# 2019 STATE OF THE INDUSTRY

MEETING THE FUTURE NEEDS OF A CHANGING COMMUNITY

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# INTRODUCTION

During the 2013 BIO International Convention in Chicago, iBIO, in partnership with the Illinois Science and Technology Coalition (ISTC) released the first comprehensive economic report on the life sciences community in Illinois, *The Economic Engine of Biotechnology in Illinois*.

The backbone of this report was built off of an economic study conducted by Ernst & Young on behalf of iBIO. The study and the resulting report solidified our understanding that Illinois and the Midwest was a major center for the life sciences industry.

This 2019 iBIO State of the State report benchmarks the recent growth of the community, identifies key trends, and provides a road map for how we can continue to expand life sciences innovation in Illinois.

#### What is the Life Sciences Industry?

For the purposes of this report, we define the "Life Sciences Industry" as companies in the fields of biotechnology, pharmaceuticals, biomedical technologies, medical devices and diagnostics, food processing and agricultural industries. Previous reports also included bioscience-related distribution and research & testing companies. For the purposes of this report we are focusing on industry sectors that are commercializing innovative research.



# EXECUTIVE SUMMARY

By several metrics, the Illinois life sciences industry is large, growing and recognized as a national leader. More than 41,000 people are employed at life science companies statewide and increases in the number of life sciences workers at Illinois companies from 2014 - 2016 (latest statistics available) have outperformed national averages.

Second, the annual economic output of the life sciences industry in Illinois was \$98 billion in 2016. Annual pay for the life sciences community was \$129,866 in 2016, and with strong wage growth in all segments, the life sciences industry remains a major contributor to state and local taxes.

Third, the life sciences innovation ecosystem in Illinois has grown significantly over the past couple years. Our state's companies reported over \$14 billion in R&D expenditures in 2017, and our research-based universities have increased R&D investment and secured numerous NIH grants and awards. Recent key indicators of startup activity have also shown an upward trend, including patent products and venture capital (VC) investment.

Commitment to patients and the community are core values for the life sciences companies in Illinois. Our enterprises are having a profound impact on patients in Illinois and beyond by expanding access to therapies through patient-assistance programs and industry-sponsored clinical trials.

Despite these positive developments, continued growth in the Illinois life sciences community is not guaranteed. Recent major acquisitions of Illinois companies reduced the number of large companies and related employment in the state. Meanwhile, an increase in commercialization activities at Illinois universities and the growth in the number of smaller R&D-stage companies will drive the future expansion of the Illinois life sciences industry.

To support the future growth of our community, state and local governments will need to realign policy and community resources to support a startup- and growth-oriented ecosystem.



# ABOUT iBIO

The Illinois Biotechnology Innovation Organization (iBIO) is a life sciences association that represents employees at member companies, universities, service providers and venture firms. Through our ongoing efforts, we seek to transform patient lives through groundbreaking research and grow the Illinois economy. Specifically, iBIO

- promotes the community's value to the public and policymakers;
- connects innovators to investment and talent;
- stimulates collaboration; and
- fosters the next generation of innovators and entrepreneurs to transform patient lives through groundbreaking research and works to grow the Illinois economy.

We achieve our goals through operations in three areas:

#### **Government & Public Affairs**

iBIO promotes the Illinois life sciences community and engages our members in advocacy at the federal, state and local levels. iBIO promotes thoughtful legislative and regulatory solutions that allow our member companies to research, develop and commercialize breakthrough therapies and cures, and support the needs of patients and families to have affordable access to those new treatments.

#### **Community Development**

We connect and engage our members on key issues and areas of community development. iBIO's Business Solutions program is part of the nation's largest discount-purchasing system for the life sciences industry, with more than \$400 million in annual sales.

#### Charitable Programs

These programs encompass our public 501(c)(3) charity activities. Currently, the programs are centered on coordinating the industry's engagement in iBIO's after-school StellarGirls program and summer STEMGirls Camps for girls grades 3-8 in underserved Illinois communities.



# ILLINOIS AT A GLANCE

#### **Employment & Establishments**

Illinois is home to over 817 life sciences establishments in the pharmaceutical, medical device and agriculture industries that directly employ more than 41,000 people. In addition, some 239,571 people are indirectly impacted by the life sciences industry, working for suppliers and at firms, such as restaurants and retail stores, where life sciences employees spend their earnings.



# Illinois Life Sciences Industry (2016)

Source: TECOnomy State Biosciences Report

Not only is the life sciences community in Illinois large, recent growth in the Drugs and Pharmaceuticals and Medical Devices and Equipment sectors for employment and establishments have both outpaced the national average.

