDS) (2016-2017), Q4 2018.

FIGURE 14: TOP LIFE SCIENCES DOCTORATES BY SCHOOL

Rank	Institution Name	Market	Doctors
6	Johns Hopkins University	Washington, D.C. - Baltimore	170
4	Harvard University	Boston-Cambridge	162
18	University of California-Davis	Sacramento	151
18	University of Wisconsin-Madison	Madison, WI	147
33	University of North Carolina at Chapel Hill	Raleigh-Durham	142
10	Duke University	Raleigh-Durham	140
18	University of California-Los Angeles	Los Angeles	139
23	University of Pennsylvania	Philadelphia	125
23	University of Michigan-Ann Arbor	Ann Arbor, MI	124
1	University of California-Berkeley	San Francisco Bay Area	123
73	University of Florida	Gainesville, FL	120
27	Vanderbilt University	Nashville	113
39	University of Minnesota-Twin Cities	Minneapolis	108
39	Ohio State University-Main Campus	Columbus	106
16	University of California-San Diego	San Diego	105
1	Stanford University	San Francisco Bay Area	102
23	University of Washington-Seattle Campus	Seattle	94
13	Washington University in St. Louis	St. Louis	94
73	University of Texas Health Science Center at Houston	Houston	92
18	Columbia University in the City of New York	New York City	91

Source: Integrated Postsecondary Education Data System (IPEDS) (2016-2017), Q4 2018.

This ranking, though helpful in evaluating markets on a broad basis for talent, obscures some significant sources of talent that can have a major impact on local market demand for lab space and industry presence. For example, the single greatest source of graduates in biomedical and biological sciences graduates in the nation, by a wide margin, is the University of California at San Diego.

Notably, the top-three schools are in California: University of California-Davis, University of California-Los Angeles and University of California-San Diego. Not one of the top-10 schools producing total graduates in biomedical and biological sciences is located along the Northeast Corridor. Finally, new sources of talent emerge that are far from traditional hubs of the industry, including in Tampa, Gainesville and Tucson.

However, evaluating markets solely on the supply of more sophisticated talent by measuring the number of Ph.D.s in biomedical and biological sciences shows a greater proportion of talent emanating from the Northeast Corridor, including Boston-Cambridge, Philadelphia and Washington, D.C.-Baltimore. In addition, the amount of Ph.D. talent supplied in Raleigh-Durham is impressive.

The relationship between life sciences innovation and the medical research institutions on the front lines of combating disease is more important than ever. The industry is clearly moving closer to where a significant amount of the innovation is occurring: the nation's leading medical research and health services institutions.

Evaluating which markets have a greater concentration of these institutions suggests they may have an edge in developing the next breakthroughs in the industry, and thus greater demand for lab space and other commercial real estate.

One of the more notable examples of this is Spark Therapeutics, which emerged from labs at Children's Hospital of Philadelphia and has become a significant source of demand for Class A office and lab space in Downtown Philadelphia. Another similar success story can be seen in Kite Pharma, a startup that originated out of the University of California, Los Angeles, and has grown to be a significant office and lab occupier in Los Angeles.

Consequently, CBRE has ranked the leading markets of medical research and health services institutions based on a combination of the quality, quantity and concentration of institutions, and the NIH funding they receive. The rankings were surprisingly high for Los Angeles and Philadelphia, but also revealed significant resources in smaller markets such as Cleveland, St. Louis, Pittsburgh and Columbus.

FIGURE 15: TOP RANKED MARKETS FOR MEDICAL RESEARCH & HEALTH SERVICES

Rank	Market	Hospitals as Ranked by U.S. News & World Report		Eds & Meds Concentration (% of Total Employment)	NIH Funding to Ranked Institutions (\$, Millions)
		# Ranked in Top 25	# Ranked in Top 100		
1	Boston-Cambridge	5	5	21.0%	1,189
2	Los Angeles	5	5	17.9%	802
3	New York City	1	4	20.5%	1,391
4	Philadelphia	1	4	22.0%	791
5	San Francisco Bay Area	2	3	14.8%	1,214
6	Cleveland	1	4	19.0%	295
7	St. Louis	2	2	18.3%	484
8	San Diego	1	4	14.1%	652
9	Pittsburgh	1	2	21.2%	575
10	Raleigh-Durham	0	2	15.4%	898
11	Seattle	1	2	13.3%	797
12	Houston	0	4	12.7%	509
13	Minneapolis	0	3	16.6%	269
14	Chicago	1	2	15.4%	396
15	Washington, D.C.-Baltimore	1	1	15.3%	663
16	Columbus	1	2	14.8%	169
17	Phoenix	0	3	15.1%	0
18	New Jersey	0	2	15.9%	0
19	Dallas/Ft. Worth	0	3	12.3%	181
20	Orange County	0	0	13.3%	0

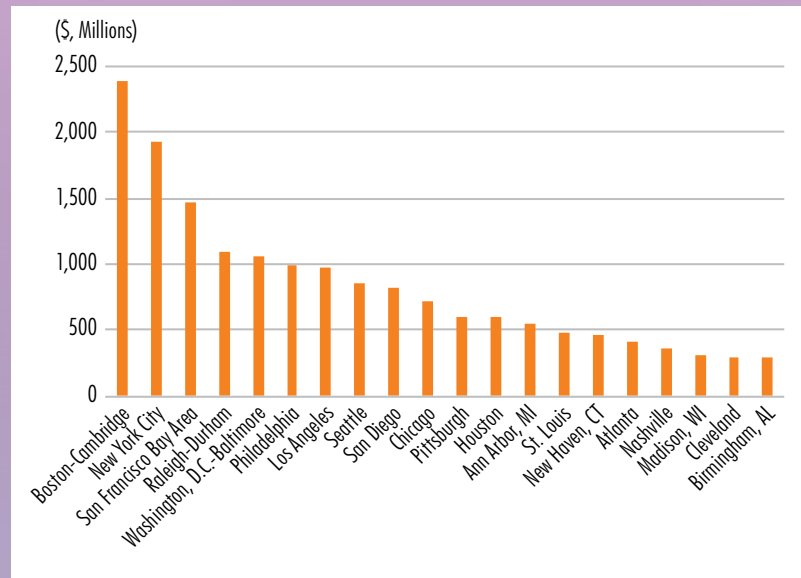
Source: U.S. News and World Report, NIH, U.S. BLS, CBRE Research, Q4 2018. Note: Markets filtered by minimum of three hospitals ranked in sum of top 25 and top 100, excluding 11 highlighted markets in this report.

NIH FUNDING

The Boston-Cambridge market once again attracted the nation's largest amount of funding from the National Institutes of Health (NIH) in 2018 at approximately \$2.4 billion. Nonetheless, New York City, the second largest recipient of funds (\$1.9 billion), is growing faster. Over the past 10 years, the amount of funding to New York City institutions grew by 52%, the fastest of any of the top-20 largest markets and far faster than the 26% increase for Boston-Cambridge institutions. The San Francisco Bay Area stands out as the primary destination for NIH funding on the west coast, though Los Angeles and San Diego are major recipients as well.

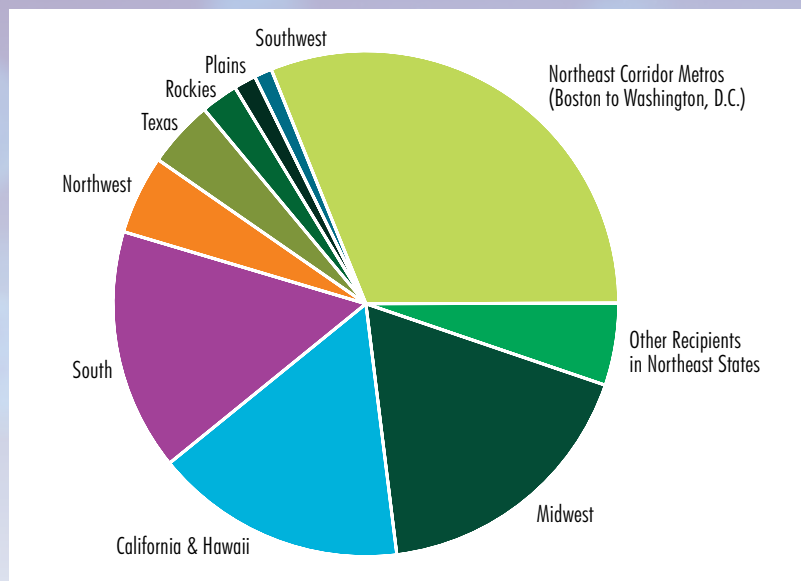
While there are various destinations for NIH funding around the country, Figure 17 shows the dominance of funding allocated to markets along Interstate 95 between Boston-Cambridge and Washington, D.C.-Baltimore, also known as the Northeast Corridor.

FIGURE 16: TOP-20 MARKETS FOR 2018 NIH FUNDING AMOUNTS ABOVE \$20 MILLION



Source: NIH, CBRE Research, Q4 2018.

FIGURE 17: 2018 NIH FUNDING BY U.S. REGION



Source: NIH, CBRE Research, Q4 2018.

FIGURE 18: TOP 2018 RECIPIENTS OF NIH FUNDING (\$, MILLIONS)

Institution	Funding	Market	State
Johns Hopkins University	\$663	Washington, D.C. - Baltimore	MD
University of California-San Francisco	\$640	San Francisco Bay Area	CA
University of Michigan-Ann Arbor	\$548	Ann Arbor	MI
University of Pittsburgh	\$534	Pittsburgh	PA
University of Pennsylvania	\$505	Philadelphia	PA
Stanford University	\$504	San Francisco Bay Area	CA
Washington University in St. Louis	\$484	St. Louis	MO
Massachusetts General Hospital	\$466	Boston-Cambridge	MA
Columbia University	\$464	New York City	NY
Duke University	\$460	Raleigh-Durham	NC
University of California-San Diego	\$457	San Diego	CA
Yale University	\$453	New Haven	CT
University of Washington	\$452	Seattle	WA
University of North Carolina at Chapel Hill	\$439	Raleigh-Durham	NC
University of California-Los Angeles	\$410	Los Angeles	CA
Brigham and Women's Hospital	\$389	Boston-Cambridge	MA
Emory University	\$331	Atlanta	GA
Icahn School of Medicine at Mount Sinai	\$331	New York City	NY
University of Wisconsin-Madison	\$316	Madison	WI
Fred Hutchinson Cancer Research Center	\$298	Seattle	WA

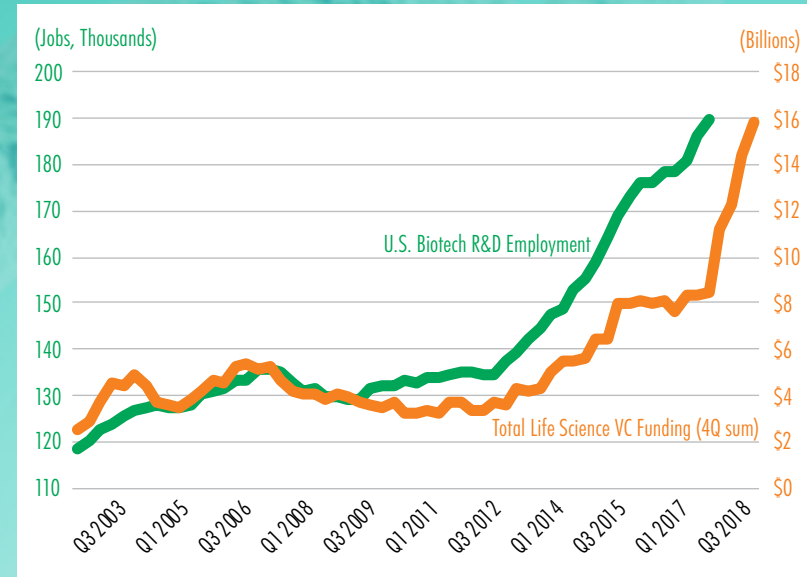
Source: NIH, Q4 2018.

Figure 18 shows the single-largest recipients of NIH funding in the country. Johns Hopkins in the Washington, D.C.-Baltimore market maintains its No. 1 rank, but most of its competitors are growing at a faster pace. On the west coast, the University of California-San Francisco attracts nearly as large a source of NIH funding as Johns Hopkins.

