

MASSBIO

2023 Industry Snapshot

massbio.org/industry-snapshot

Letter from the CEO & President



Dear Reader —

Across the following pages, you will find the 2023 MassBio Industry Snapshot — a moment in time for the Massachusetts life sciences industry.

This year's Snapshot is evidence of the resilience of the local ecosystem, showing that despite some of the toughest times for biotechs, the Massachusetts biopharma workforce still grew by nearly 7% in 2022, the most recent metric available. More recent data released this summer by JLL suggests that the growth is continuing, with biopharma job openings increasing every month since March, with Massachusetts leading the way with 17,700+ postings. We never like to see company closures or layoffs, but we also know the nature of our industry is one of big risks for researchers, founders, and investors, and big rewards for patients with unmet medical needs around the world.

We are optimistic that we are emerging from what was the perfect storm for a sector that was left exposed to a cooling off after a red hot 2020 and 2021. We had some investors going elsewhere, while most others pressed for more data. Wall Street remained closed to new biotechs. Pharma stayed on the sidelines. To add insult to injury, macroeconomic conditions like inflation and rising interest rates hamstrung the global economy.

Why am I hopeful heading into 2024 and beyond? Let's look at some of the data in the Snapshot:

- Massachusetts is continuing to establish itself in biomanufacturing, and that growth is not happening in Middlesex County (aka Cambridge), but in Suffolk County (+29.1 percent) and Worcester County (+18.4 percent).
- Massachusetts companies raked in 32 percent of all national VC dollars, with an average round of funding of \$34.2 million compared to \$15.6 million nationally.

- Eleven Massachusetts headquartered companies have been acquired this year for a disclosed total of \$10.47 billion (vs. \$4.47 billion over the same time last year).
- There is now nearly 62 million square feet of lab and manufacturing space across Massachusetts.

The industry in the Commonwealth is regionalizing and diversifying. While seed fundings may be down, homegrown companies are still seeing their science funded in Series A and beyond and doing so in many cases outside Boston and Cambridge. An uptick in merger and acquisition activity is a good sign and one that should be a positive signal to investors. Though the lab market has softened, the availability of space means that companies can get the space they need right now, rather than banking on it for the future. With one company having gone public via IPO in Q3 and another filing to do so, we could be looking at a thawing of the public market winter.

Partnerships between industry and government have stood the test of time and this collaboration must continue if our state is to remain in a leadership position. Massachusetts has long been the envy of the world in R&D. To extend that lead and write our next chapter, we must be laser focused on certain things. Skills training, workforce diversity, regionalization, biomanufacturing — advancing each is dependent on ongoing investment and cooperation. I am confident that the relationships that have been forged on Beacon Hill will ensure our companies, especially pre-revenue biotechs — the most vulnerable part of our ecosystem — can continue to grow and deliver for patients.

This year, you'll notice we've brought in other voices to speak to the data and read the tealeaves. I hope this latest edition of the MassBio Industry Snapshot proves useful to all who utilize it.

Kendalle Burlin O'Connell
CEO & President, MassBio

Acknowledgements

Gratitude to the industry leaders who provided their commentary in this year's Snapshot:

Governor Maura Healey, Lieutenant Governor Kim Driscoll, Andrew Adams, Noubar Afayen, Vivek Arora, Christopher Coburn, *Robert Coughlin*, *Chris Garabedian*, *Gary Gilheeny*, Julie Gilmore, *Dennis Huang*, Bill Kane, Julie Kim, Rep. John Lawn, Jeffrey Leerink, Geoff Meyerson, *Bill Sibold*, Navjot Singh, Steve Walsh, and Hann Yew.

Note: MassBio Board of Directors members are italicized.

Executive Summary

The Massachusetts life sciences industry experienced greater employment growth in research and development than its direct competitor states and continued to establish the state as a biomanufacturing destination despite a challenging economic environment and layoffs.

- The biopharma research & development workforce experienced year-over-year employment growth of 8.5%, outpacing California (6.8%), demonstrating resilience in the face of headwinds.
- At a growth rate of 6.3%, Massachusetts outpaced nearly all its competitors in biomanufacturing jobs added, with California, Texas, and New York all experiencing negative growth.

Though venture capital (VC) funding in the biopharma industry is lower than recent record setting years, the first half of 2023 saw historically healthy investment and found Massachusetts companies receiving a larger share of national VC dollars.

- In the first half of 2023, Massachusetts-based companies received \$3.73 billion, a total more in line with the \$3.49 billion received over the first 6 months of 2018 rather than the pandemic inflated totals of 2020-2022.
- Massachusetts headquartered biopharma companies received 32% of all VC dollars invested in the industry – up from 26% last year and second only to California (36%).
- Communities outside Cambridge kept pace with last year's trend by receiving more than half of the total VC funding (55%) than the industry hub, with clusters located in Boston, Waltham, and Watertown leading the way.

Pandemic era development has created an inventory of new life sciences lab and biomanufacturing space across the Commonwealth that has flipped the real estate market from an unhealthy one marked by low vacancy rates and climbing rents to one that offers more options to more lessees in more places.

- Construction was completed on 6 million square feet (SF) of life sciences-specific space across Massachusetts in 2022, giving the industry a total inventory of more than 61.9 million SF.
- With available space now more than meeting demand, pipeline projections are dramatically smaller (between 14 and 17 million SF).

Due to this, Massachusetts plays an outsized role in addressing the world's unmet medical needs through its biotechs, working on more complex drug development, and the R&D operations of the largest pharmaceutical companies. With a preponderance of pre-revenue companies, however, the Commonwealth is also more susceptible to fluctuations in the investment environment and major public policy changes.

- While down slightly from last year's report as a percentage of the U.S. pipeline (14.9% vs. 15.6%) and omitting companies operating but not headquartered here, Massachusetts' drug development pipeline (2,010) reflects a scale that is nearly half of China's total pipeline.
- The nature of Massachusetts' ecosystem makes it more sensitive to investment fluctuations and the negative impacts of government policies curtailing innovation. That said, ongoing and targeted state support can counter these realities and continue to protect the Commonwealth's leadership in patient driven R&D and drive economic development and job creation.