Industry Subsector	2016	2014 - 2016 Change	2014 - 2016 Change (USA)
Drugs and Pharmaceuticals			
Establishments	185	22.5%	13.7%
Employment	20,102	9%	2%
Medical Devices and Equipment			
Establishments	550	18%	5.9%
Employment	12,950	7.5%	2.9%



The geographic distribution of the life sciences industry is also diversified, with companies found in counties throughout Illinois.

Lake County, with 18,317 employees, is home to the nation's second largest pharmaceutical

cluster (only New York/New Jersey/ Philadelphia is larger). The "I-294 corridor" of established pharmaceutical and medical device companies (Abbott, AbbVie, 7 Baxter, Fresenius Kabi, Horizon Pharma, Lundbeck, Pfizer, and Takeda) comprises the majority of the employees in the Illinois life sciences industry. Lake County is also home to a number of growthstage biopharma companies, including Assertio, Athenex, and TerSera.

**Cook County** includes Chicago and is home to three major research universities: Northwestern, University of Chicago and University of Illinois at Chicago. Because of the proximity to these research institutions and incubators, the majority of the startup community in Illinois is located in Cook County. The North American



headquarters of pharmaceutical company Astellas and many life sciences service organizations also are located in Cook County.

**Macon county** is home to large food processing segments of the community, including Archer Daniels Midland and Tate & Lyle. With 5,114 employees, Decatur has the highest concentration of agricultural employment in the United States.

**Kankakee County** is home to CSL Behring's manufacturing site in Bradley. This site currently employees over 1,400 employees, and the company recently announced a 1.8 million sqf expansion.

**Champaign County** is home to the University of Illinois at Urbana-Champaign and its Enterprise Works, a 43,000 sqf incubator that was named one of *Inc. Magazine*'s "Top 3 College Town Incubators" and one of *Forbes*' "12 Business Incubators Changing the World."



#### Economic & Employment Impact

With an annual overall economic output of \$98 billion, the Illinois life science industry continues to be a large contributor to the state's economy. Economic output is generally considering the broadest measure of economic activity. It represents the sales related to life sciences firms, as well as the suppliers and service industry firms that benefit from the spending of life sciences employees.

The figure below depicts the industry sectors' employment and establishment numbers in 2016.

The pharmaceutical industry, with \$28 billion, and the agricultural industry, with \$15 billion, have a very high output per worker. In general, for every \$1 of direct output generated from the life sciences industry, the indirect-and-induced output contribution was \$1.88.

# Illinois Life Sciences Economic Output (\$ Billions)



Source: TECOnomy State Bioscience Report

Illinois residents employed by the life sciences industry earn wages that are more than 120% higher than the average Illinois resident. The mean total compensation of people working in the life sciences industry was \$129,866 in 2016.



### Illinois Life Sciences Wages (2016)

What's more, annual pay for the life sciences industry continues to exhibit strong growth.



Wages in the Illinois life science community experienced a 10.5% growth from 2014-2016, outpacing the Illinois average wage growth of 4.7% and the national life sciences wage growth of 3.1%.

Because employees are highly compensated, the life sciences industry provides significant state and local tax contributions; in 2016, they paid \$1.49 billion in Illinois taxes, including taxes on indirect and induced activity.

In summary, our community has a significant impact on the Illinois economy. Investing in this valued industry yields a strong return by supporting a large service industry statewide, and will contribute substantially to improving the economic health of local and state government.

#### Illinois Innovative Economy

Among all US industries, life sciences has the highest percentage of research and development (R&D) investment of any US industry. According to publicly available reports, Illinois-based life science companies spent over \$14 billion in R&D last year. The pharmaceutical industry was the largest contributor at more than \$10 billion, with medical device companies reporting just over \$3 billion in R&D expenditures. The agricultural industry is not as research intensive as pharmaceuticals and medical devices, but major food processing companies in Illinois reported just over \$218 million in R&D last year.

Small and emerging medical device and pharmaceutical companies are at the forefront of the search for new cures and therapies. These companies are fueled by research at Illinois-based academic institutions.

Illinois is home to 11 research universities with spending of more than \$1.4 billion in R&D last year. Illinois universities have steadily increased their R&D expenditures. R&D at Illinois academic research centers has increased by \$33 million since 2014.



#### Life Sciences Academic R&D (\$ Millions)

Source: TECOnomy State Biosciences Report



National Institutes of Health (NIH) funding directly impacts trends in bioscience-related academic research. For several years iBIO and other groups and associations have raised concerns about declining NIH research budgets and the corresponding effect on academic research. Fortunately, NIH funding is on the rise. Budget increases have been sustained each of the last three years, with FY 2016 - 2018 R&D budgets increasing an average of 4.8% annually. This increase has translated into a growing funding base for research awards in Illinois. This expansion in R&D at Illinois universities can be attributed in part to their success in obtaining federal funding.