VENTURE CAPITAL FUNDING/IPOS

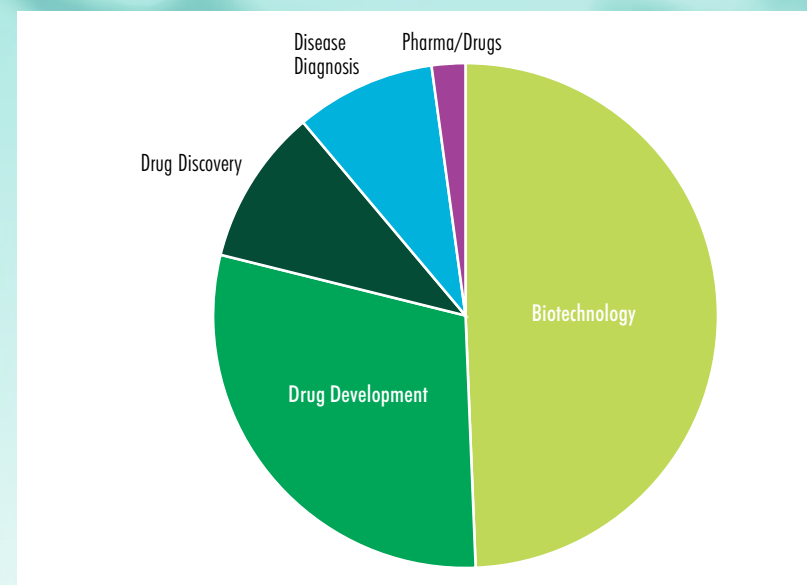
The amount of new venture capital to the life sciences industry over the past year has been staggering. Since the plentiful capital also correlates to future job growth in the industry, stronger hiring and demand for commercial real estate should occur over the next year. Most of this funding is being allocated to companies in Massachusetts and California (74%), but that share has dropped over the past two years as investors seek companies in new markets. Most of this funding is going to biotechnology (Figure 20).

FIGURE 19: U.S. BIOTECH R&D EMPLOYMENT (LAGGED 4 QTRS) & LIFE SCIENCES VENTURE CAPITAL FUNDING



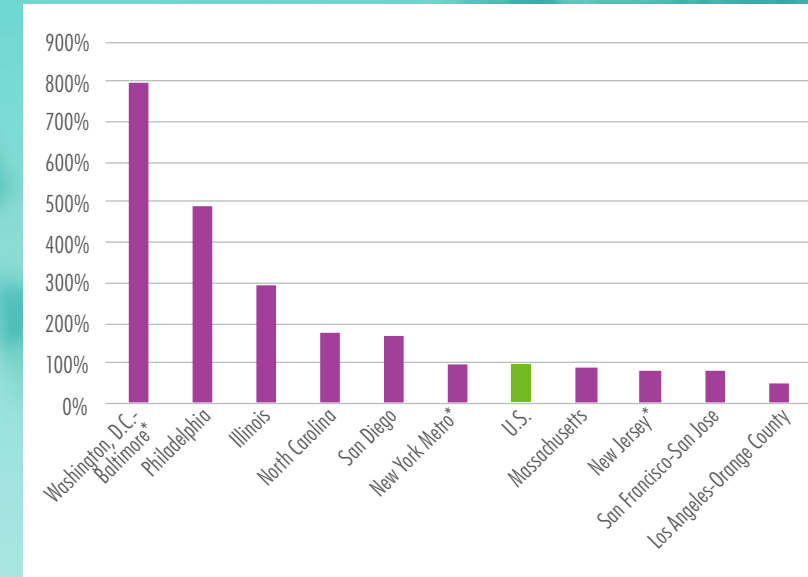
Sources: PWCMoneyTree Report, U.S. BLS, CBRE Research, Q4 2018.

FIGURE 20: COMPOSITION OF U.S. LIFE SCIENCES VENTURE CAPITAL FUNDING (4-QTRS ENDING Q3 2018)



Source: PWCMoneyTree Report, CBRE Research, Q4 2018.

FIGURE 21: 18-MONTH CHANGE IN LIFE SCIENCE VENTURE CAPITAL FUNDING BY MARKET (Q1 2017 - Q3 2018)

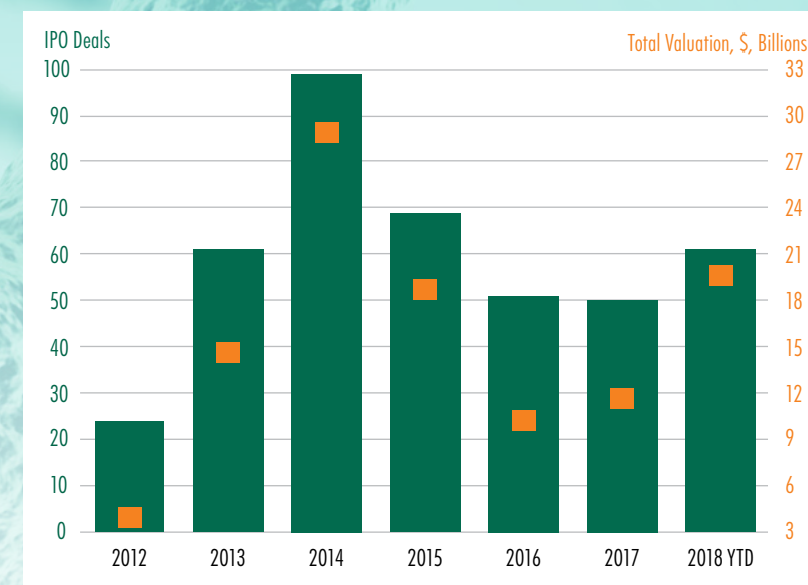


Source: PWCMoneyTree, CBRE Research, Q4 2018.

Note: 4-quarter rolling sum.

*Washington, D.C.-Baltimore data covers Washington, D.C., Maryland, Virginia and West Virginia. New York Metro data covers the New York City MSA including northern New Jersey and Fairfield County, Connecticut. New Jersey data covers the entire state.

FIGURE 22: LIFE SCIENCES IPO DEALS & VALUE (THROUGH SEPTEMBER 2018)



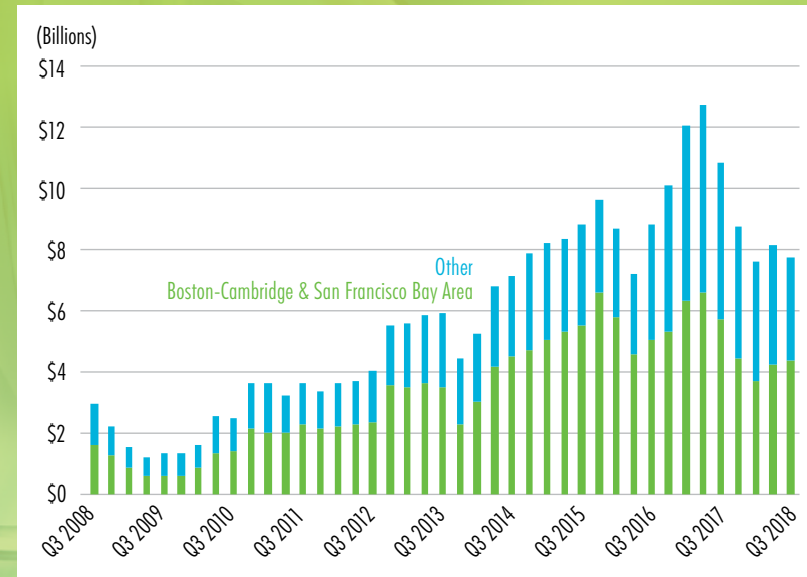
Source: CBInsights, CBRE Research, Q4 2018.

A few notable markets have been the beneficiaries of life sciences investors seeking more opportunities. The largest has been the Washington, D.C.-Baltimore market, which has seen venture capital funding jump by nearly ninefold within the past 18 months. Philadelphia, Chicago, Raleigh-Durham and San Diego also had impressive gains in attracting venture capital over the past 18 months.

Another significant source of capital to life sciences expansion is initial public offerings (IPOs) of shares in life science companies. The two largest IPOs in 2018 were also two of the largest recipients of venture capital funding: Moderna Therapeutics (Boston-Cambridge) and Allogene Therapeutics (San Francisco Bay Area).

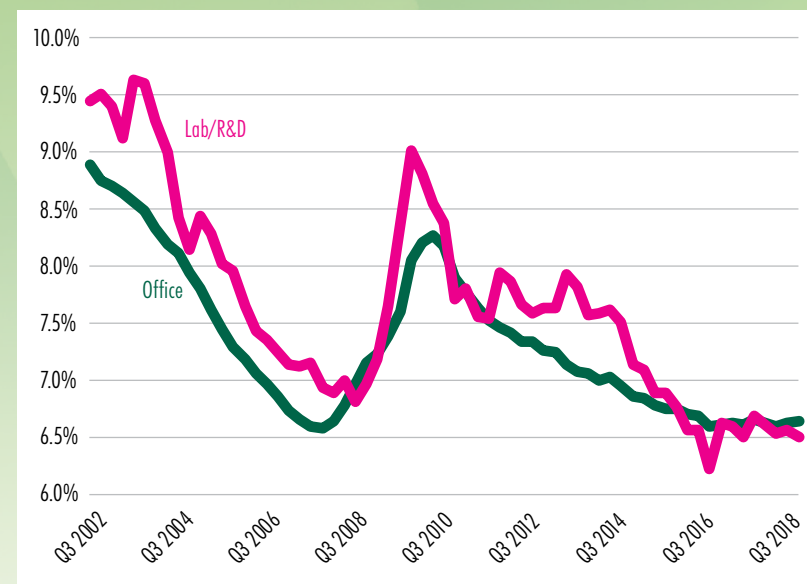
CAPITAL MARKETS/INVESTMENT

FIGURE 23: U.S. LAB/R&D PROPERTY SALES VOLUME BY MARKET



Source: Real Capital Analytics, CBRE Research, Q4 2018.
Note: 4-quarter rolling sum.

FIGURE 24: U.S. CAP RATES BY PROPERTY TYPE



Source: Real Capital Analytics, CBRE Research, Q4 2018.

The expansion of the industry and its growing role as a source of office demand (26% of all demand in the San Francisco Bay Area in 2018 through Q3) not surprisingly has caught the attention of commercial real estate investors. However, most of the investment activity has taken place in the San Francisco Bay Area and Boston-Cambridge. The players fueling the top deals generally are institutional investment managers, private equity, a select number of REITs and several owner-occupants.

Pricing for deals has been impressive. As shown in Figure 24, cap rates for lab/R&D facilities are not only lower than they've ever been, but for the first time on record for a sustained period are lower than conventional offices.

2019 Leading U.S. Life Sciences Clusters

BOSTON-CAMBRIDGE

HOT TOPICS

The No. 1 life sciences cluster in the U.S. is growing as fast as ever. Between 2014 and 2017, the Boston-Cambridge market grew faster than any other major life sciences cluster. The region's unparalleled educational institutions, abundance of available funding and top-rated talent have this market well-positioned for continued growth.

Low single-digit vacancies and rapidly rising rents in Kendall Square, the preeminent center of the local life sciences industry, are pushing demand to the Seaport, Somerville and the suburbs. Cambridge lab vacancy fell by 40 basis points over the past year as average rents rose 22%. Over the same time, demand for lab space has more than doubled, largely driven by companies involved in gene therapy, oncology, pharmaceuticals and biotechnology.

Developers are struggling to keep up with demand, despite a near tripling of new construction and office-to-lab conversions over the past year. The recent, considerable uptick in VC funding suggests that market conditions will remain tight over the next year.