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Industry Employment: Biopharma

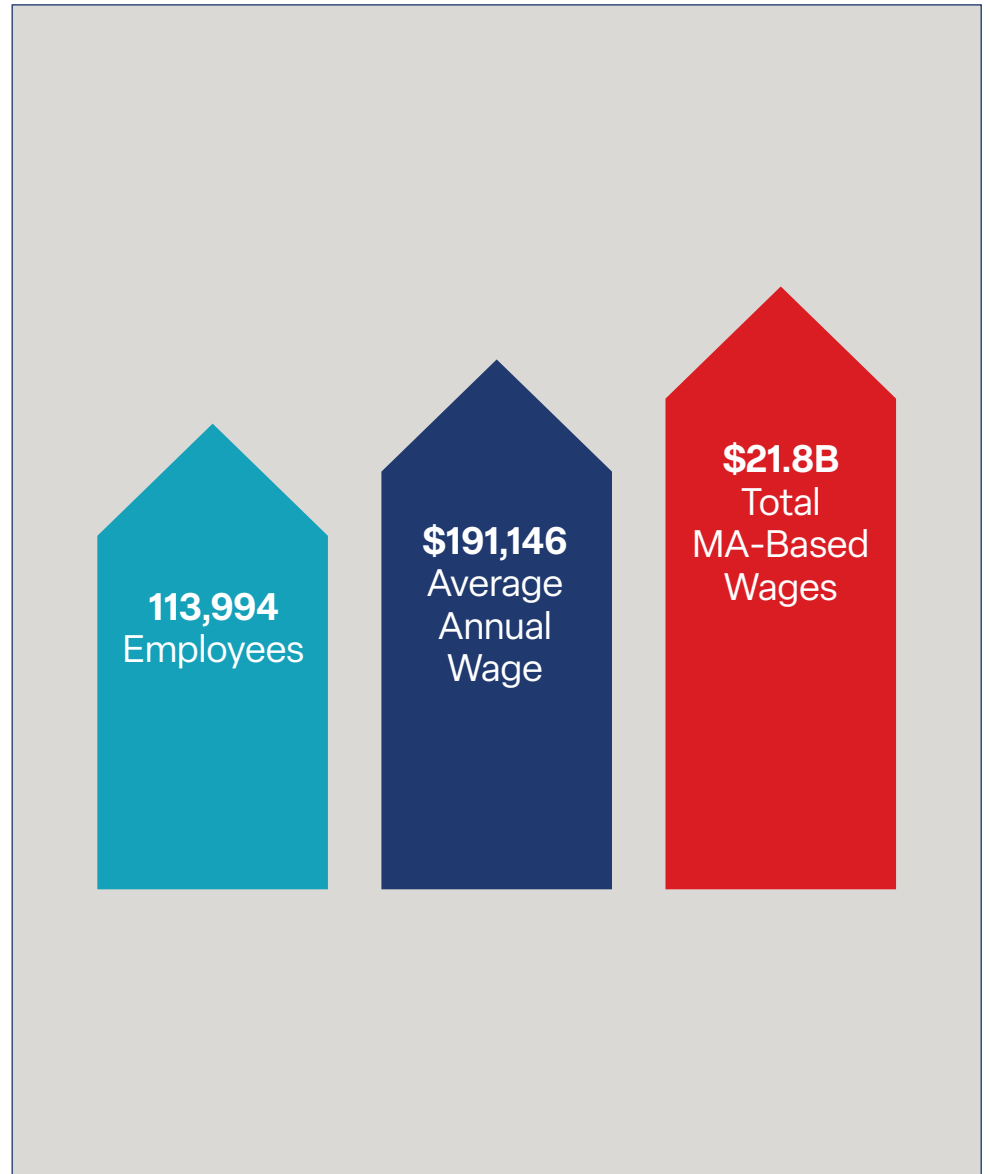
Industry Employment: Biopharma

Economic Impact, 2022



“MassBio’s 2023 Snapshot outlines what we have long known to be true — Massachusetts is the global epicenter of the life sciences industry. We are the home of life-changing innovation because we have recognized the unique opportunity to harness the incredible talents and resources that we have here, and back them with real investments. Our administration remains committed to partnering with the industry to support our workforce, expand new opportunities through job training, and continue to inspire innovation.”

— **Governor Maura Healey**, Commonwealth of Massachusetts



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW)

Massachusetts Biopharma Industry Employment

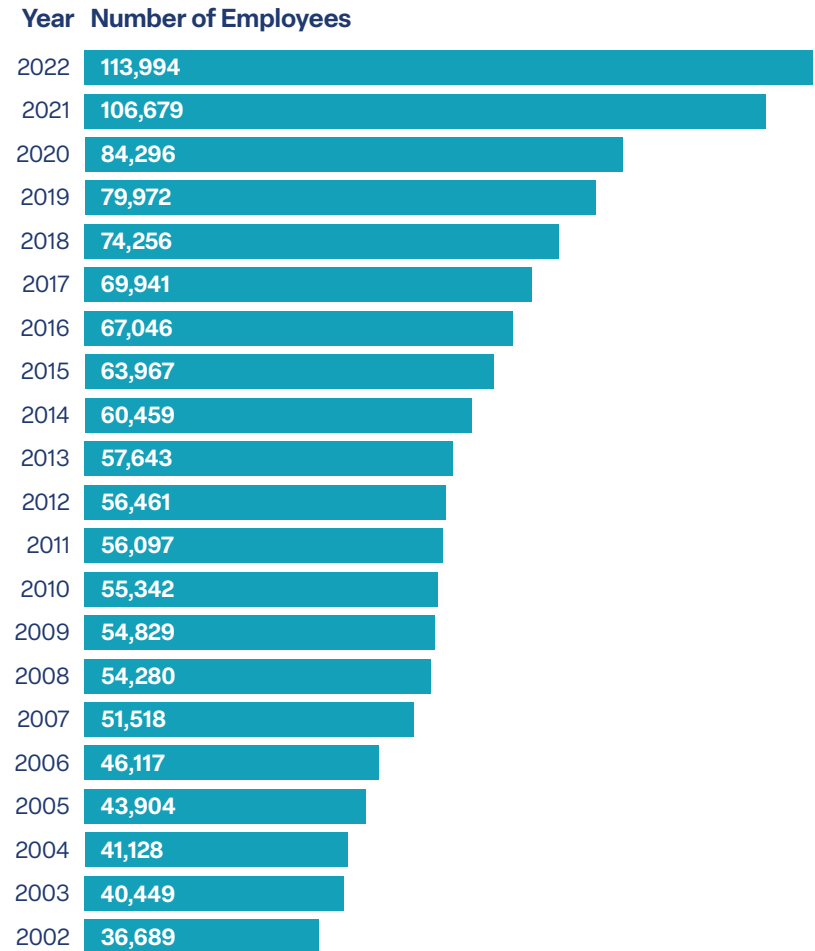
- In 2022, biopharma employment in Massachusetts grew by 6.9%.
- Since the Massachusetts Life Sciences Initiative was passed in 2008, biopharma employment grew by 110%.