#### Illinois NIH Awards (\$ Millions)

Patent production is a key indicator of the commercialization activities of research from Illinois universities. Since 2011, Illinois life sciences patents have increased by just over 26%.





According to a recent innovation report by the Illinois Science and Technology Coalition (ISTC), over the past five years Illinois patent production outpaced the national average with an increase of 7.2% in patent awards during that same time period. The ISTC report announced a 135% increase in startup companies launching from Illinois universities over the past five years.

To support the development of new companies emerging from university laboratories, major Illinois research institutions, including Northwestern, University of Chicago, Rosalind Franklin University and University of Illinois have built out supportive services to increase startups including incubation space and proof-of-concept investments.

In addition to the universities, private and non-profit organizations have developed a robust state-wide network of 50 incubators, 30 accelerator programs, over 20 angel investment groups and 70 VC funds to support the growing startup community in Illinois.

Small and emerging biopharma companies operate without profits or even revenues yet are able to devote substantial resources toward their R&D efforts through various funding mechanisms. This would not be possible without the VC investors that provide the necessary backing for biopharma startups to operate during the long R&D time frame.

While historically access to VC investment for the Illinois life sciences industry has been a challenge, that trend is starting to turn around. Illinois VC investment in 2017 and 2018 showed considerable growth from previous years.



## **Illinois Life Sciences Venture Capital Investments**



Looking at the sub sectors, the majority of the VC investment was for health technology and for pharmaceutical development.



#### Life Sciences Investment by Segment

Medical device venture capital investment in medtech has declined over the past several years. As a result many startup medical device companies are struggling to make it out of the "valley of death". While large medtech companies depend on a thriving external innovation ecosystem for acquisition targets and new sources of growth, many shy away from investing in early-stage, unproven technologies.

Recent reports shows encouraging signs of a reversal of this long-standing trend. Total venture investment in medtech increased nearly 60 percent from \$5.8 billion to \$9.0 billion nation wide (Global Data, "Medical Intelligence Deals Database,"). The nature of early-stage deals suggests this reversal might be driven in-part by interest in digitally-enabled devices, as investors are interested in digitally-enabled diagnostics.

Ag and especially "ag-tech" funding continues to trend upward. The last 10 years have seen remarkable growth in agtech investment nationwide, with \$ 6.7 billion invested in the last 5 years and \$ 1.9 billion in the last year alone, as shifting consumer preferences drove a funding surge in burgeoning investments areas such as alternative proteins (Finistere Ventures 2018 Agtech Investment Review).

Source: TECOnomy State Biosciences



#### Commitment to Patients and the Community

Illinois life sciences companies are committed to expanding the boundaries of science by discovering, developing, and delivering innovative and needed medications to patients.

To that point last year, Illinois-based biopharma companies helped over 400,000 patients receive the medications they need through the companies' financial assistance programs and participation in the Partnership for Prescription Assistance (PPA). Founded in 2005, the PPA helps people connect to patient assistance programs (PAPs), which serve as critical safety nets for the millions of Americans who lack health insurance or whose insurance does not sufficiently cover the cost of the medicines they need.

Also last year, industry sponsored over 1,200 clinical trials in Illinois, with an estimated enrollment of over 20,000 Illinois residents at clinical sites located throughout the state.

Clinical trials for new medicines are a vitally important part of the drug development and approval process—they account for 45 to 75 percent of the \$2.6 billion average cost of developing a new drug and are conducted to determine the safety and effectiveness of that treatment in patients.

In Illinois, pharmaceutical companies benefit from conducting their trials at the states' highly respected university medical schools, comprehensive cancer centers and clinical trial research centers. Illinois is home to a number of the nation's top research-oriented medical schools, University of Chicago's Pritzker School of Medicine, Northwestern University's Feinberg School of Medicine, the University of Illinois College of Medicine, Rush University College of Medicine and the Stritch School of Medicine at Loyola University ranked.

The Battelle Technology Partnership Practice estimates the industry's 2018 investment in clinical trials in Illinois was nearly \$250 million.

Illinois life sciences companies are also committed to the communities where they are located. From STEM programs to coat drives and other community assistance services, Illinois life sciences companies reported providing over \$65 million in support to local charities in 2017.



# MEETING THE FUTURE NEEDS OF A CHANGING COMMUNITY

Growth in the Illinois life sciences industry traditionally has been a result of the expansion or relocation of large corporate headquarters. For the past two years Site Selection Magazine has named Chicago as the top location among all large US metropolitan areas for corporate facility investment projects.