QUICK STATS

Lab Market Stats, YE 2018

	Inventory	Vacancy Rate	Avg Asking Rent (NNN)	Demand	Inventory
Boston	8,021,818	2.5%	\$81.34	Number of Tenant Lab Requirements	60
Cambridge	13,641,908	1.7%	\$86.45	Total Sq. Ft. of Lab Requirements	3,900,000
Route 128 - Core	5,493,449	9.3%	\$45.34		
Route 495 - Core	2,728,705	10.4%	\$25.41		
Total (Core Submarkets)	29,885,880	4.1%	\$69.14		

Construction

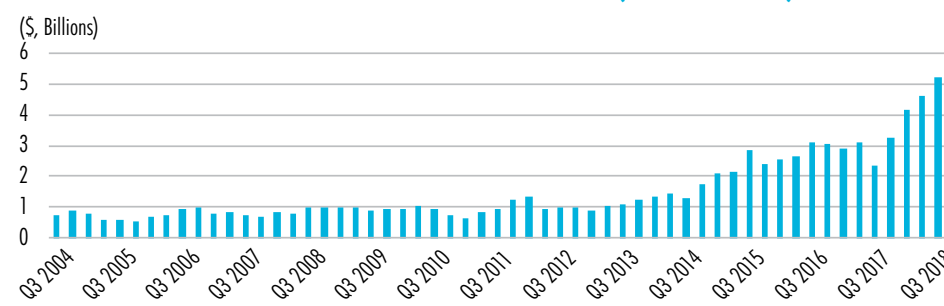
	Submarket	Developer	Sq. Ft.	Notes
250 Dawes Street	East Cambridge	DivcoWest	470,000	Spec; Delivery 2021
250 North Street	East Cambridge	DivcoWest	430,000	Delivery 2019
238 Main Street	East Cambridge	MITIMCo	381,420	Spec; Delivery 2021
Cambridge Discovery Park	West Cambridge	Bulfinch	250,000	Spec; Delivery 2020
75 Hayden Avenue	Route 128 West	King Street Properties/HCP	200,000	Spec
828 Winter Street	Route 128 West	King Street/Morgan Stanley	144,000	Spec

Significant Lease Deals, 2018

	Submarket	Sq. Ft.	Type
Sanofi	East Cambridge	501,000	New, HQ relocation; Another 401,000 sq. ft. of conventional office
Takeda	East Cambridge	407,000	Renewal
Merck	East Cambridge	96,000	Expansion
Sarepta Therapeutics	East Cambridge	152,000	Expansion
Generation Bio	East Cambridge	72,000	New

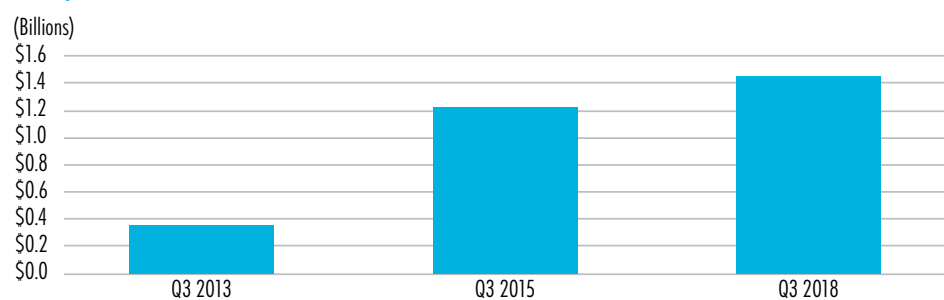
Source: CBRE Research, Q4 2018.

LIFE SCIENCES VENTURE CAPITAL FUNDING (Massachusetts)



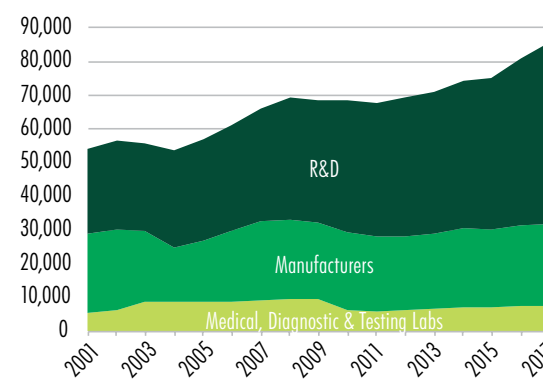
Source: PWCMoneyTree (BioTech, Drug Development & Discovery, Pharma/Drugs, Disease Diagnosis), CBRE Research, Q4 2018.

LAB/R&D PROPERTY SALES VOLUME



Source: Real Capital Analytics, Q4 2018. Note: Annual sales figures of R&D properties.

LIFE SCIENCES EMPLOYMENT



TALENT

Biomedical Engineers, Biochemists & Biophysicists, and Chemists

Rank	Market	Total	% of Tot Emp
1	New York City	7,770	0.10%
2	New Jersey	7,540	0.54%
3	San Francisco Bay Area	7,400	0.21%
4	Boston-Cambridge	5,980	0.23%
5	Washington, D.C.-Baltimore	5,980	0.13%
6	Philadelphia	4,760	0.17%
7	Chicago	4,670	0.10%
8	Minneapolis	3,630	0.19%
9	Houston	3,280	0.11%
10	Los Angeles	3,070	0.07%
11	San Diego	3,060	0.21%
12	Raleigh-Durham	2,110	0.23%
13	Orange County	1,620	0.10%
14	St. Louis	1,570	0.12%
15	Cleveland	1,440	0.14%
16	Cincinnati	1,390	0.13%
17	Seattle	1,350	0.07%
18	Detroit	1,330	0.07%
19	Denver	1,170	0.08%
20	Pittsburgh	1,140	0.10%

Source: U.S. BLS, CBRE Research, Q4 2018.

SOURCES OF NEW TALENT

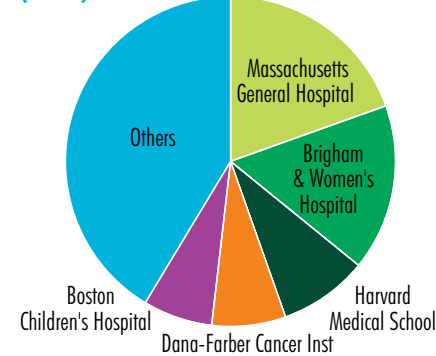
Biological and Biomedical Sciences Degree Graduates (2017)

School Rank	Institution Name	Drs	Total
4	Harvard University	162	595
85	Boston University	87	868
1	Massachusetts Institute of Technology	64	168
73	Tufts University	41	361
54	Brandeis University	18	306

Source: IPEDS, U.S. News & World Report, CBRE Research, Q4 2018.

NIH FUNDING RECIPIENTS

Boston-Cambridge #1 in nation: \$2.4 billion (2018)



Source: NIH, CBRE Research, Q4 2018.

SAN FRANCISCO BAY AREA

HOT TOPICS

The nation's No. 2 life sciences cluster has grown at a far greater rate than most markets in the country, reflected by increased construction activity along the Peninsula. Between 2014 and 2017, San Francisco Bay Area life sciences employment jumped 13.3%, much faster than the 2.9% national average and behind only Boston-Cambridge.

Lab vacancy below 2% in primary submarkets has pushed rents 10% higher over the past year in sought-after submarkets like the North Peninsula, which includes booming South San Francisco—the "Birthplace of Biotech." Major projects like the Gateway of Pacific and the Alexandria Science/Tech Park provide a much-needed pipeline of new space for tenants.

A record \$4.9 billion in venture capital funding for the Bay Area life sciences industry, as well as an active IPO market, likely will keep market fundamentals very tight in the Bay Area. At the same time, large high-tech companies are crowding out life sciences companies in other submarkets, causing firms to migrate south from San Francisco and north from Silicon Valley to the already-tight Peninsula.

QUICK STATS

Lab Market Stats, YE 2018

	Inventory	Vacancy Rate	Avg Asking Rent (NNN)	Demand	Inventory
North Peninsula	13,801,952	2.0%	\$63.60	Number of Tenant Lab Requirements	60
Mid Peninsula	3,834,610	0.2%	\$57.00	Total Sq. Ft. of Lab Requirements	2,100,000
South Peninsula	3,478,523	1.3%	\$57.00		
Emeryville/Berkeley	3,280,884	3.9%	\$52.50		
Hayward/Union City	1,549,687	6.0%	\$36.00		
Fremont	2,241,976	0.4%	\$40.50		
Total (Core Submarkets)	28,187,632	2.0%	\$57.15		

Construction

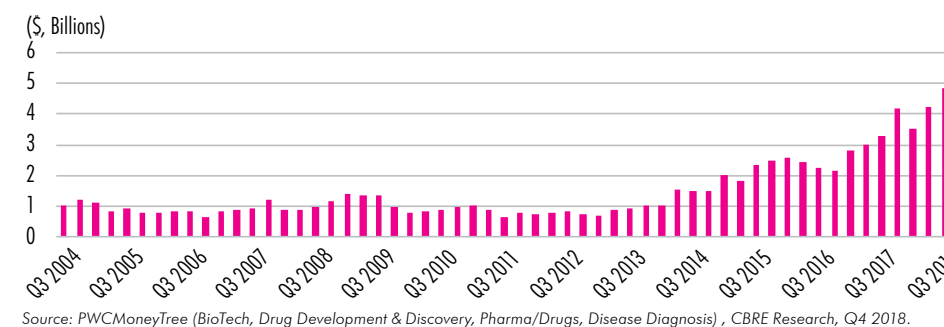
	Submarket	Developer	Sq. Ft.	Notes
Sierra Point I	Brisbane	HCP	250,000	50% pre-leased
Alexandria Science/Tech Park	South San Francisco	ARE	214,000	
Gateway of Pacific Phase I	South San Francisco	BMR	530,000	
Genesis SSF Tower 2	South San Francisco	Phase 3	400,000	
213 East Grand (Merck)	South San Francisco	ARE	294,000	
Oyster Point Phase I	South San Francisco	Kilroy	600,000	
The Cove Phase IV	South San Francisco	HCP	165,000	

Significant Lease Deals, 2018

	Submarket	Sq. Ft.	Type
Abbvie	South San Francisco	479,000	New
Global Blood Therapeutics	South San Francisco	164,150	New
Denali Therapeutics	South San Francisco	148,020	New

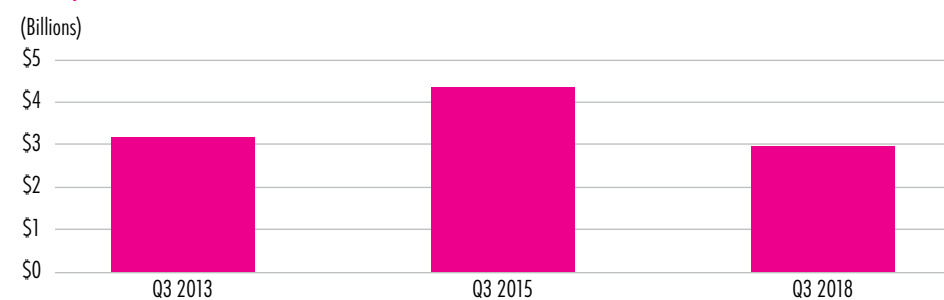
Source: CBRE Research, Q4 2018.

LIFE SCIENCES VENTURE CAPITAL FUNDING



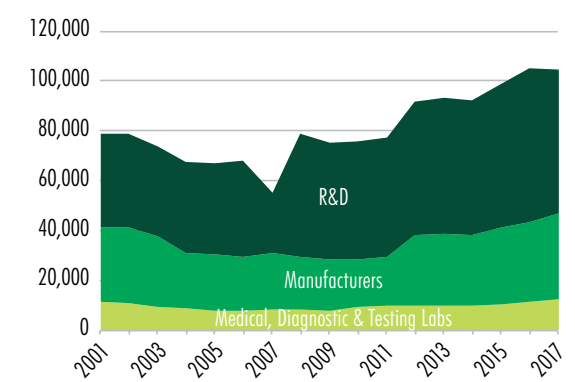
Source: PWCMoneyTree (BioTech, Drug Development & Discovery, Pharma/Drugs, Disease Diagnosis), CBRE Research, Q4 2018.

LAB/R&D PROPERTY SALES VOLUME



Source: Real Capital Analytics, Q4 2018. Note: Annual sales figures of R&D properties.

LIFE SCIENCES EMPLOYMENT



TALENT

Biomedical Engineers, Biochemists & Biophysicists, and Chemists

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Source: U.S. BLS, CBRE Research, Q4 2018.

SOURCES OF NEW TALENT

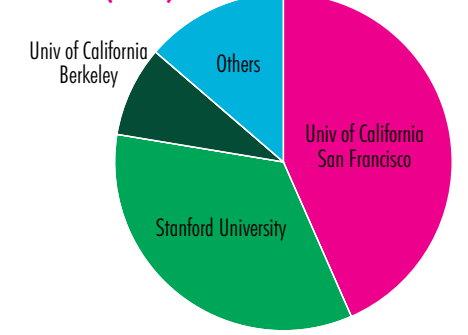
Biological and Biomedical Sciences Degree Graduates (2017)

School Rank	Institution Name	Drs	Total
1	University of California-Berkeley	123	1,086
1	Stanford University	102	224
6	University of California-San Francisco	68	77
na	San Francisco State University	0	454

Source: IPEDS, U.S. News & World Report, CBRE Research, Q4 2018.

NIH FUNDING RECIPIENTS

San Francisco Bay Area #3 in nation: \$1.5 billion (2018)



Source: NIH, CBRE Research, Q4 2018.

SAN DIEGO

HOT TOPICS

The nation's third-ranked life sciences cluster remains as vibrant and sought-after as ever. Life sciences employment is at a record level, while a surge of venture-capital funding to local companies in 2018 should equate to more growth in 2019. With demand for lab space increasing over the past year, commercial real estate fundamentals are expected to remain very tight.