“Sanofi’s newest campus, Cambridge Crossing, opened in 2022 where our Massachusetts-based Research & Development (R&D), Medical and the Specialty Care business unit teams, among others, help develop

transformative treatments for patients. Grounded by our rich heritage and driven by our patient-focused, science led approach, we are proud of our long-history in Massachusetts and our unwavering commitment to the communities where we live and work across the Commonwealth.”

— **Bill Sibold**, Executive Vice President,
Head of Global Specialty Care, Sanofi



Footnote: In response to the changing life sciences industry, MassBio revised the NAICS codes we use to measure total biopharma employment in 2021.

Source: Privately owned companies, U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW)

Year-Over-Year Research & Development Job Growth

- Massachusetts' R&D workforce continued to grow faster than direct competitor states.
- Despite its dramatic growth on a percentage basis, North Carolina has a limited drug pipeline that leans toward traditional small molecule drugs.

Research and Development Employment

| | 2021 | 2022 | % Change |
|----------------------|---------------|---------------|-------------|
| North Carolina | 14,692 | 16,857 | 14.7% |
| Massachusetts | 59,172 | 64,195 | 8.5% |
| Pennsylvania | 18,869 | 20,161 | 6.8% |
| California | 65,978 | 70,465 | 6.8% |
| New Jersey | 17,476 | 17,805 | 1.9% |



“Massachusetts is the hub of life science innovation for the world. At the very foundation of this ecosystem is a diverse array of small but ambitious biotechs that are developing cutting-edge solutions to everything from rare diseases to cancer, to pandemic infectious disease, to devastating chronic conditions such as cardiovascular and Alzheimer’s disease, and to agricultural carbon emissions. When thought of as one collective entity, this Massachusetts ecosystem is the most powerful agent changing the course of human health and wellbeing.”

— **Noubar Afeyan**, Founder and CEO, Flagship Pioneering

Industry Employment: Biopharma

Year-Over-Year Biomanufacturing Job Growth

- Massachusetts continues to grow as a biomanufacturing destination, largely outside urban settings, to serve companies with their R&D located here.
- Massachusetts has an opportunity to lead in the expanding cell and gene therapy and personalized medicine sectors that require manufacturing in close geographic proximity to R&D.

Biomanufacturing Employment

| | 2021 | 2022 | % Change |
|----------------------|--------------|---------------|-------------|
| Florida | 10,220 | 11,103 | 8.0% |
| Massachusetts | 9,831 | 10,493 | 6.3% |
| New Jersey | 26,447 | 28,068 | 5.8% |
| Maryland | 10,506 | 11,012 | 4.6% |
| Pennsylvania | 20,088 | 20,770 | 3.3% |
| North Carolina | 24,286 | 24,733 | 1.8% |
| New York | 24,615 | 24,406 | -0.9% |
| Texas | 14,321 | 14,079 | -1.7% |
| California | 51,693 | 47,141 | -9.7% |

Source: Privately owned companies, U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW)



“With our roots in academia, technology transfer has played a key role in the commercialization of new products. For more than 30 years, Organogenesis has been manufacturing in Massachusetts, alongside R&D, quality and regulatory. The advantages of centralized operations include proximity to internal expertise to ensure quality and improve yields – and access to an incredible pool of talented individuals. As we look to expand our manufacturing footprint, a trained and available workforce is a key factor in choosing a site in Massachusetts.”

— **Gary Gillheeny**, President, Chief Executive Officer and Chair of the Board, Organogenesis



“Companies, especially gene therapy biotechs like Ultragenyx, want—really need their manufacturing to be close to their R&D. With our Massachusetts R&D in Cambridge and Woburn, Bedford was a natural choice for a manufacturing site. Continued intentional public-private partnerships focused on manufacturing talent and manufacturing preparedness can accelerate Massachusetts’ opportunity to be a manufacturing hub. This will also strengthen the emerging cluster development outside of Boston and Cambridge.”

— **Dennis Huang**, Chief Technical Operations Officer; EVP Gene Therapy at Ultragenyx

Industry Employment: Biopharma

Largest Biopharma Industry Employers in Massachusetts



“Massachusetts is a global leader in the life sciences industry with a thriving ecosystem of innovative companies, world-renowned hospitals and top academic institutions. Takeda is proud to contribute to the continued growth of

this important science innovation hub, and we support the state’s commitment to fostering a dynamic environment that attracts investment, drives collaboration, builds talent and advances patient care.”

— **Julie Kim**, President, U.S. Business Unit and U.S. Country Head, Takeda

| Rank | Company | Massachusetts Employees |
|------|----------------------|-------------------------|
| 1 | Takeda | 6,290 |
| 2 | Sanofi | 4,600 |
| 3 | Moderna | 4,163 |
| 4 | Vertex | 3,400 |
| 5 | Pfizer | 3,012 |
| 6 | Novartis | 2,500 |
| 7 | Biogen | 2,100 |
| 8 | Bristol Myers Squibb | 1,850 |
| 9 | AbbVie | 1,560 |
| 10 | AstraZeneca/Alexion | 1,400 |
| 11 | Alnylam | 1,159 |
| 12 | Foundation Medicine | 1,100 |
| 13 | Merck | 955 |
| 14 | Sarepta | 735 |
| 15 | Ginkgo Bioworks | 726 |
| 16 | Alkermes | 700 |
| 17 | EMD Serono | 618 |
| 18 | Beam Therapeutics | 550 |
| 19 | GlaxoSmithKline | 432 |
| 20 | Amgen | 407 |

Source: MassBio Membership Reports & Surveys

Industry Investment

Top NIH-Funded States by Total Funding & Per Capita in 2022

- Despite being home to just 2% of the US population, Massachusetts entities received 9% of all NIH (National Institutes of Health) funding.
- Massachusetts organizations received an even further outsized portion (11.7%) of SBIR/STTR grants that fund startups and small businesses.

