California Life Sciences Industry 2016 Report





Letter from the Governor



Jerry Brown Governor of California



Sara Radcliffe President & CEO California Life Sciences Association (CLSA)



Peter Claude Partner, Pharmaceutical & Life Sciences Advisory PwC

I am impressed by the mark the life sciences sector has made in our state. The investment, innovation and job creation they bring are critical and growing parts of California's DNA.

In recent years, the life science sector has been able to attract billions of investment dollars and has added thousands of new jobs. The sector continues to be an economic engine; helping power our state's continued growth. The biomedical footprint extends throughout the state and the discoveries produced here extend life and reduce suffering. We are fortunate to have so many brilliant minds working on these difficult problems.

California is committed to establishing and advancing thoughtful and innovative policies to support the life sciences and extend the state's worldwide leadership in this field.

Sincerely, Jerry Krown

Letter to Stakeholders

Nothing about the life sciences is easy. Consider developing an effective medication. First researchers must find a biological target – a protein active in cancer, for example – and then develop a drug that affects that target. This process alone can take many years.

If investigators decide to commercialize the compound, they must create a company and find investors. From there, they must gather even more resources to take the drug to clinical trials.

Assuming the drug is safe and effective in patients, the company must seek FDA approval, as well as convince payers to cover the new medication. Creating a new therapy can cost more than a billion dollars and take more than a decade to accomplish.

This arduous path makes California's life sciences industry's success even more impressive. As of Sept. 30, 2015, California companies have 1,235 new drugs in the pipeline. Some of these medications will have a remarkable impact on human health, helping people with cancer, hepatitis, heart disease, neurodegenerative diseases and many other conditions. Add to that the remarkable medical devices, diagnostics, research tools, and biorenewables under development in the state, and you have a story of unrivaled significance.

There are 2,848 life sciences companies in California, including industry-leading global corporations, entrepreneurial start-ups and everything in between. In addition to impacting health and well-being worldwide, their efforts have a powerful impact on our economy. California life sciences companies directly employ 281,000 people and generate \$130 billion in revenue. When we add indirect employment — jobs that support and are supported by the sector — the total is 862,000 people employed in the sector in California.

Together, we have built something wonderful in California, something we must fight to preserve and improve. At the California Life Sciences Association, we are working with industry and state, local and federal policymakers to increase research and education funding, streamline regulation, adjust the tax code and deliver other changes that will make it easier for our entrepreneurs to move new ideas forward.

We've chosen a difficult path, but one with incredible rewards. With your support, we can continue to build California's life sciences ecosystem, impact health and save lives.

Sincerely,

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Improving the World's Health and Well-Being

Life sciences innovation has a tremendous impact on the world's health and well-being. The medicines, medical devices, diagnostics, research tools, and biorenewables developed by life sciences companies across California preserve and improve quality of life for people around the world. Those suffering from cancer, heart disease, diabetes and other conditions can return to their families and jobs sooner, driving value not only for patients, but for the healthcare system and the overall economy. In addition, biorenewables offer a promising option in the fight for sustainability.

For decades, California has had an excellent track record, producing thousands of new therapies and technologies. In 2015, California companies were shepherding 1,235 new drugs through the product development pipeline. These included 366 to treat cancer, 151 for infectious diseases and 109 to address central nervous system conditions.

The 2,848 life sciences companies in California, 212 more than last year, share one common trait: the desire to improve health and well-being. Many of these companies are small, entrepreneurial start-ups, built on innovative technologies that could change the medical calculus for thousands, or even millions, of patients. For the many people who face conditions with no cure, and sometimes no treatments at all, these efforts are an incredible source of hope.

California Products by Therapeutic Area Investigational New Drug (IND) products through Phase III clinical trials 366 Cancer 151 Infectious Diseases (incl. HIV) 109 Central Nervous System Hormonal Systems/Nephrology* 93 *incl. Diabetes Immune System 77 Musculoskeletal 73 Cardiovascular 66 57 Eye/Ear Pain 52 Gastrointestinal 44 Hematological 43 Dermatology 40 Respiratory 39 Genitourinary **14** Diagnostic/Imaging/Delivery 7 Miscellaneous 4 Therapies in Pipeline TOTAL: 1,235

SOURCE: Biopharm Insight, INDs filed through Phase III, Sept. 30, 2015



SOURCES: Bureau of Labor Statistics Quarterly Census of Employment and Wages; 2007 Economic Census

A Powerful Economic Engine

In addition to creating the next generation of treatments and other products, California's life sciences sector has a profound impact on the state's economy. In 2014, California's life sciences innovators – including companies, laboratories and academic research institutes – employed more than 281,000 people. These jobs were dispersed throughout the state, with concentrations in the San Francisco Bay Area, San Diego, Orange County and Los Angeles. The average salary exceeded \$108,000, an 8 percent increase from the previous year. Total life sciences wages exceeded \$30 billion.