A limited supply of new lab space has caused exceedingly low vacancy and record-high rents, particularly in Torrey Pines and University Towne Center (UTC). Over the past year, average asking rents for lab space in Torrey Pines and UTC have grown 8% and 6%, respectively. Asking rents in Sorrento Mesa and Sorrento Valley are also at, or near, a record.

Surging venture capital funding in 2018 for local life sciences companies should translate into increased hiring and demand for space in 2019. Providing a healthy pipeline of talent for expanding companies and underscoring an optimistic outlook for the local industry, the University of California, San Diego (UCSD) graduates more students in biomedical and biological sciences than any institution in the U.S. and is the nation's 16th-ranked program.

QUICK STATS

Lab Market Stats, YE 2018

	Inventory	Vacancy Rate	Avg Asking Rent (NNN)	Demand	Inventory
Torrey Pines	5,873,551	6.5%	\$51.72	Number of Tenant Lab Requirements	33
University Towne Center	3,367,010	4.8%	\$48.36	Total Sq. Ft. of Lab Requirements	1,300,000
Sorrento Mesa	4,470,277	6.8%	\$39.96		
Sorrento Valley	1,220,775	10%	\$39.96		
Total (Core Submarkets)	14,931,613	6.4%	\$46.93		

Construction

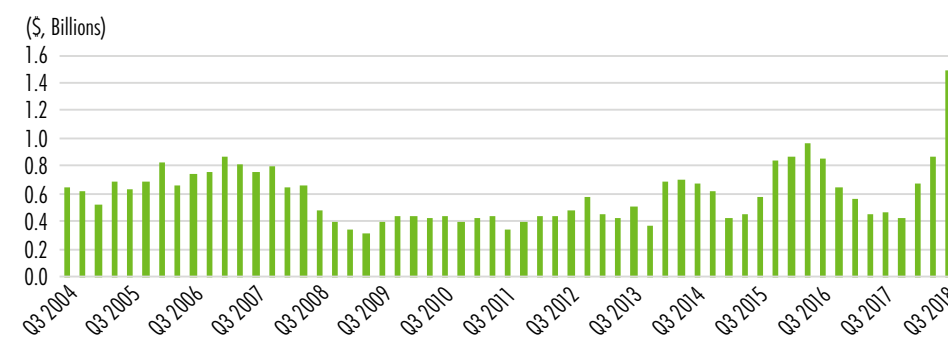
	Submarket	Developer	Sq. Ft.	Notes
The Borough	UTC	Alexandria	165,000	Takeda Build-to-suit
Center for Novel Therapeutics	UTC	UCSD/Biomed	137,500	50% pre-leased to UCSD
GradLabs	UTC	Alexandria	113,721	Q4 2019 Delivery

Significant Lease Deals, 2018

	Submarket	Sq. Ft.	Type
Trilink/Maravai	Sorrento Mesa	100,000	New
Pacira	Torrey Pines	84,358	Renewal
Samumed	UTC	73,893	New
Sorrento Therapeutics	Sorrento Mesa	61,207	New
Genopis	Sorrento Mesa	68,536	New

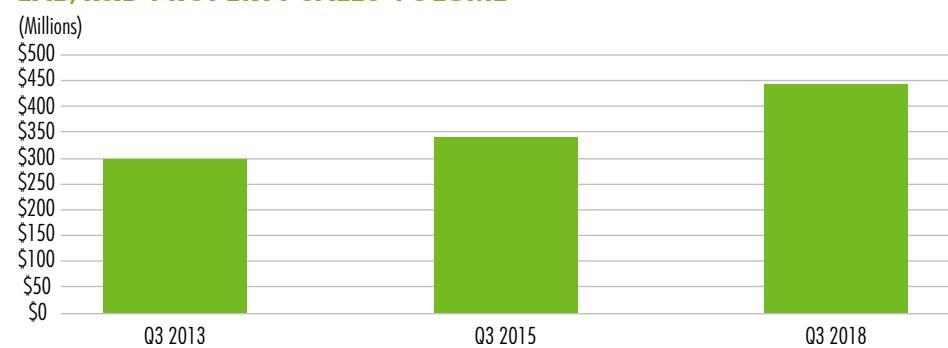
Source: CBRE Research, Q4 2018.

LIFE SCIENCES VENTURE CAPITAL FUNDING



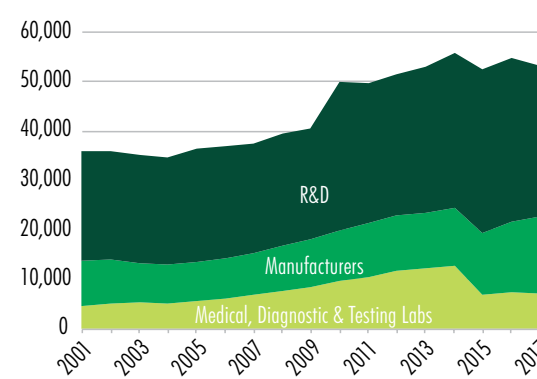
Source: PWCMoneyTree (BioTech, Drug Development & Discovery, Pharma/Drugs, Disease Diagnosis), CBRE Research, Q4 2018.

LAB/R&D PROPERTY SALES VOLUME



Source: Real Capital Analytics, Q4 2018. Note: Annual sales figures of R&D properties.

LIFE SCIENCES EMPLOYMENT



TALENT

Biomedical Engineers, Biochemists & Biophysicists, and Chemists

Rank	Market	Total	% of Tot Emp
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18	Detroit	1,330	0.07%
19	Denver	1,170	0.08%
20	Pittsburgh	1,140	0.10%

Source: U.S. BLS, CBRE Research, Q4 2018.

SOURCES OF NEW TALENT

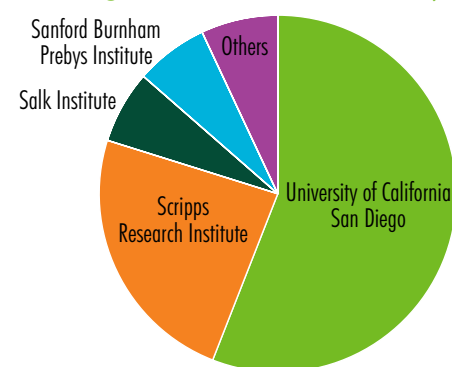
Biological and Biomedical Sciences Degree Graduates (2017)

School Rank	Institution Name	Drs	Total
16	University of California-San Diego	105	1,870
na	San Diego State University	9	334
na	California State University-San Marcos	0	283
na	University of San Diego	0	177

Source: IPEDS, U.S. News & World Report, CBRE Research, Q4 2018.

NIH FUNDING RECIPIENTS

San Diego #9 in nation: \$817 million (2018)



Source: NIH, CBRE Research, Q4 2018.

NEW JERSEY

HOT TOPICS

New Jersey ranks fourth among top life sciences clusters in the U.S. due to the significant size of its 18.2 million sq. ft. lab inventory and its deep talent pool (No. 2 of all markets for key life scientists). The local life sciences industry has revived its growth over the past several years, with life sciences employment growth of 3.7% exceeding the national average of 2.9% between 2014 and 2017.

Increased demand for lab space is being driven by companies involved in gene therapy, cell therapy, oncology, clinical trials and manufacturing. With diminishing supply, vacancy has dropped significantly over the past year. Continued strong demand likely will result in a tighter market for lab space in 2019.

Local industry will be monitoring any potential changes to the NJEDA Incentive programs, especially with the GrowNJ program, under the new Murphy administration. The pending sale of the New Jersey Center of Excellence campus in Bridgewater will provide valuable insight into how life sciences-focused investors view the New Jersey market.

QUICK STATS

Lab Market Stats, YE 2018

	Inventory	Vacancy Rate	Avg Asking Rent (NNN)	Demand	Inventory
New Jersey	18,200,000	8.6%	\$21.00	Number of Tenant Lab Requirements	15
				Total Sq. Ft. of Lab Requirements	425,000

Construction

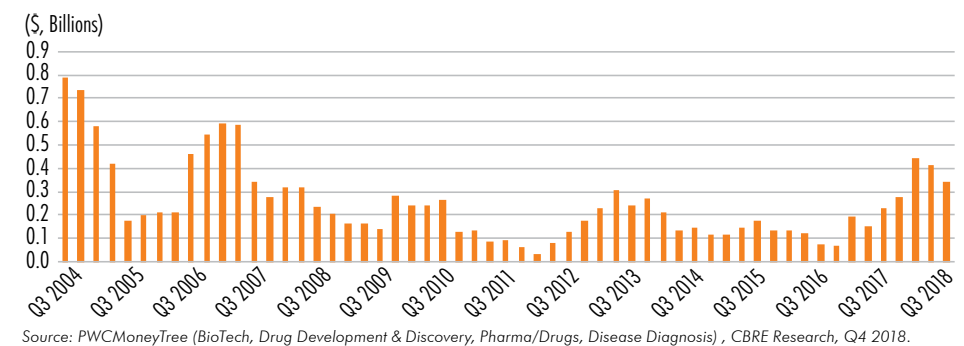
	Submarket	Developer	Sq. Ft.	Notes
95 Greene Street	Jersey City	SJP	338,000	Renovation of 8 floors
ON3 R&D Campus	Nutley	Prism	250,000	Two buildings - planned

Significant Lease Deals, 2018

	Submarket	Sq. Ft.	Type
Quest Diagnostics	Nutley	250,000	Relocation/Expansion
Rocket Pharma	Cranbury	102,000	New
Celgene	Warren	107,000	New
Concours Pharmaceuticals	Ewing	23,000	New

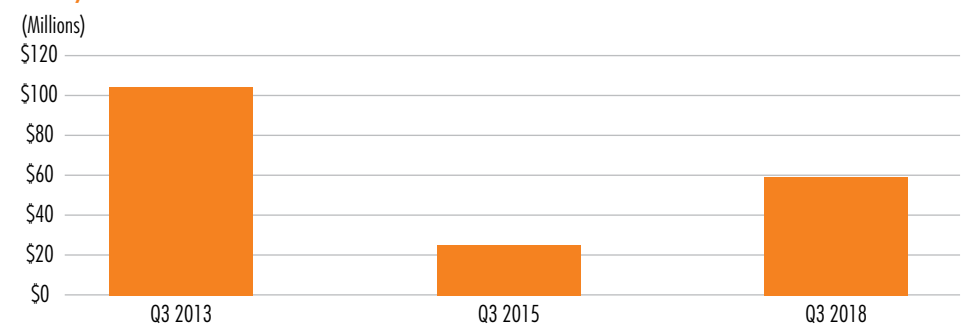
Source: CBRE Research, Q4 2018.

LIFE SCIENCES VENTURE CAPITAL FUNDING



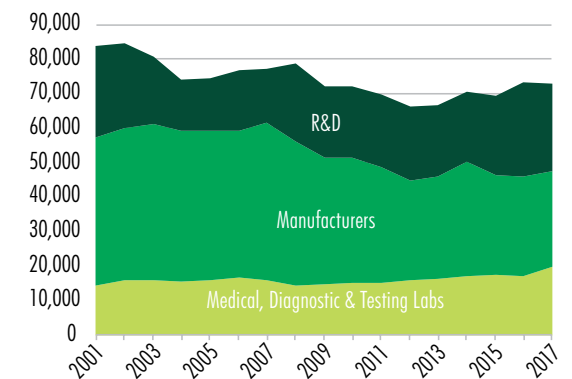
Source: PWCMoneyTree (BioTech, Drug Development & Discovery, Pharma/Drugs, Disease Diagnosis), CBRE Research, Q4 2018.

LAB/R&D PROPERTY SALES VOLUME



Source: Real Capital Analytics, Q4 2018. Note: Annual sales figures of R&D properties. ¹New York-Newark-Jersey City NY-NJ-PA MSA, ²Newark Metropolitan Division and Trenton MSA only.

LIFE SCIENCES EMPLOYMENT



TALENT

Biomedical Engineers, Biochemists & Biophysicists, and Chemists

Rank	Market	Total	% of Tot Emp
1	New York City ¹	7,770	0.10%
2	New Jersey ²	7,540	0.54%
3	San Francisco Bay Area	7,400	0.21%
4	Boston-Cambridge	5,980	0.23%
5	Washington, D.C.-Baltimore	5,980	0.13%
6	Philadelphia	4,760	0.17%
7	Chicago	4,670	0.10%
8	Minneapolis	3,630	0.19%
9	Houston	3,280	0.11%
10	Los Angeles	3,070	0.07%
11	San Diego	3,060	0.21%
12	Raleigh-Durham	2,110	0.23%
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16	Cincinnati	1,390	0.13%
17	Seattle	1,350	0.07%
18	Detroit	1,330	0.07%
19	Denver	1,170	0.08%
20	Pittsburgh	1,140	0.10%

Source: U.S. BLS, CBRE Research, Q4 2018.