| State | Number of Awards | Total NIH (National Institutes of Health) Funding |
|----------------------|------------------|---------------------------------------------------|
| California | 9,096 | \$5,477,694,813 |
| New York | 6,259 | \$3,436,575,824 |
| Massachusetts | 5,810 | \$3,281,811,936 |
| Maryland | 2,950 | \$2,407,450,506 |
| Pennsylvania | 4,258 | \$2,193,635,123 |
| North Carolina | 2,860 | \$2,164,552,282 |
| Texas | 3,567 | \$1,783,589,827 |
| Washington | 1,909 | \$1,460,071,410 |
| Illinois | 2,343 | \$1,197,971,579 |
| Ohio | 1,998 | \$952,937,316 |
| US Total | 64,185 | \$36,441,594,070 |

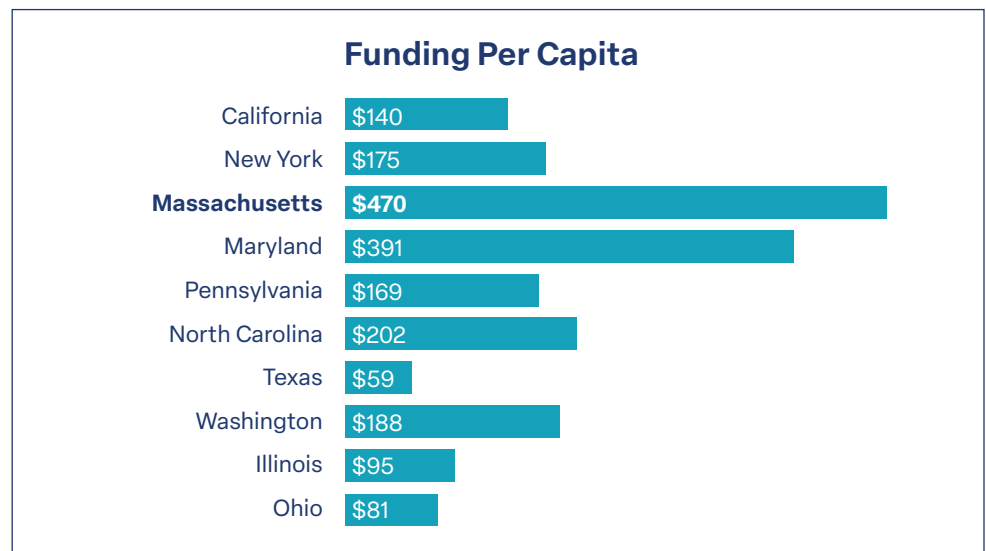
Source: NIH, Research Portfolio Online Reporting, U.S. Census Bureau



“While the capital markets continue to be challenging, the demand for breakthrough innovation remains strong and points towards a vibrant future especially in the Commonwealth. There are few, if any, places on the planet that rival Massachusetts for the density of discovery research, rapid translation and patient care.

We understand that power in new ways since the pandemic. That experience taught us the importance of ready access to innovation in every community and the consequences of falling short of that goal. The arrival of new federal translational funding through programs like ARPA-H should create new opportunities to address historic commercialization gaps while also increasing broader equity in access to the innovation it will enable.”

— **Christopher M. Coburn**, Chief Innovation Officer, Mass General Brigham



Top NIH-Funded Independent Hospitals in 2022

- Massachusetts hospitals received 51% of all NIH funding to independent hospitals – down from 54% in 2021.



“When federal investments come to Massachusetts, they help save lives. Whether it’s leading on COVID-19 vaccines or complex and rare diseases, it’s clear that the Commonwealth has never been a more trusted source for

healthcare innovation on the national stage. Our hospitals are proud to be part of a life sciences community that continues to transform historic NIH funding into historic strides for patient treatment.”

— **Steve Walsh**, President and CEO,
Massachusetts Health & Hospital Association

| Organization | State | Awards | Funding |
|------------------------------------------------------------------------------------------|-------|--------|----------------------|
| Massachusetts General Hospital | MA | 1,025 | \$559,991,048 |
| Brigham and Women's Hospital | MA | 662 | \$381,969,300 |
| Vanderbilt University Medical Center | TN | 565 | \$376,065,941 |
| Boston Children's Hospital | MA | 432 | \$215,757,651 |
| Cincinnati Children's Hospital Medical Center | OH | 328 | \$170,310,395 |
| Children's Hospital of Philadelphia | PA | 302 | \$154,733,483 |
| Dana-Farber Cancer Institute | MA | 252 | \$157,744,606 |
| Beth Israel Deaconess Medical Center | MA | 228 | \$126,775,422 |
| Cedars-Sinai Medical Center | CA | 190 | \$102,138,325 |
| Seattle Children's Hospital | WA | 174 | \$113,372,623 |
| St. Jude Children's Research Hospital | TN | 147 | \$102,714,393 |
| New York State Psychiatric Institute DBA Research Foundation for Mental Hygiene, Inc. | NY | 138 | \$75,638,339 |
| Rhode Island Hospital | RI | 88 | \$38,451,552 |
| Massachusetts Eye and Ear Infirmary | MA | 76 | \$38,909,599 |
| Roswell Park Cancer Institute Corp | NY | 76 | \$38,827,215 |
| McLean Hospital | MA | 73 | \$42,953,330 |
| Boston Medical Center | MA | 70 | \$37,757,599 |
| Children's Hospital of Los Angeles | CA | 67 | \$35,123,138 |
| Lurie Children's Hospital of Chicago | IL | 55 | \$30,020,714 |
| National Jewish Health | CO | 49 | \$29,699,122 |