Early in the 2000's Chicago attracted a number of corporate expansions and relocations, including Astellas, Takeda, Lundbeck and Vetter Pharma. Recent state and local efforts have focused on attracting these large corporate investments into Illinois.

But over the past couple of years we have started to see a dramatic shift in the makeup of the life sciences community in Illinois and across the US. This change is partially driven by mergers and acquisitions and also by the growing importance and number of R&D stage companies. The graph below provides an illustration of the momentum in the Illinois life sciences industry.



Since the spin off of Baxalta from Baxter and AbbVie from Abbott, trends in industry mergers and acquisitions activity have continued to shape the Illinois community. Starting with Hospira's acquisition by Pfizer, Baxalta's acquisition by Shire and the subsequent acquisition by Takeda and the announcement that Takeda is moving its headquarters to Cambridge, Mass., the makeup of the Illinois life sciences community has undergone significant changes



#### New Enterprises Will Drive Growth

Meanwhile, as reflected in the reported economic numbers, Illinois universities have dramatically shifted their focus and resources to increasing the number of startup companies spinning out of university research. Another noteworthy trend is that industry executives are leaving major pharmaceutical companies and building successful startups and R&D-stage companies. Last year our community had 3 IPO's and the acquisition of AveXis by global pharmaceutical giant Novartis. All four companies are led by former industry executives from major companies.

Startup and R&D-stage companies represent 90% of the industry and 70% of the global clinical pipeline and are critical to the pipeline of new innovative therapies for patients. The larger corporations rely on the ability of these companies to access VC funding so they can ultimately form strategic alliances to successfully translate novel therapeutics into approved medical products for patients. Those financing deals provided \$4.4 billion in up-front payments to small companies in 2017 in the US.

It takes a complex web of resources to ensure that new companies can form and succeed while remaining in Illinois. To support their continued growth, state, local and private sector resources need to be realigned to increase investment into needed infrastructure expansions and improvements and increase access to early-stage capital.

For emerging life sciences startups in Illinois, the availability of quality laboratory space is one of the most crucial components for continued growth, innovation and development, and yet it is one of Illinois' scarcest resources (see table below).

Region	Inventory 🔺	Vacancy Rate
Boston-Cambridge	28,762,120	4.6
San Francisco Bay Area	24,500,000	2.6
New Jersey	18,200,000	8.6
San Diego	14,931,613	6.4
Philadelphia	9,573,478	8.5
Washington DC/Baltimore	7,800,231	3.3
Raleigh-Durham	4,113,892	22.1
Chicago Metro	2,964,790	3.5

#### **CBRE Lab Market Stats**

Year End 2018

Source: CBRE: 2019 US LIfe Sciences Clusters Report



In CBRE's 2019 US Life Science Clusters report, the overview for Chicago cited a number of positive trends in the areas of community growth and VC investment, but it also named a critical lack of space infrastructure to support the continued growth of the community as a shortcoming of our region.

Startup companies needing less than 1,000 square feet (sqf) and growth-stage companies in need of 5,000 sqf or more of lab space simply have nowhere to go in Illinois.

Larger life sciences companies looking to expand or relocate R&D or manufacturing facilities to Illinois do not have an option to move into pre-existing space; they must build-to-suit. This circumstance results in creating a more expensive option for these companies than other communities where we are seeing accelerated life sciences industry growth.

Recently developers have been expanding in Illinois to meet the increasing demand for lab space. Rosalind Franklin University's Science and Innovation Research Park in North Chicago will open in the summer of 2019 with 100,000 sqf of newly constructed lab space. Sterling Bay purchased the old Stanley Manne Children's Research Institute in the Lincoln Park neighborhood of Chicago, where 120,000 sqf of renovated lab space will be available later this year. And the ISTP intends to renovate 146,000 sqf of available space. Future expansions include the University of Chicago's Polsky Center, which will add 280,000 sqf of office and lab space in Hyde Park by 2022.

Yet Illinois needs even more development for industry collaboration with university research and space for startup and growth-stage companies to realize our full potential.

#### **Seeking Capital**

In addition to space, expanded access to capital is a prerequisite for sustaining our community's growth. While the trend in VC investment in Illinois has increased, comparatively, Illinois receives a small fraction of investment.



#### Life Sciences Venture Capital by State

Source: TECOnomy State Biosciences Report



As the startup community continues to grow in Illinois, venture investment is likely to increase, but efforts to attract and develop venture funds would help enhance the state's VC position. Bridging the proof-of-concept gap and helping companies meet critical milestones to attract venture capital will be critical to the success of startup companies in Illinois.