But these numbers only begin to describe the sector's impact on the Golden State. The life sciences indirectly generate another 262,000 jobs. These are the people who

Life Sciences Industry

12 Michigan

14 Wisconsin

13 Utah

🖸 Ohio

22,264

17,485

15,794

15,675

2,829

2,995

(-181)

(-154)

support the industry: software designers, consultants, intellectual property attorneys, communications professionals and many more. Beyond that, spending by biomedical industry employees creates another 319,000 jobs. When taken as a whole, the life sciences industry generates and supports 862,000 jobs in California.

Life sciences companies paid more than \$2.7 billion in federal corporate income tax, while employees paid \$3 billion in federal income tax. The industry contributed more than \$13.2 billion in federal and California state and local taxes. In addition, the life sciences accounted for \$23 billion in exports, a big plus for the state's balance of trade. The sector's estimated revenue exceeded \$130 billion in 2015.

Employing Nearly One Million Californians

in California, 2014 (estimated) Total revenue \$130.2 billion **Direct Employment Direct employment** 281.000 281.000 Total wages and salaries \$30.6 billion Average annual life sciences industry wage \$108,893 Total NIH grants awarded (2015) \$3.3 billion Total venture capital investments (2015) \$4.8 billion Total biomedical exports \$23 billion \$9.5 billion Direct federal taxes \$3.7 billion Direct state and local taxes Number of Life Sciences Companies: 2.848 Indirect and Induced Employment 581.000* 1,662 1,186 Total Direct, Indirect and Induced Jobs: 862,000* Device and Medical **Biotechnology and** Equipment Mfg. Pharmaceutical *Estimates based on the IMPLAN mod<mark>eling system for Cali</mark>fornia, 2013 base year **Biopharmaceutical and Medical Device Employment** by state, 2010-2014 Employment growth, 2010-2014 2014 ranking Employees, by employment change from 2010 California 121,716 7,217 6% 2 New Jersey 41,656 (-6,356) -13% 3 New York 37,242 -6% (-2, 221)4 Indiana 35,741 -5% (-1,740)-11% 5 Pennsylvania 35,363 (-4, 347)6 Illinois 32.477 1% 244 7 Massachusetts 32,391 2% 767 13 8 Minnesota 32,333 (-639)-2% 9 North Carolina 31,327 1,893 6% 10 Florida 28,788 958 3% Texas 26,246 1,364 5%

15%

21%

SOURCES: Bureau of Labor Statistics Quarterly Census of Employment and Wages; 2007 Economic Census; Bloomberg

-1%

-1%

Employment data continued on Page 4

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Research Excellence

Top 10 States Receiving NIH Funding

2014 vs. 2015*

2015*

Historically, California's strong biomedical enterprise stems from an equally strong academic and non-profit research infrastructure. The state fuels its life sciences engine with some of the world's most prestigious universities and independent research institutes. These organizations are the fuel that feeds a high percentage of California's life sciences innovation, as well as providing a well-educated, highly motivated work force.

California continues to dominate the nation in academic achievement. The state has the most universities in the Shanghai Index of the world's top 100 schools. In 2013, academic institutions in the state awarded 4,966 doctorates

2014 Funding Awards California 7,328 \$3.26B \$3.36B 7,582 Massachusetts \$2.29B 4.730 \$2.34B 4.884 **New York** \$1.93B 4,657 4,755 \$2.04B Pennsylvania \$1.44B 3,258 \$1.49B 3,350 Texas \$955M 2,419 2,498 \$968M North Carolina \$942M 2.015 \$975M 2,101 Maryland \$871M 1,943 \$894M 1,987 Washington \$834M 1,466 \$867M 1.555 Illinois \$701M 1,831 \$703M 1,854 Ohio \$629M 1,534 \$623M 1,518

*2015 data reflect awards through September 28, 2015 Note: Data excludes R&D contracts and projects funded through the American Recovery and Reinvestment Act

SOURCE: National Institutes of Health

Top 10 California Organizations Receiving NIH Funding 2015*

to young scientists and engineers. By contrast, the second highest state, New York, awarded 2,985.

However, this intellectual achievement is not an end in itself, but rather a means towards an end. This standing reflects an outstanding educational system that attracts brilliant minds from around the world. Many of these scientists move on to work in academic labs and industry. This intellectual firepower translates into innovative science, which attracts federal grant money. In 2014, California labs were awarded 7,328 grants totaling \$3.3 billion from the National Institutes of Health (NIH), driving cutting-edge research.