Top Massachusetts-Based, NIH Funded Education & Research Institutes in 2022

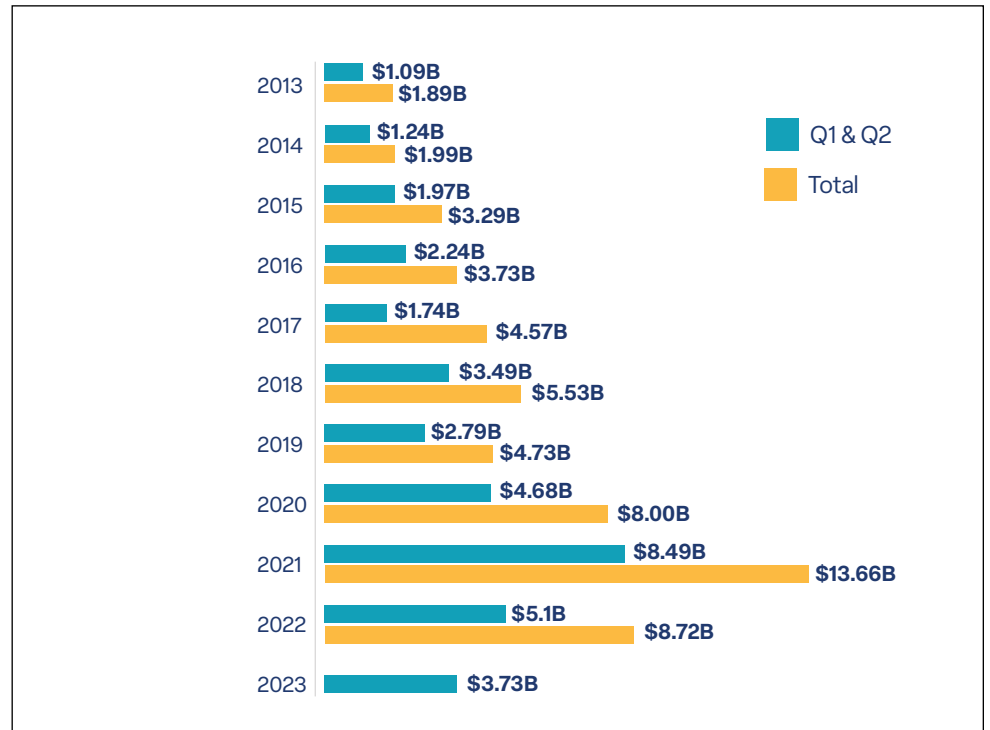
- Massachusetts higher education and research institutes received \$1.48 billion in funding from the NIH – a nearly 4% increase from 2021.
- Massachusetts' share of total funding decreased from 5% to 3.6%.

| Organization | Awards | Funding |
|------------------------------------------------------|--------|---------------|
| Broad Institute, Inc. | 98 | \$195,517,769 |
| University of Massachusetts Medical School Worcester | 349 | \$179,947,334 |
| Boston University Medical Campus | 307 | \$179,383,577 |
| Harvard Medical School | 362 | \$175,093,320 |
| Harvard School of Public Health | 173 | \$139,146,846 |
| Massachusetts Institute of Technology | 269 | \$117,827,905 |
| Harvard University | 138 | \$78,372,810 |
| Tufts University Boston | 156 | \$77,053,834 |
| Boston University (Charles River Campus) | 177 | \$76,670,836 |
| Northeastern University | 96 | \$43,124,004 |
| University of Massachusetts Amherst | 119 | \$39,491,245 |
| Brandeis University | 62 | \$27,829,588 |
| Joslin Diabetes Center | 37 | \$21,013,169 |
| Boston College | 40 | \$16,347,565 |
| Charles River Laboratories International, Inc. | 13 | \$16,346,266 |
| Schepens Eye Research Institute | 31 | \$12,799,447 |
| Whitehead Institute for Biomedical Research | 20 | \$11,530,273 |
| National Bureau of Economic Research | 23 | \$11,110,883 |
| Forsyth Institute | 19 | \$8,684,053 |
| Tufts University Medford | 27 | \$8,656,975 |
| Marine Biological Laboratory | 21 | \$7,879,826 |
| University of Massachusetts Lowell | 19 | \$7,465,327 |

Source: NIH, Research Portfolio Online Reporting, U.S. Census Bureau

Venture Capital Investment: Massachusetts-Headquartered Companies, Q1 & Q2, 2023

- The \$3.73 billion of venture capital (VC) invested in Massachusetts headquartered companies in Q1 and Q2 of 2023 is a 30% drop from the first half of 2022.
- Q1 & Q2 of 2023 represents the highest first half total for any year outside of the record setting years of 2020-2022 which were fueled by pandemic-inspired investing.
- Massachusetts-headquartered biopharma companies received 32% of all VC dollars invested in the industry – up from 26% last year – second only to California (36%) and more than all other states combined.
- Of Massachusetts-headquartered companies that received venture funding in the first half of 2023, 33% of R&D programs were focused on oncology, 25% on CNS, and 11% on anti-infectives.
- Massachusetts hospitals received 51% of all NIH funding to independent hospitals – down from 54% in 2021.



“The early VC market is still working through an era of exuberance leading into and through the Covid trade from 2018-2021 when an abundance of new companies were created with healthy financings. This led to an increased number of new company creations and healthy Series A rounds which led to an oversupply of companies that demanded Series B and Series C financings. While many VCs are focused on extending runway to existing portfolio companies and securing new investors into current portfolio companies, there has been a slowing down of new Series A investments while we achieve a healthy steady-stage of new investments. I expect that we are close to working through the excess inventory of early-stage biotechs and that 2024 will show signs of a healthier early-stage VC marketplace.”

— **Chris Garabedian**, CEO, Xontogeny

Top VC Financing Rounds for Massachusetts-Headquartered Companies, Q1 & Q2, 2023

- 104 Massachusetts companies received a total of 109 rounds of funding in Q1 & Q2 of 2023, down from 122 companies and 124 rounds in the first half of 2022. The average round of funding for MA companies was \$34.2 million compared to \$15.6 million nationally.
 - 2022 averages were \$35.3 million and \$28.8 million, respectively.
- The average seed round for MA companies was \$10.5 million – down from \$11.1 million in 2022.
- The average Series A round was \$57.8 million – up from \$50.9 million in 2022.
- Post-Series A rounds averaged \$106.5 – up from \$83.3 million in 2022.

| Organization | Series | Funding Amount (in millions) |
|-------------------------|------------|------------------------------|
| ElevateBio | Series D | \$401.00 |
| Orbital Therapeutics | Series A | \$270.00 |
| Upstream Bio | Series B | \$200.00 |
| Aera Therapeutics | Series B | \$193.00 |
| Alkeus Pharmaceuticals | Series B | \$150.00 |
| Ensoma | Series B | \$135.00 |
| Chroma Medicine | Series B | \$135.00 |
| Flare Therapeutics | Series B | \$123.00 |
| Cerevance | Series B | \$116.00 |
| Bicara Therapeutics | Series B | \$108.00 |
| Vedanta Biosciences | Series D | \$106.50 |
| Rapport Therapeutics | Series A | \$100.00 |
| Convergent Therapeutics | Series A1 | \$90.00 |
| QurAlis | Series B | \$88.00 |
| Ring Therapeutics | Series C | \$86.50 |
| Mediar Therapeutics | Series A | \$85.00 |
| Crossbow Therapeutics | Series A | \$80.00 |
| GC Therapeutics | Series A | \$80.00 |
| Avilar Therapeutics | Seed Round | \$75.28 |
| Nido Biosciences | Series B | \$74.60 |

Industry Investment

Location of VC-Backed Companies, Q1 & Q2, 2023

- 55% of funding went to companies outside of Cambridge.
- 8 municipalities in MA saw at least 1% of MA VC funding.