SOURCES OF NEW TALENT

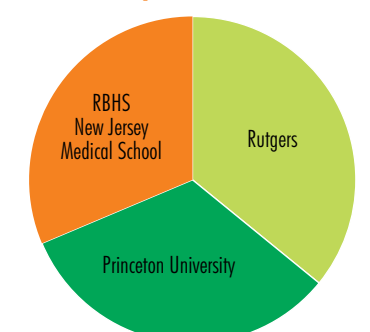
Biological and Biomedical Sciences Degree Graduates (2017)

School Rank	Institution Name	Drs	Total
73	Rutgers University-New Brunswick	85	1,127
6	Princeton University	38	205
90	Rutgers University-Newark	6	121
na	Seton Hall University	5	166

Source: IPEDS, U.S. News & World Report, CBRE Research, Q4 2018.

NIH FUNDING RECIPIENTS

New Jersey #35 in nation: \$149 million (2018)



Source: NIH, CBRE Research, Q4 2018.

RALEIGH-DURHAM

HOT TOPICS

The Raleigh-Durham market, with Research Triangle Park as its traditional hub and a growing, dynamic Durham submarket, is the fifth-ranked life sciences cluster in the nation. The region benefits from an abundance of life sciences talent and a disproportionate amount of NIH funding compared to other regions.

Demand and a limited supply of new lab space have pushed average rents 15% higher over the past year and driven vacancy down by more than 3 percentage points. Major occupiers seeking space include gene-therapy companies, contract research and manufacturing organizations, and crop-science companies.

The major trend impacting the Raleigh-Durham lab market is the redevelopment of major research campuses. Alexandria is redeveloping the Syngenta campus, while Karlin is redeveloping former GSK, DuPont and Reichold campuses—all in Research Triangle Park.

Raleigh-Durham life sciences employment has grown the third-fastest among major markets over the past three years at 12.1%, just behind Boston-Cambridge and the San Francisco Bay Area. This growth demonstrates the amount of momentum in the local industry, especially with a recent surge in venture capital funding.

QUICK STATS

Lab Market Stats, YE 2018

	Inventory	Vacancy Rate	Avg Asking Rent (NNN)	Demand	Inventory
Research Triangle Park	2,825,583	28.1%	\$23.24	Number of Tenant Lab Requirements	16
Durham	954,000	1.7%	\$30.00		
Raleigh	334,309	29.3%	\$22.57	Total Sq. Ft. of Lab Requirements	655,000
Total (Core Submarkets)	4,113,892	22.1%	\$24.75		

Construction

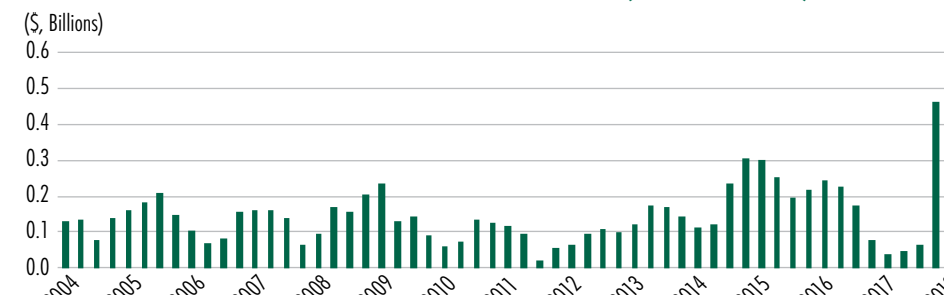
	Submarket	Developer	Sq. Ft.	Notes
Syngenta Campus	RTP/I-40 Corridor	ARE	155,000	Renovation
Biopoint	RTP/I-40 Corridor	Longfellow	143,000	Renovation
2400 Ellis Road	RTP/I-40 Corridor	Karlin	332,000	Renovation
Parmer 14	RTP/I-40 Corridor	Karlin	276,000	Renovation

Significant Lease Deals, 2018

	Submarket	Sq. Ft.	Type
KBI Pharma	RTP/I-40 Corridor	60,000	New
Pairwise	Central Durham	38,000	New
Ask Bio	RTP/I-40 Corridor	36,000	New

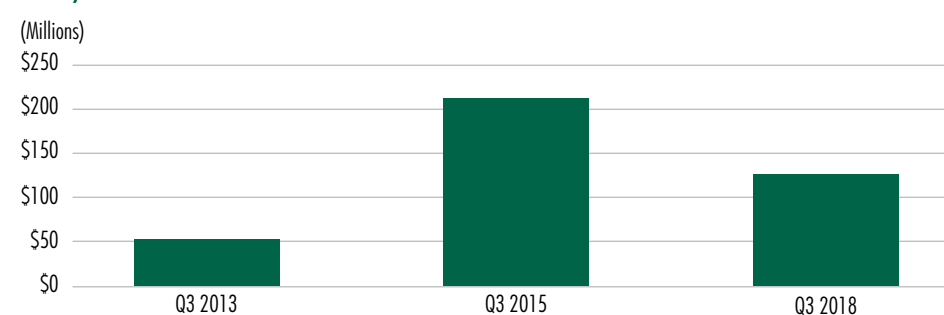
Source: CBRE Research, Q4 2018.

LIFE SCIENCES VENTURE CAPITAL FUNDING (North Carolina)



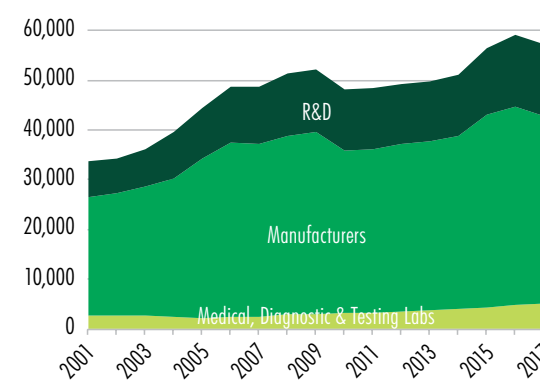
Source: PWCMoneyTree (BioTech, Drug Development & Discovery, Pharma/Drugs, Disease Diagnosis), CBRE Research, Q4 2018.

LAB/R&D PROPERTY SALES VOLUME



Source: Real Capital Analytics, Q4 2018. Note: Annual sales figures of R&D properties.

LIFE SCIENCES EMPLOYMENT



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Source: U.S. BLS, CBRE Research, Q4 2018.

SOURCES OF NEW TALENT

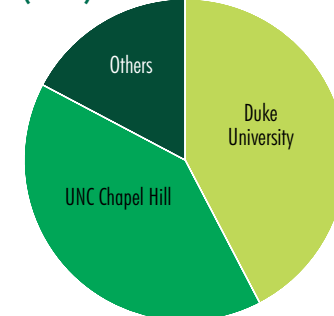
Biological and Biomedical Sciences Degree Graduates (2017)

School Rank	Institution Name	Drs	Total
33	University of North Carolina at Chapel Hill	142	735
10	Duke University	140	589
85	North Carolina State University	52	728

Source: IPEDS, U.S. News & World Report, CBRE Research, Q4 2018.

NIH FUNDING RECIPIENTS

Raleigh-Durham #4 in nation: \$1.1 billion (2018)



Source: NIH, CBRE Research, Q4 2018.

WASHINGTON, D.C. - BALTIMORE

HOT TOPICS

Washington, D.C.-Baltimore, ranked sixth in the country, had unprecedented growth in the biotech sector last year.

The region had the largest percentage increase in life sciences venture-capital funding over the past 18 months of any major market in the country, mostly to biotech companies. Major investments were made in Viela Bio, NextCure and Personal Genome Diagnostics.

Lab vacancy dropped by nearly 3 percentage points over the past year to 3.3%. Average asking rents rose 3.1% overall, but those for higher-quality spaces have jumped by an estimated 20%. The dearth of supply in the near-term likely will keep availability tight and rents relatively high.

Landlords have increasingly capitalized on positive market fundamentals by converting offices to lab space. However, Alexandria Real Estate Equities' upcoming construction of a new 175,000-sq.-ft. Class A lab building in Rockville, which is 75% preleased to RegenxBio, could pave the way for more lab development.

QUICK STATS

Lab Market Stats, YE 2018

	Inventory	Vacancy Rate	Avg Asking Rent (NNN)	Demand	Inventory
Suburban Washington, D.C.	6,124,475	2.9%	\$32.25	Number of Tenant Lab Requirements	14
Baltimore	1,675,756	4.7%	\$33.00		
Total	7,800,231	3.3%	\$32.41	Total Sq. Ft. of Lab Requirements	600,000

Construction

No construction of lab space as of YE 2018

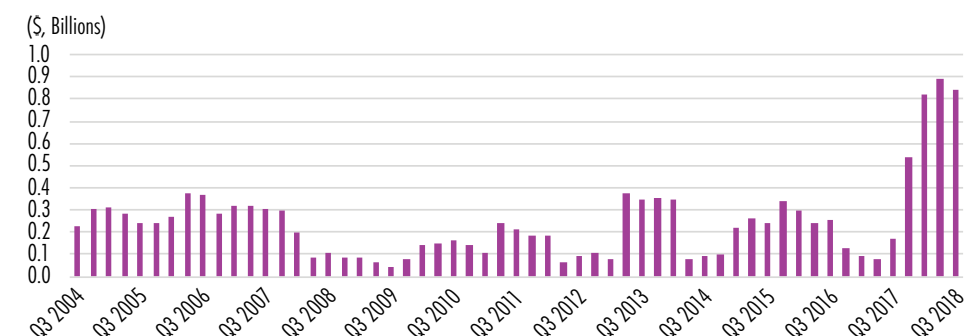
Significant Lease Deals, 2018

	Submarket	Sq. Ft.	Type
ReGenxBio	Gaithersburg	135,000	New
Supernus*	Rockville	118,000	New
VyGene	Rockville	40,000	New

Source: CBRE Research, Q4 2018.

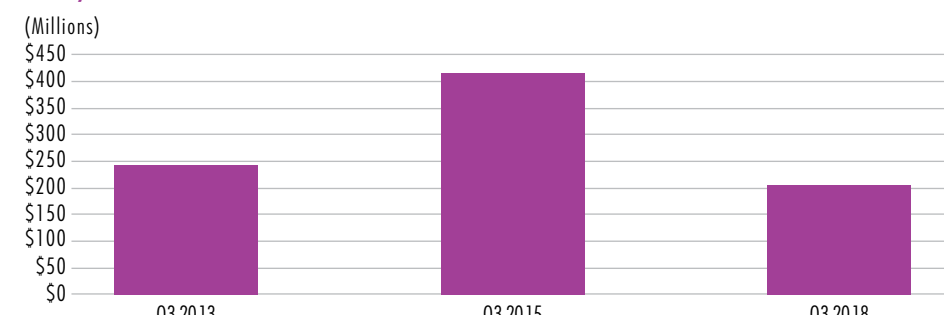
*Unexpected termination at the time of publication.

LIFE SCIENCES VENTURE CAPITAL FUNDING¹



Source: PWCMoneyTree (BioTech, Drug Development & Discovery, Pharma/Drugs, Disease Diagnosis), CBRE Research, Q4 2018.

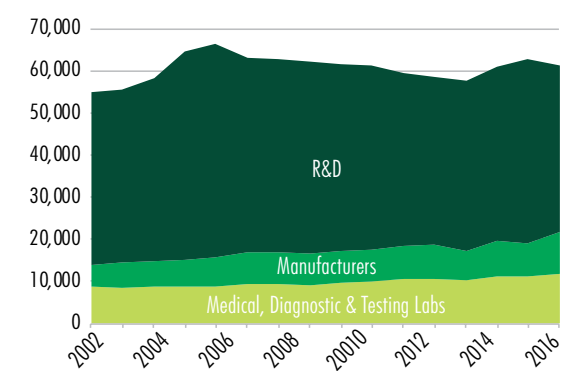
LAB/R&D PROPERTY SALES VOLUME



Source: Real Capital Analytics, Q4 2018. Note: Annual sales figures of R&D properties.