Increasing access to non-dilutive federal grants and SBIR/STTR grant funds also will be important. The federal SBIR/STTR program provides more than \$2.5 billion annually in grants from 11 federal agencies designed to help small businesses nationwide create and commercialize new innovations and technologies. The program consists of three phases:

- Phase I awards range from \$75,000 to \$150,000 to support feasibility studies
- Phase II awards range from about \$250,000 to \$1,000,000 to support R&D efforts
- Phase III entails commercialization based on successes achieved through the first two phases, but funding generally comes from outside of the federal program

Despite the size of Illinois, our 11 research universities and growth in the startup ecosystem, Illinois receives a disproportionally small amount of SBIR Phase I awards compared to other states.



#### **SBIR Phase I Awards by State**

2007 - 2017

Source: SBIR.Gov: https://www.sbir.gov/sbirsearch/award/all

States with an (\*) listed above also provide matching state funds for SBIR Phase I awards.



IBIO is working on a three-phase approach to increasing non-dilutive funding for Illinois companies.

- 1. Through monthly reports, iBIO will provide notification of available federal non-dilutive grant opportunities.
- 2. iBIO will provide consulting and training services to assist Illinois companies in applying for non-dilutive federal grants.
- 3. Working with state lawmakers and the governor's administration, iBIO introduced legislation to provide matching state funds for SBIR Phase I grants. Fourteen states currently provide state matching funds for Federal SBIR grants, in the graph above, the states with an asterisk provide at least a 50% state match up to \$50,000 to Federal SBIR grants.

Finally, increased federal funding for the SBIR/STTR program and the NIH will continue to help fuel the startup life sciences ecosystem in Illinois. iBIO and its members actively participate in advocating for this vital financial support.



# Leading States, NIH Funding

Source: TECOnomy State Biosciences Report

While NIH funding has increased over the past couple Illinois share of NIH funding is low. For Illinois public universities to rebound from the two-year state budget impasse, increased funding to rebuild the research infrastructure and system is needed and will impact future NIH investment into Illinois.

Governor Pritzker's proposed FY2020 budget includes a \$132 million, or 7.4 percent, increase in funding for higher education over FY2019 levels. While this is a step forward in the right direction, this may not be enough to fully reverse the damage caused by the budget impasse. According to the Center For Tax And Budget Accountability, to fully restore colleges' and universities' funding to what it was before the major cuts they experienced during the



impasse, overall higher education appropriations would have to increase by at least \$204 million. Given the state's financial challenges, the Governor's commitment to increasing funding is a step in the right direction

At the federal level, in addition to increasing investment into the NIH, it is also important to preserve the Bayh-Dole Act which encourages private-sector investment needed to turn basic government-funded basic research into tested and approved products benefitting the US economy and patients.

The Bayh-Dole Act, enacted in 1980, placed patent ownership of federally funded research at universities in the hands of the university and enabled universities to out-license technologies for commercialization. As a result of the Act, more than 11,000 startup companies have been created and more than 9,000 new products have been made available to patients and other consumers.

Illinois universities rely on licensing deals related to university research as a source of revenue. Over the past five years, Illinois universities have reported \$1.25 billion in revenue from these licensing deals. The funds from licensing deals are used differently at every university but a portion of the funds are allocated to the researcher of the licensed technology, and into funds for future R&D and general campus funds.



# CONCLUSION

As this report documents, Illinois has a large and growing life sciences industry that is a major contributor to the Illinois economy, its residents and to patients across the world.

Despite current trends continued growth in the Illinois life sciences community is not guaranteed. Recent major life sciences acquisitions of Illinois companies are leading to a reduction in large companies and related employment in the state. Meanwhile, an increase in commercialization at Illinois universities and the growth in the number of smaller R&D stage companies will drive the future expansion of the Illinois life sciences industry.

To support the growth of the life sciences industry in Illinois, state and local governments will need to realign policy and community resources into three key areas:

- 1. Expanding access to early-stage financing, including updating and funding Illinois' SBIR Matching program and expanding federal investment into the program.
- 2. Supporting development projects to address Illinois' critical lack of lab space.
- 3. Increasing investment in academic research at the state and federal levels, and encouraging private-sector investment by protecting key provisions in the Bayh-Dole Act.

From our community's resources to our world-class research institutions to the business leadership in the state, the Illinois life sciences industry is perfectly positioned for continued growth. iBIO believes a strong and consistent commitment by our government partners is critical to maintaining an ecosystem for success in Illinois. When government, industry, and academia work together, our community thrives.

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