“Over the last five years we have seen the previously tight real estate inventory add more than 30 million square feet. The addition of this space is allowing and will continue to allow the most innovative and patient-focused companies in the world to grow at the speed and scale needed to ensure the best use of their capital. The ability to make business decisions that align with their true stage of growth will allow these companies to dedicate more resources to the aspects of their businesses that really create change for patients all around the world.”

— **Bob Coughlin**, Managing Director – Life Sciences and Healthcare, JLL



“As the biopharma industry expands outside of Boston and Cambridge, other municipalities are starting to see the direct benefits previously only seen by the urban core. Representing Waltham and Watertown, I have seen firsthand how the presence of this industry can positively impact a community. From a diversified tax base to consistent foot traffic, life sciences development has the ability to be an economic driver in addition to everything it does for patients.”

— **State Representative John J. Lawn, Jr.**, 10th Middlesex District, Chairman Joint Committee on Health Care Financing

MA VC Investment by Municipality



| Municipality | Total \$ Invested (in millions) | % of MA Total |
|--------------------|---------------------------------|---------------|
| Boston | \$935.53 | 25% |
| Cambridge | \$1,744.51 | 45% |
| Waltham | \$694.94 | 19% |
| Watertown | \$155.34 | 4% |
| Natick | \$91.00 | 3% |
| Lexington | \$37.05 | 1% |
| Newton | \$20.27 | 1% |
| Woburn | \$26.97 | 1% |
| Other | \$29.05 | 1% |
| Grand Total | \$3,734.66 | 100% |

Massachusetts-Headquartered Biopharma IPOs (Initial Public Offerings), Q1 & Q2, 2023

- No Massachusetts-headquartered biotechs went public in the first half of 2023. Just eight Massachusetts companies went public in all of 2022.
- Nationally, 10 companies went public in the first half of 2023 – down from 26 in 2022.
- At the time of publication, one Massachusetts company has gone public through an IPO in Q3 with another recently announcing intentions to do so.



“Unfortunately, we believe the current IPO market will remain challenging into 2024. On an absolute basis, IPO’s for Massachusetts-headquartered companies have declined 96% since 2021. However, on a relative basis, we’ve fared better than other

states, largely because of the quality, depth, and strength of our ecosystem. That bodes well for the future as the IPO market will likely open first for companies in Massachusetts and other centers of excellence.”

— **Geoff Meyerson**, CEO and Co-Founder, Locust Walk



“After the unprecedented and historic boom of IPOs during the pandemic, a cooling off period was inevitable. Especially with the Federal Reserve raising interest rates to combat inflation and its effect on risk-based assets. That said, we are seeing signs of the IPO market starting to rebound and expect IPO volume in 2024 to be double the 12-15 companies we project will go public in 2023. When we evaluate the 2024 class of IPOs, there is no question that Massachusetts, as an epicenter of company creation and innovation, will retain its outsized market share.”

— **Jeffrey A. Leerink**, Chief Executive Officer, Leerink Partners

Industry Investment

Top Massachusetts Biopharma Mergers and Acquisitions, Q1 & Q2, 2023

- Through Q2 of 2023, 11 MA-headquartered companies have been acquired for a disclosed total of \$10.47 billion. This is up from the same number of deals for \$4.47 billion over the same time last year.
- Through Q2 of 2023, MA-headquartered biopharma companies have acquired eight companies for a disclosed total of \$1.39 billion. This is up from 7 acquisitions for \$649 million over the same time last year.

MA HQ Companies Acquired in 2023

| Aquiring Company | Target Company | Amount |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------|
|  |  | \$6.0B |
|  |  | \$1.8B |
|  |  | \$952M |

MA HQ Companies Making Acquisitions in 2023

| Aquiring Company | Target Company | Amount |
|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------|
|  |  | \$1.0B |
|  |  | \$85M |
|  |  | \$79M |

Source: Pitchbook, July 2023

* Nimbus Lakshmi, Inc., a subsidiary of Nimbus Therapeutics, LLC.

Drug Development Pipeline

Drug Development Pipeline

Total Pipeline

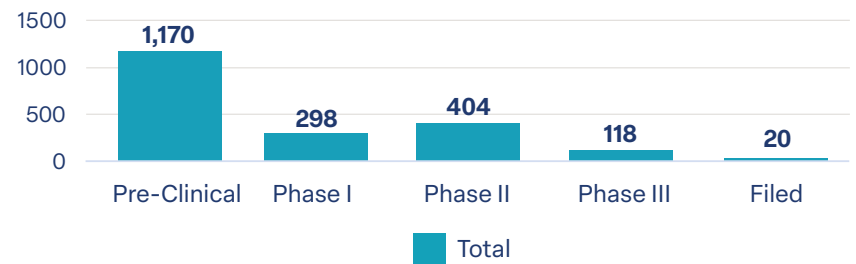
- The drug pipelines of MA headquartered companies make up 14.9% of the US pipeline and 6.5% of the global pipeline – down from 15.6% and 7.2% respectively in last year’s report.
- The most common therapeutic areas of the MA pipeline are oncology 34%, CNS 16%, and anti-infectives 10%.



“Massachusetts is already a global leader in biopharma R&D with ~25% of US biotechs headquartered in the state. The region boasts a deep and broad multi-modality pipeline with a strong focus on biologics. With a high concentration of this pipeline in biologics, there is a unique opportunity for Massachusetts to become a leader in biomanufacturing over time. With a robust demand likely to come from biotechs in the region, and one of the most advanced technology ecosystems, the state can become a global hub of cutting edge, advanced manufacturing. This can add \$6-8 billion to the state’s GDP and create 30-80K additional jobs in the region.”