¹Washington, DC, Maryland, Virginia, and West Virginia

LIFE SCIENCES EMPLOYMENT



TALENT

Biomedical Engineers, Biochemists & Biophysicists, and Chemists

Rank	Market	Total	% of Tot Emp
1	New York City	7,770	0.10%
2	New Jersey	7,540	0.54%
3	San Francisco Bay Area	7,400	0.21%
4	Boston-Cambridge	5,980	0.23%
5	Washington, D.C.-Baltimore	5,980	0.13%
6	Philadelphia	4,760	0.17%
7	Chicago	4,670	0.10%
8	Minneapolis	3,630	0.19%
9	Houston	3,280	0.11%
10	Los Angeles	3,070	0.07%
11	San Diego	3,060	0.21%
12	Raleigh-Durham	2,110	0.23%
13	Orange County	1,620	0.10%
14	St. Louis	1,570	0.12%
15	Cleveland	1,440	0.14%
16	Cincinnati	1,390	0.13%
17	Seattle	1,350	0.07%
18	Detroit	1,330	0.07%
19	Denver	1,170	0.08%
20	Pittsburgh	1,140	0.10%

Source: U.S. BLS, CBRE Research, Q4 2018.

SOURCES OF NEW TALENT

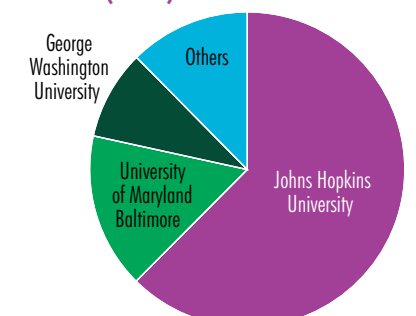
Biological and Biomedical Sciences Degree Graduates (2017)

School Rank	Institution Name	Drs	Total
6	Johns Hopkins University	170	891
90	University of Maryland, Baltimore	51	74
62	University of Maryland-College Park	48	714
85	Georgetown University	24	634
98	George Washington University	22	225

Source: IPEDS, U.S. News & World Report, CBRE Research, Q4 2018.

NIH FUNDING RECIPIENTS

Washington, D.C.-Baltimore #5 in nation: \$1.1 billion (2018)



Source: NIH, CBRE Research, Q4 2018.

NEW YORK CITY (and Surrounding Areas)

HOT TOPICS

New York City, the seventh-ranked life sciences cluster in the nation, heads into 2019 with considerable momentum. With a central focus on Manhattan, New York City's life sciences industry has a considerable edge on other markets in terms of talent, institutions, funding and municipal support.

Developers are exploiting these local advantages by supplying a significant amount of new lab space to the market. The 1.5 million sq. ft. of lab space in the pipeline will nearly double the inventory over the next two years.

Three life sciences incubators will open this year, supporting emerging companies and technologies that likely will be prime candidates to expand into the growing lab inventory. A significant uptick in venture-capital funding, which reached its highest level in more than 10 years in 2018, is fueling the growth of these emerging companies.

Demand has been driven by companies involved in biotech, medical devices, and cell and gene therapy. Continued strong demand will help support the market over the near-term, but the abundance of new supply likely will more than accommodate this growth.

QUICK STATS

Lab Market Stats, YE 2018

	Inventory	Vacancy Rate	Avg Asking Rent (NNN)	Demand	Inventory
Manhattan	1,640,378	6.8%	\$79.81	Number of Tenant Lab Requirements	23
				Total Sq. Ft. of Lab Requirements	550,000

Construction

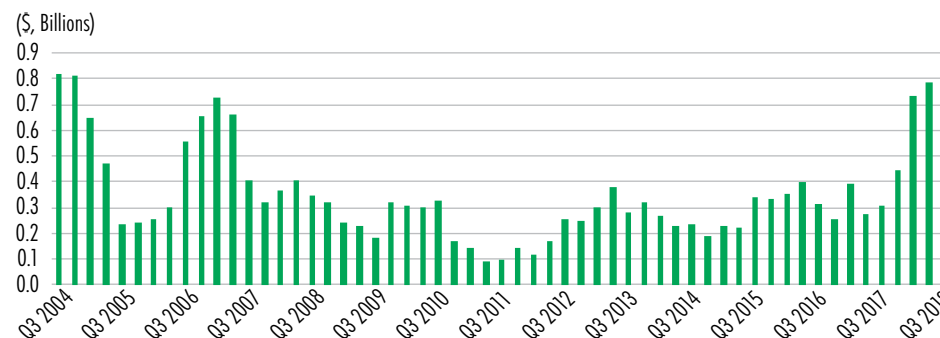
	Submarket	Developer	Sq. Ft.	Notes
The Bindery Building	Long Island City	ARE	122,000	Spec, 2019 Delivery
45-18 Court Square West	Long Island City	GFP/KingStreet	263,000	BTS & Spec, 2021-22 Delivery
Alexandria - North Tower - East 29th St	Manhattan	ARE	550,000	BTS & Spec, 2022 Delivery
Taystee Building	Manhattan	Janus Partners	350,000	BTS & Spec, 2019-20 Delivery
Farley Building	Manhattan	Vornado/Related	250,000	BTS, 2020-21 Delivery

Significant Lease Deals, 2018

	Submarket	Sq. Ft.	Type
Prevail Therapeutics	Manhattan	17,000	Expansion
Kallyope	Manhattan	15,000	Expansion
Quentis Therapeutics	Manhattan	10,000	New - Relocation

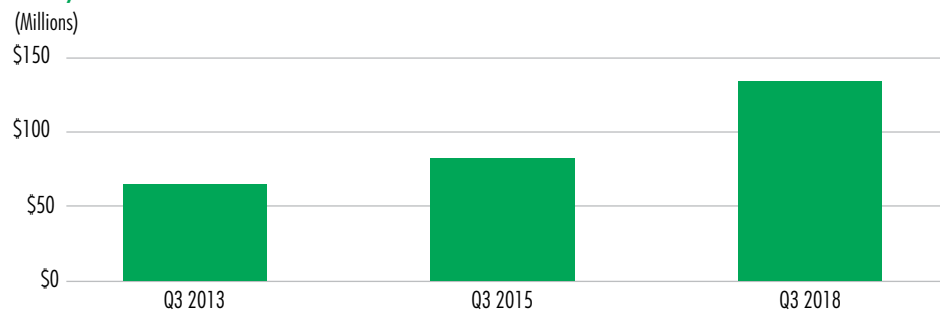
Source: CBRE Research, Q4 2018.

LIFE SCIENCES VENTURE CAPITAL FUNDING¹



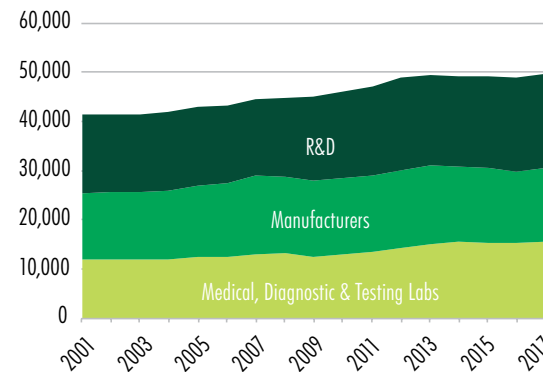
Source: PWCMoneyTree (BioTech, Drug Development & Discovery, Pharma/Drugs, Disease Diagnosis), CBRE Research, Q4 2018.

LAB/R&D PROPERTY SALES VOLUME⁴



Source: Real Capital Analytics, Q4 2018. Note: Annual sales figures of R&D properties.
¹New York-Newark-Jersey City NY-NJ-PA MSA, ²Newark Metropolitan Division and Trenton MSA only,
³Only NYC Boroughs, ⁴NYC and NY Counties in MSA only.

LIFE SCIENCES EMPLOYMENT⁴



TALENT

Biomedical Engineers, Biochemists & Biophysicists, and Chemists

Rank	Market	Total	% of Tot Emp
1	New York City ¹	7,770	0.10%
2	New Jersey ²	7,540	0.54%
3	San Francisco Bay Area	7,400	0.21%
4	Boston-Cambridge	5,980	0.23%
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17	Seattle	1,350	0.07%
18	Detroit	1,330	0.07%
19	Denver	1,170	0.08%
20	Pittsburgh	1,140	0.10%

Source: U.S. BLS, CBRE Research, Q4 2018.

SOURCES OF NEW TALENT⁴

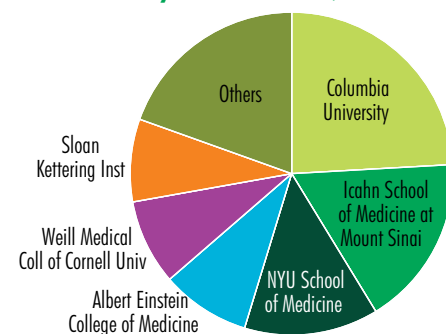
Biological and Biomedical Sciences Degree Graduates (2017)

School Rank	Institution Name	Drs	Total
18	Columbia University	91	587
62	New York University	57	455
27	Weill Cornell Medical College	51	66
54	Stony Brook University	48	734
54	Icahn School of Medicine at Mount Sinai	43	63

Source: IPEDS, U.S. News & World Report, CBRE Research, Q4 2018.

NIH FUNDING RECIPIENTS⁴

New York City #2 in nation: \$1.9 billion (2018)



Source: NIH, CBRE Research, Q4 2018.

PHILADELPHIA

HOT TOPICS

2018 was a year of significant momentum in the nation's eighth-ranked life sciences hub, most of it due to the region's premier educational and health institutions. Notably, the University of Pennsylvania announced plans to invest up to \$50 million over the next three years in local life sciences ventures.

After years of sluggish venture capital investment in local companies, funding surged in 2018 to its highest level since 2007. The increase should benefit local life sciences employment as seen in other markets.

Most of the momentum exists in Central Philadelphia, amid the region's greatest concentration of universities and institutions. The 345,000-sq.-ft. 3675 Market Street building, anchored by the region's first location of the Cambridge Innovation Center, was recently completed with little vacancy. Also notable was a new partnership between the University of Pennsylvania and Johnson & Johnson Innovation at the Pennovation Center, where the JPOD @ Philadelphia incubator program was announced with much fanfare.

Other success stories were expansions by Spark Therapeutics at Brandywine's Schuylkill Yards development and WuXi AppTec at the Navy Yard.

QUICK STATS

Lab Market Stats, YE 2018

	Inventory	Vacancy Rate	Avg Asking Rent (NNN)	Demand	Inventory
Philadelphia Metro	9,573,478	8.5%	\$13.47	Number of Tenant Lab Requirements	7
				Total Sq. Ft. of Lab Requirements	224,000

Construction

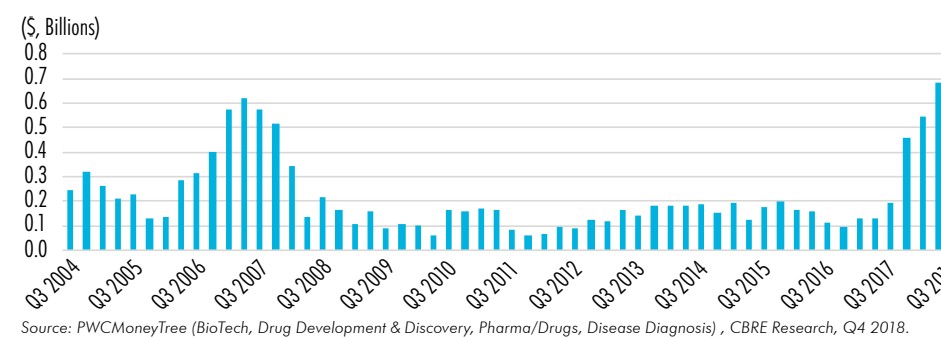
	Submarket	Developer	Sq. Ft.	Notes
WuXi AppTec	Navy Yard	LPT/Synterra Partners	95,000	Build-to-suit
Biopharmaceutical Innovation Building	Northern Delaware	University of Delaware	200,000	Delivery 2020

Significant Lease Deals, 2018

	Submarket	Sq. Ft.	Type
Spark Therapeutics	University City	107,669	New
Charles River Laboratories	Route 202 Corridor	50,000	New
Agrofresh	Route 202 Corridor	14,032	New

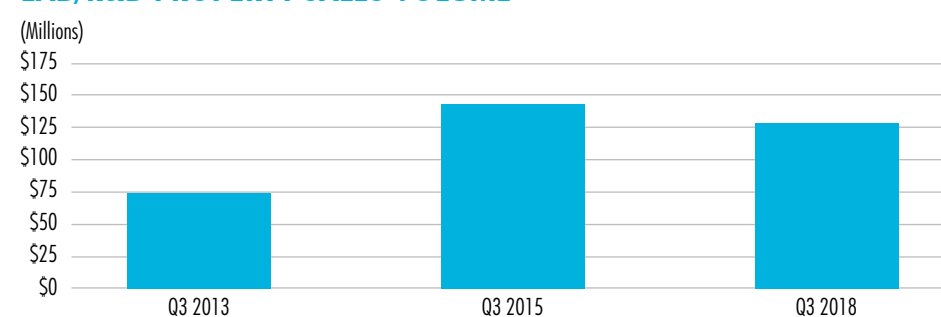
Source: CBRE Research, Q4 2018.