Note: Data excludes R&D contracts and projects funded through the American Recovery and Reinvestment Act

SOURCE: National Institutes of Health

World Class Research Institutions

California continues to lead the world with the highest number of premier research institutions. The Golden State is home to 11 of the top 100 universities on the Shanghai Index. These institutions include: **Stanford University, UC Berkeley, California Institute of Technology, UCLA, UC San Diego, UC San Francisco, UC Santa Barbara, USC, UC Irvine, UC Davis** and **UC Santa Cruz**. New York, Pennsylvania and Texas tied for second with four institutions apiece.

Number of Universities in the World Top 100 Shanghai Index, 2015 rankings

California	11	Massachusetts	3
New York	4	Arizona	2
Pennsylvania	4	Maryland	2
Texas	4	Michigan	2
Illinois	3	New Jersey	2
		Newsle Canalina	2





Doctoral Recipients in Life Sciences Disciplines *Top 10 states, 2013*

SOURCE: NSF/NIH/USED/USDA/NEH/NASA; Survey of Earned Doctorates, 2013

Continued from Page 2

Life Sciences Employment vs. Other High-Tech Sectors

in California, 2014

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Top Life Sciences Employment *in California, 2012 - 2014*



SOURCES: Bureau of Labor Statistics Quarterly Census of Employment and Wages; 2007 Economic Census

Attracting Investment

The discoveries made in California's academic institutions attract the interest of companies and investors, both public and private. In some cases, large companies license promising technologies, providing additional resources for universities to thrive.

Often new start-up companies are created by enterprising scientist-entrepreneurs, with the express purpose of developing, and ultimately commercializing, an innovative idea. In these cases, venture capital investment plays a crucial role, providing early, middle and late financing, as well as business advice for budding entrepreneurs. In particular, early investors can make a crucial difference, recognizing the value of a new idea and its potential to change health care.

In 2015, California is projected to attract more than \$4.7 billion in life science investment, a sharp increase from the \$3.6 billion the state's entrepreneurs received in 2014.* This increase was reflected in all stages of company development:

seed, early, expansion and later stage. By contrast, seed stage investments declined in the nation as a whole in 2015.

Public financing also plays an important role. Just as it does in private venture capital, California leads the nation in its ability to attract Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) funding from the NIH, bringing in \$144 million through Sept. 28, 2015, a small decline from 2014.

The life sciences enterprise is funded in numerous ways. Initial public offerings (IPOs) generate resources for later stage companies. Mergers and acquisitions convert innovative technologies into capital that can be reinvested into new ventures. Through the beginning of September, there were 16 life sciences IPOs in 2015, generating \$122 billion. In addition, there were 27 mergers and acquisitions with terms reported, which produced another \$1.2 billion.

*Based on projections from the first two quarters.

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Venture Capital Investment, Biotech and Medical Devices by stage, U.S. and California, 2013-2015*



*2015 data based on projection from first two quarters

SOURCE: PricewaterhouseCoopers/National Venture Capital Association MoneyTree™ Report based on data from Thomson Reuters

Improving Public Policy

To some, the California life sciences innovation ecosystem may look like it's on autopilot. Each year, the state produces excellent research, attracts new investment and develops a variety of new therapies and other products. But this success was hard won and even more difficult to maintain. Academic institutions, investors, business leaders, advocacy organizations, and state and federal policymakers must all work in concert to ensure our continued success.

As the data in this report shows, the success of the life sciences sector has been due in part to federal and state government policies that have recognized and rewarded the value of life sciences innovation, especially in the areas of science research funding and support, patent rights, and programs to provide patients with timely and affordable access to new, life-saving medical technologies and therapies. Such support will remain critical in the future.

While the news is good, it could always be better. By working together to improve public policy, we can accelerate the pace of innovation and help more patients.

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About California Life Sciences Association (CLSA)

California Life Sciences Association (CLSA) is the leading voice for California's life sciences sector. We work closely with industry, government, academia and other stakeholders to shape public policy, drive business solutions and grow

California's life sciences innovation ecosystem. CLSA serves over 750 biotechnology, pharmaceutical, medical device, and diagnostics companies, research universities and institutes, investors, and service providers. CLSA was founded in 2015 when the Bay Area Bioscience Association (BayBio) and the California Healthcare Institute (CHI) merged to create the state's most influential life sciences advocacy and business leadership organization.

Visit CLSA at www.CALifeSciences.org, and follow us on Twitter @CaLifeSciences, Facebook, LinkedIn, and YouTube.





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