- **Navjot Singh**, Senior Partner – Boston, McKinsey & Company
- **Vivek Arora**, Partner – Boston, McKinsey & Company
- **Hann Yew**, Partner – Boston, McKinsey & Company

MA-Headquartered Company Pipeline by Phase

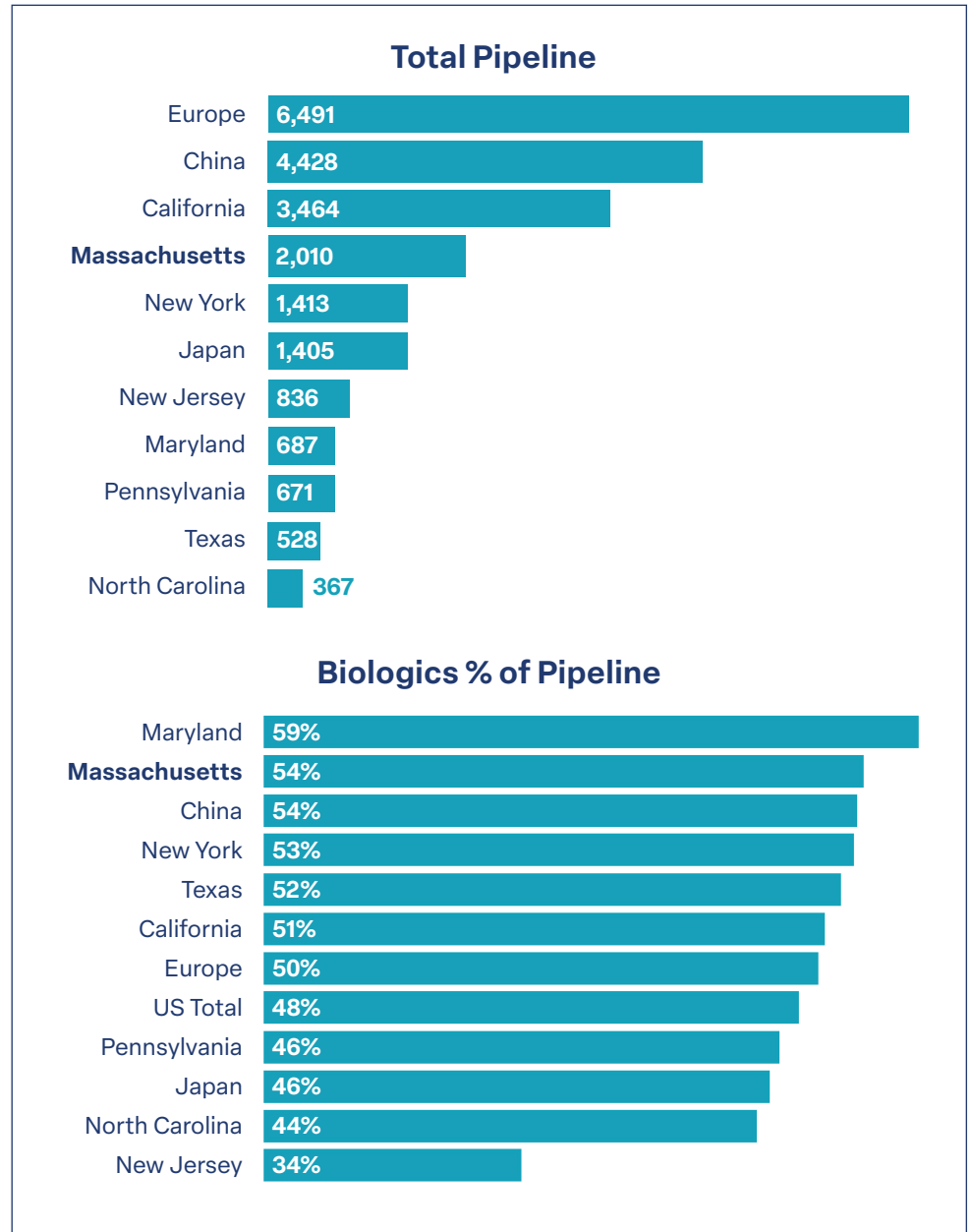


| Therapeutic Category | % of MA-Headquartered Drug Pipeline |
|--------------------------|-------------------------------------|
| Oncology | 35% |
| Central Nervous System | 16% |
| Systemic Anti-infectives | 10% |
| Various | 7% |
| Gastro-Intestinal | 5% |
| Immunomodulators | 5% |
| Musculoskeletal | 5% |
| Sensory Organs | 4% |
| Blood | 3% |
| Respiratory | 3% |
| Cardiovascular | 2% |
| Dermatology | 2% |
| Endocrine | 2% |
| Genito-Urinary | 2% |
| Grand Total | 100% |