LIFE SCIENCES VENTURE CAPITAL FUNDING



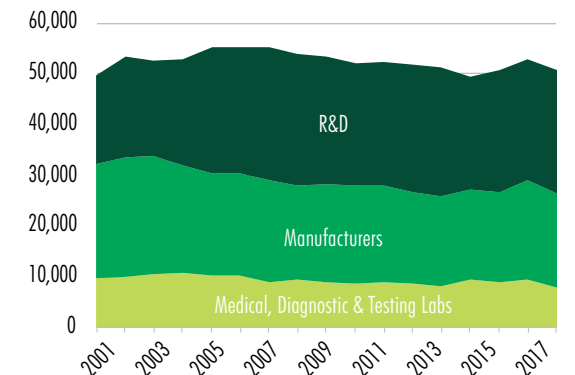
Source: PWCMoneyTree (BioTech, Drug Development & Discovery, Pharma/Drugs, Disease Diagnosis), CBRE Research, Q4 2018.

LAB/R&D PROPERTY SALES VOLUME



Source: Real Capital Analytics, Q4 2018. Note: Annual sales figures of R&D properties.

LIFE SCIENCES EMPLOYMENT



TALENT

Biomedical Engineers, Biochemists & Biophysicists, and Chemists

Rank	Market	Total	% of Tot Emp
1	New York City	7,770	0.10%
2	New Jersey	7,540	0.54%
3	San Francisco Bay Area	7,400	0.21%
4	Boston-Cambridge	5,980	0.23%
5	Washington, D.C.-Baltimore	5,980	0.13%
6	Philadelphia	4,760	0.17%
7	Chicago	4,670	0.10%
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9	Houston	3,280	0.11%
10	Los Angeles	3,070	0.07%
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12	Raleigh-Durham	2,110	0.23%
13	Orange County	1,620	0.10%
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16	Cincinnati	1,390	0.13%
17	Seattle	1,350	0.07%
18	Detroit	1,330	0.07%
19	Denver	1,170	0.08%
20	Pittsburgh	1,140	0.10%

Source: U.S. BLS, CBRE Research, Q4 2018.

SOURCES OF NEW TALENT⁴

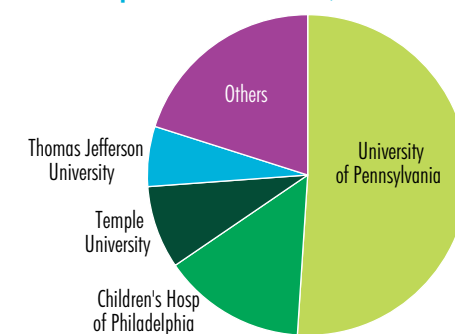
Biological and Biomedical Sciences Degree Graduates (2017)

School Rank	Institution Name	Drs	Total
23	University of Pennsylvania	125	529
na	Drexel University	43	369
na	Temple University	33	408
na	Thomas Jefferson University	28	53
na	University of Delaware	20	329

Source: IPEDS, U.S. News & World Report, CBRE Research, Q4 2018.

NIH FUNDING RECIPIENTS

Philadelphia #6 in nation: \$990 million (2018)



Source: NIH, CBRE Research, Q4 2018.

LOS ANGELES

HOT TOPICS

Los Angeles, the ninth-ranked life sciences cluster in the U.S., is experiencing growing momentum. LA BioMed, located in Torrance at the Harbor-UCLA Medical Center, just completed construction of a \$63 million research building with an entire floor (18,000 sq. ft.) as a dedicated life science incubator. They are also in the planning stages of a 250,000-sq.-ft. biotechnology park on 15 acres of their campus. The vision for LA BioMed, supported by growing resources, is to become one of the nation's premier destinations for life sciences.

Reflecting the local momentum over the past three years (2014-2017), L.A. life sciences employment has grown faster than the U.S. average (3.7% vs. 2.9%). The near-term outlook is for further growth, as a surge in venture capital funding to the industry occurred over the past year.

L.A.'s life sciences industry possesses many of the critical ingredients required for rapid growth, including preeminent medical research and health services institutions, a significant source of new talent from local universities and the 7th-largest amount of NIH funding in the country.

A relative lack of supply has supported low lab vacancy (4.3%, YE 2018), while pushing average asking rents 16% higher over the past year. Top-tier lab space is estimated to fetch \$72 per sq. ft. gross.

QUICK STATS

Lab Market Stats, YE 2018

	Inventory	Vacancy Rate	Avg Asking Rent (NNN)	Demand	Inventory
Los Angeles	8,415,464	4.3%	\$32.49	Number of Tenant Lab Requirements	7
				Total Sq. Ft. of Lab Requirements	450,000

Construction

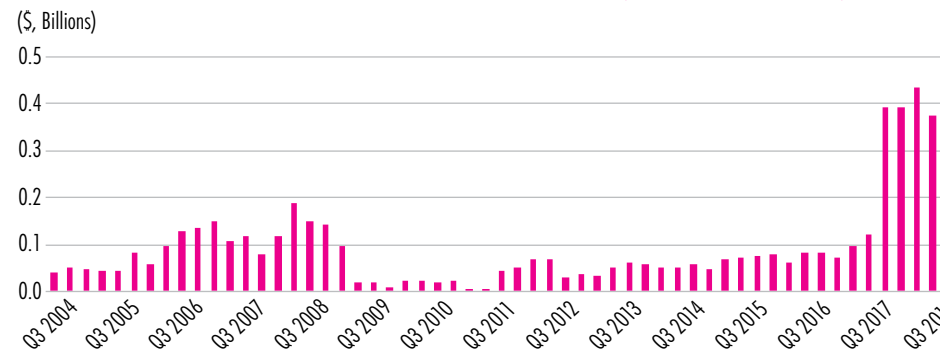
	Submarket	Developer	Sq. Ft.	Notes
LA Biomed	Torrance	na	250,000	Planned
LA Biomed	Torrance	na	18,000	2019; incubator
9919 Jefferson	Culver City	Nantworks	62,000	
HatchSpaces	East Los Angeles	Agora Partners/ASG	22,000	2018

Significant Lease Deals, 2018

	Submarket	Sq. Ft.	Type
Kite Pharma	Santa Monica	160,000	Acquisition
NantHealth	El Segundo	111,238	Acquisition
The Lawrence J. Ellison Institute for Transformative Medicine of USC	Santa Monica	80,340	New
Kite Pharma	El Segundo	28,000	New
UroGen Pharma	Westwood	5,000	New

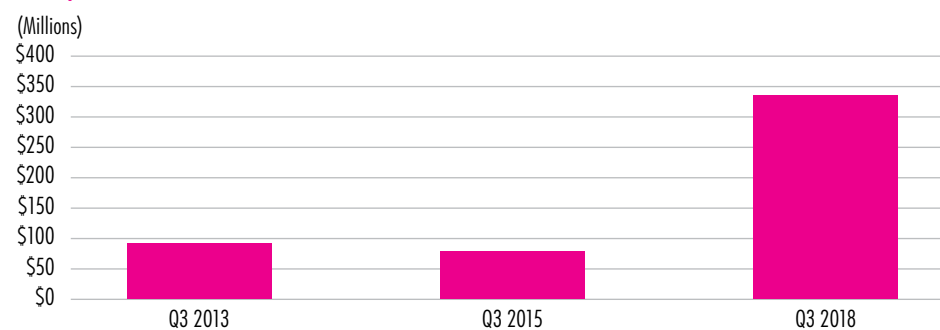
Source: CBRE Research, Q4 2018.

LIFE SCIENCES VENTURE CAPITAL FUNDING (LA-Orange County)



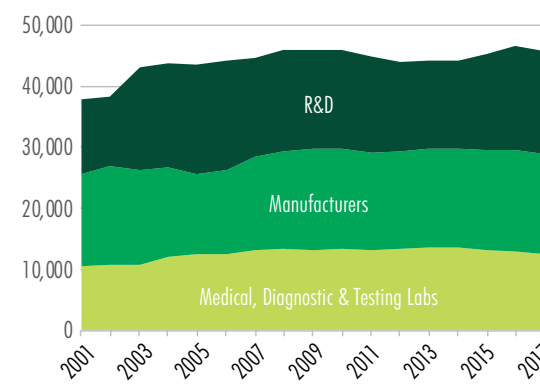
Source: PWCMoneyTree (BioTech, Drug Development & Discovery, Pharma/Drugs, Disease Diagnosis), CBRE Research, Q4 2018.

LAB/R&D PROPERTY SALES VOLUME



Source: Real Capital Analytics, Q4 2018. Note: Annual sales figures of R&D properties.

LIFE SCIENCES EMPLOYMENT



TALENT

Biomedical Engineers, Biochemists & Biophysicists, and Chemists

Rank	Market	Total	% of Tot Emp
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12	Raleigh-Durham	2,110	0.23%
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16	Cincinnati	1,390	0.13%
17	Seattle	1,350	0.07%
18	Detroit	1,330	0.07%
19	Denver	1,170	0.08%
20	Pittsburgh	1,140	0.10%

Source: U.S. BLS, CBRE Research, Q4 2018.

SOURCES OF NEW TALENT

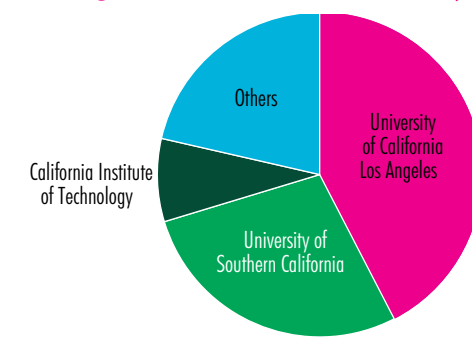
Biological and Biomedical Sciences Degree Graduates (2017)

School Rank	Institution Name	Drs	Total
18	University of California-Los Angeles	139	1,529
54	University of Southern California	86	385
4	California Institute of Technology	21	37
na	California State University-Northridge	0	326
na	California State University-Long Beach	0	311

Source: IPEDS, U.S. News & World Report, CBRE Research, Q4 2018.

NIH FUNDING RECIPIENTS

Los Angeles #7 in nation: \$966 million (2018)



Source: NIH, CBRE Research, Q4 2018.

CHICAGO

HOT TOPICS

Several trends support underlying momentum and optimism in Chicago's life sciences industry, but the region continues to lag in terms of employment growth, sources of funding and new supply of lab space.

Few institutions in the U.S. have increased their NIH funding as rapidly as Northwestern University over the past decade. The results can be seen in the completion of the new, 600,000-sq.-ft. Simpson Querrey Biomedical Research Center. A second, similarly-sized phase of this project will follow.

Other sources of optimism are found in a new collaboration between the University of Illinois-Chicago, the University of Chicago and Northwestern for a new innovation center in the near South Side, the potential for the Illinois Medical District to be designated a federal opportunity zone and a new state government administration expected to be more aggressive in courting the life sciences industry.

The market for lab space remains extremely tight. Some small tenants are facing difficulty obtaining space with most of the incubators nearly at capacity. Life sciences venture capital funding to Chicago has grown sharply over the past 18 months, likely to push lab rents higher over the next year.

QUICK STATS

Lab Market Stats, YE 2018

	Inventory	Vacancy Rate	Avg Asking Rent (NNN)	Demand	Inventory
Chicago Metro	2,964,790	3.5%	\$27.50	Number of Tenant Lab Requirements	5
				Total Sq. Ft. of Lab Requirements	175,000

Significant improvements were made in CBRE's database in 2019 to better reflect laboratory market fundamentals.

Construction

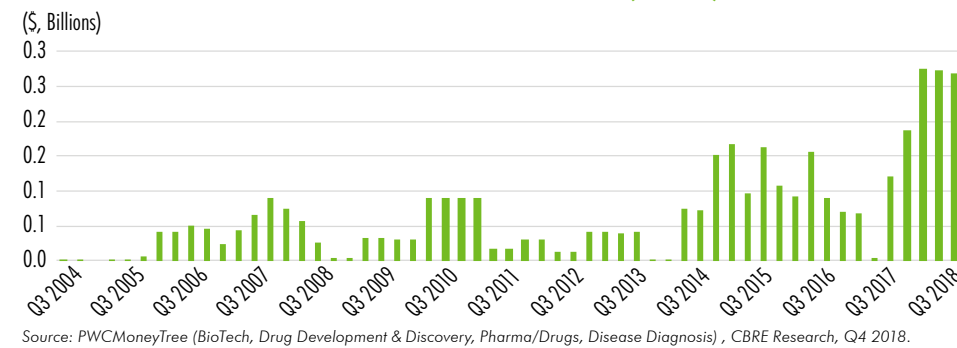
	Submarket	Developer	Sq. Ft.	Notes
Illinois Science and Technology Park	North Suburbs	American Landmark	146,000	Renovation
Rosalind Franklin Science and Innovation Research Park	North Suburbs	Rosalind Franklin Univ	100,000	New construction
Stanley Manne Children's Research Institute	Lincoln Park	Sterling Bay	120,000	Renovation

Significant Lease Deals, 2018

	Submarket	Sq. Ft.	Type
Valent Biosciences	North Suburbs	150,000	New/Expansion
Tempus Labs	River North	85,059	New
AveXis	North Suburbs	40,000	New/Expansion
Charles River Laboratories	North Suburbs	5,000	Expansion

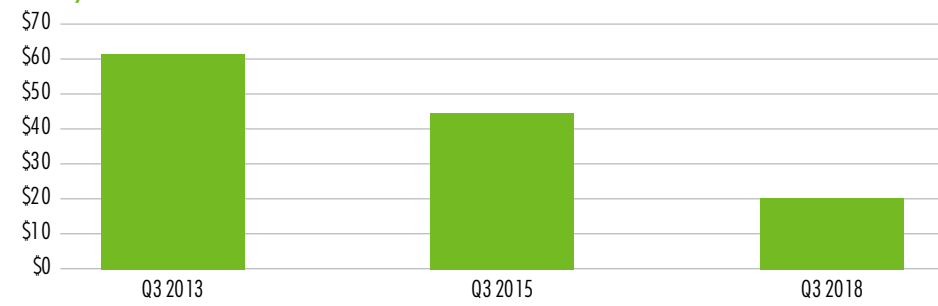
Source: CBRE Research, Q4 2018.

LIFE SCIENCES VENTURE CAPITAL FUNDING (Illinois)



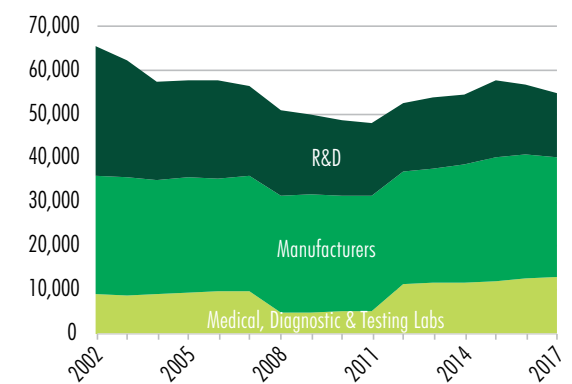
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LAB/R&D PROPERTY SALES VOLUME



Source: Real Capital Analytics, Q4 2018. Note: Annual sales figures of R&D properties.

LIFE SCIENCES EMPLOYMENT



TALENT

Biomedical Engineers, Biochemists & Biophysicists, and Chemists

Rank	Market	Total	% of Tot Emp
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17	Seattle	1,350	0.07%
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20	Pittsburgh	1,140	0.10%

Source: U.S. BLS, CBRE Research, Q4 2018.

SOURCES OF NEW TALENT

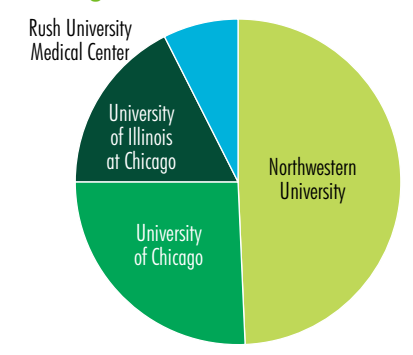
Biological and Biomedical Sciences Degree Graduates (2017)

School Rank	Institution Name	Drs	Total
13	University of Chicago	73	262
27	Northwestern University	64	278
73	University of Illinois at Chicago	45	622
na	Loyola University Chicago	18	546

Source: IPEDS, U.S. News & World Report, CBRE Research, Q4 2018.

NIH FUNDING RECIPIENTS

Chicago #10 in nation: \$718 million (2018)



Source: NIH, CBRE Research, Q4 2018.

ORANGE COUNTY

HOT TOPICS

Orange County's life sciences industry has shown impressive growth over the past several years. Among major U.S. life sciences clusters, the county has been a leader in terms of employment growth, outpacing the U.S. average over the past 15 years.

The county's 3.5 million sq. ft. of lab space is only 5.5% vacant. A dearth of new lab supply has contributed to limited availabilities and a considerable increase in the average asking rent for lab space over the past year.

Orange County benefits from an attractive pool of talent, including the 13th largest concentration of key life scientists in the nation, as well as having one of the nation's top universities for biomedical and biological sciences graduates—the University of California, Irvine.

Positioning the local life sciences industry well for the future, especially in its outsized medical devices sector, is the strong concentration of an existing high-tech workforce, which will support stronger growth in life sciences as a convergence of technologies between the industries becomes more common.

QUICK STATS

Lab Market Stats, YE 2018

	Inventory	Vacancy Rate	Avg Asking Rent (NNN)	Demand	Inventory
Orange County	3,544,420	5.5%	\$20.74	Number of Tenant Lab Requirements	2
				Total Sq. Ft. of Lab Requirements	150,000

Construction

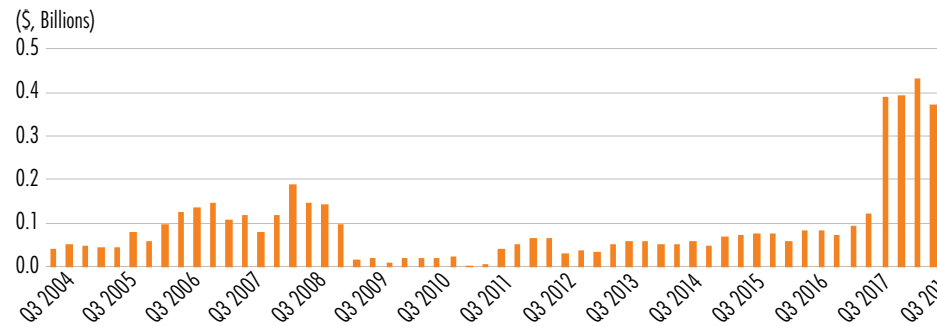
No construction of lab space as of YE 2018

Significant Lease Deals, 2018

	Submarket	Sq. Ft.	Type
Vyair Medical	South Orange County	184,886	New
Glaukos	South Orange County	165,028	New
Metagenics	South Orange County	56,164	Renewal/Expansion

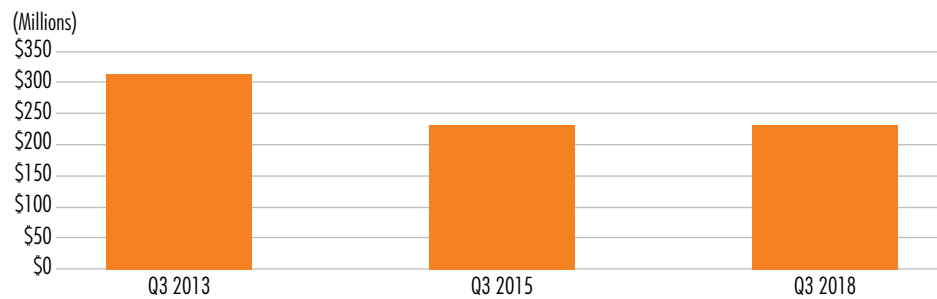
Source: CBRE Research, Q4 2018.

LIFE SCIENCES VENTURE CAPITAL FUNDING (LA-Orange County)



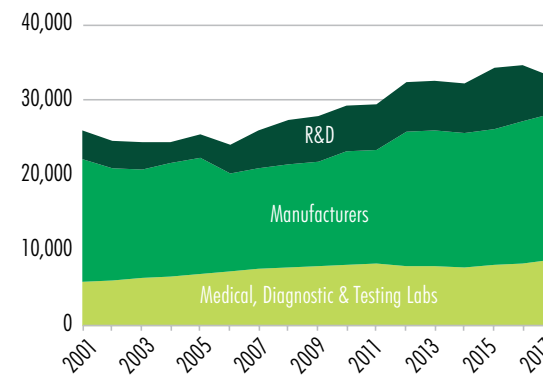
Source: PWC MoneyTree (BioTech, Drug Development & Discovery, Pharma/Drugs, Disease Diagnosis), CBRE Research, Q4 2018.

LAB/R&D PROPERTY SALES VOLUME



Source: Real Capital Analytics, Q4 2018. Note: Annual sales figures of R&D properties.

LIFE SCIENCES EMPLOYMENT



TALENT

Biomedical Engineers, Biochemists & Biophysicists, and Chemists

Rank	Market	Total	% of Tot Emp
1	New York City	7,770	0.10%
2	New Jersey	7,540	0.54%
3	San Francisco Bay Area	7,400	0.21%
4	Boston-Cambridge	5,980	0.23%
5	Washington, D.C.-Baltimore	5,980	0.13%
6	Philadelphia	4,760	0.17%
7	Chicago	4,670	0.10%
8	Minneapolis	3,630	0.19%
9	Houston	3,280	0.11%
10	Los Angeles	3,070	0.07%
11	San Diego	3,060	0.21%
12	Raleigh-Durham	2,110	0.23%
13	Orange County	1,620	0.10%
14	St. Louis	1,570	0.12%
15	Cleveland	1,440	0.14%
16	Cincinnati	1,390	0.13%
17	Seattle	1,350	0.07%
18	Detroit	1,330	0.07%
19	Denver	1,170	0.08%
20	Pittsburgh	1,140	0.10%

Source: U.S. BLS, CBRE Research, Q4 2018.

SOURCES OF NEW TALENT

Biological and Biomedical Sciences Degree Graduates (2017)

School Rank	Institution Name	Drs	Total
33	University of California-Irvine	80	791
na	California State University-Fullerton	0	286
na	Chapman University	0	61

Source: IPEDS, U.S. News & World Report, CBRE Research, Q4 2018.

NIH FUNDING RECIPIENTS

Orange County #34 in nation: \$151 million (2018)



Source: NIH, CBRE Research, Q4 2018.

DEFINITIONS & NOTES:

Life Sciences is the science and business of life-enhancing medical products. Though commonly encompassing human and animal products, this publication emphasizes human life sciences in its analysis of employment and industry funding.

Life sciences employment data, as well as data regarding key scientists and graduates, is measured on a metropolitan statistical area basis, except for the following markets or otherwise noted:

- New York City: New York City and all New York State counties in the New York MSA
- New Jersey: Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex and Union counties
- Washington, D.C.-Baltimore: Washington, D.C. and Baltimore MSAs
- Raleigh-Durham: Raleigh and Durham MSAs
- Orange County: Anaheim-Santa Ana-Irvine Metropolitan Division
- Los Angeles: Los Angeles-Long Beach Metropolitan Division
- San Francisco Bay Area: San Francisco-Oakland and San Jose MSAs

Laboratory market data reflects the same geographies with the exception of New York City, whose lab inventory only covers Manhattan.

Data on number and concentration of biomedical engineers, biophysicists, biochemists and chemists reflect MSA areas, except for New Jersey (Newark Metropolitan Division and Trenton MSA), Los Angeles (Los Angeles Metropolitan Division), Orange County (Anaheim-Santa Ana-Irvine Metropolitan Division) and San Francisco Bay Area (San Francisco-Oakland and San Jose MSAs).



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CONTACTS:

TODD RICHARDSON

Senior Managing Director
Global Life Sciences Practice
+1 704 972 0074
todd.richardson@cbre.com

IAN ANDERSON

Director, Research & Analysis
+1 215 561 8997
ian.anderson2@cbre.com
Follow Ian on [Twitter](#) | [LinkedIn](#)

SPENCER G. LEVY

Chairman and Senior Economic
Advisor, Americas Research
+1 617 912 5236
spencer.levy@cbre.com
Follow Spencer on [Twitter](#) | [LinkedIn](#)

LISA DENIGHT

Senior Research Analyst
+1 215 561 8932
lisa.denight@cbre.com
Follow Lisa on [Twitter](#) | [LinkedIn](#)



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