Source: Evaluate, July 2023

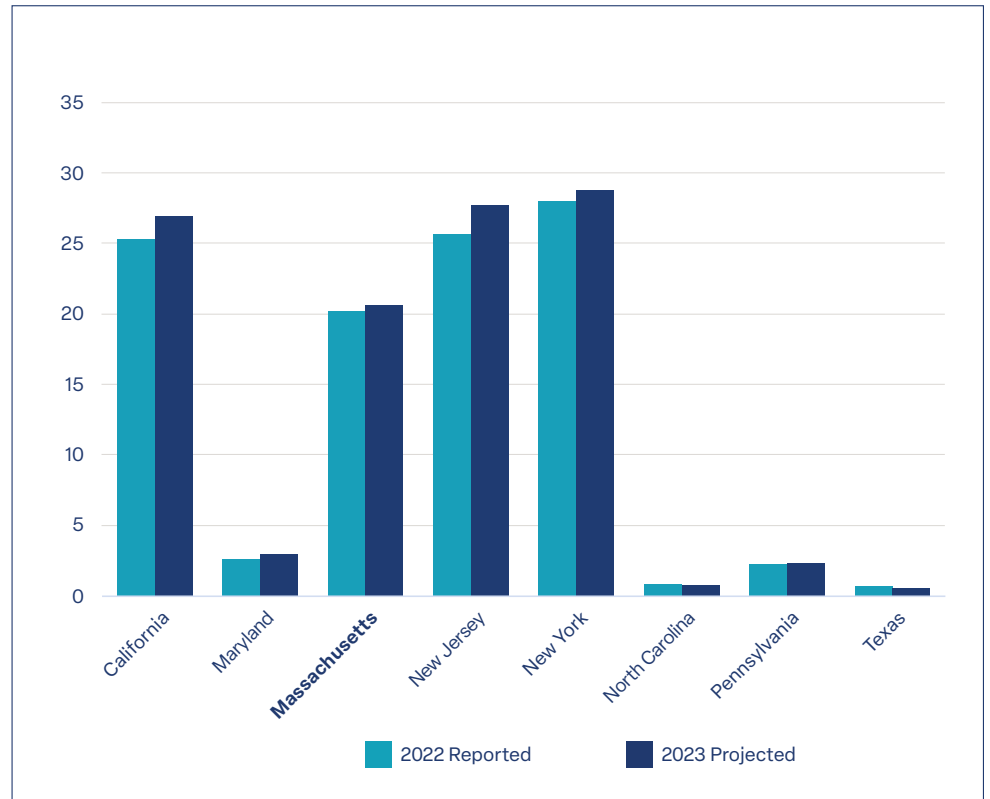
Pipeline Comparisons to Other Regions

- With a strong pipeline in biologics, Massachusetts is primed for continued expansion into biomanufacturing.
- Despite a population of fewer than 7 million, Massachusetts has a drug development pipeline nearly half of China's pipeline, a country with 1.3 billion people.



R&D Spend by Publicly Traded Companies

- The graph on the right includes megacap pharma. When excluding those and generics, Massachusetts companies have the second highest R&D spend – only behind California based companies.
- Under these parameters, Massachusetts companies make up 33% of the national R&D spend.
- Under the same parameters, Massachusetts biotechs have a median R&D spend making up 69% of total operating expenses.

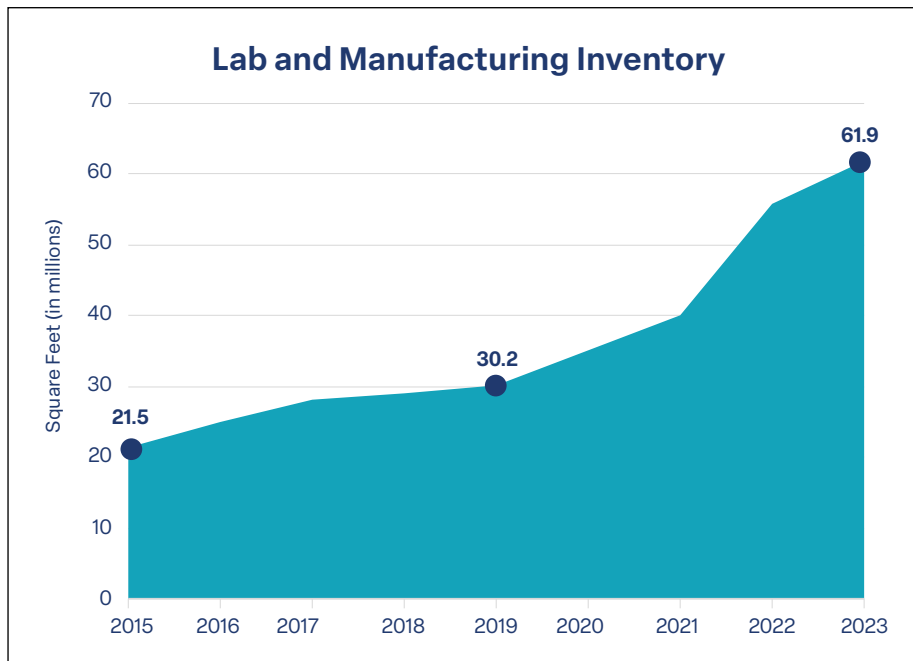


Source: Evaluate, July 2023

Real Estate and Regionalization

Total Life Sciences and GMP Inventory

- Construction was completed on 6 million square feet (SF) of life sciences-specific space in 2022, giving the industry a total inventory of more than 61.9 million SF.
- Pipeline projections range between 14 and 17 million SF to be added by the end of 2025.



Source: JLL, CBRE, and Colliers



“Looking through the lens of BioMed Realty, an owner and operator of over 16 million square feet of life science real estate within the US and UK, the addition of new life science facilities in Massachusetts is necessary to support the State’s global

leadership position in biopharma research and manufacturing and, regardless of market conditions, science will continue to move forward. It’s important to realize the extraordinary long term potential that Massachusetts carries with its current institutional and commercial base and the broader industry trend of clustering into areas like Cambridge, Somerville, and Boston, where R&D thrives in close proximity to unmatched levels of talent and programs. With a diversity in capital sources and a commitment to address current unmet medical needs, the life science industry has proven its resilience to push through previous business cycles and continue its upward trend in ushering in job growth and creating life-saving therapies. Thinking about Massachusetts specifically, our leadership position in the life sciences industry depends on this growth... growth in our supply-constrained R&D clusters, growth in state-based biomanufacturing facilities that support the speed, accuracy and personalization of new therapies, and growth in clinical facilities that maintain our trademark ‘bench to bedside’ approach to applying the latest technology in improving human health.”

— **Bill Kane**, President of East Coast and U.K. Markets, BioMed Realty

Largest New Massachusetts Lab and GMP Leases in 2022



“Lilly is expanding its presence in Boston, the world’s leading biotech corridor, through a \$700 million investment to establish a state-of-the-art R&D facility in the Seaport area. We are thoughtful in our approach when it comes to solving the toughest challenges in healthcare, including when and where to grow our important strategic investments. After thorough consideration, the company plans to open the Lilly Institute for Genetic Medicine in 2024 to further fuel its development of genetic medicines, which already accounts for more than 20 percent of Lilly’s diabetes, immunology and CNS research portfolio. The Institute will

also house a local Lilly Gateway Labs location to support biotech companies in the Boston area. Being geolocated with Boston’s diverse workforce of biologists, chemists, data scientists, academia, startups and VCs, along with other experts in the field of genetic medicine, will enable us to work in an integrated genetic research ecosystem with the infrastructure and connectivity needed to speed up the development of new medicines from the lab to clinical trials, and ultimately get to the patients who are waiting on treatments faster.”

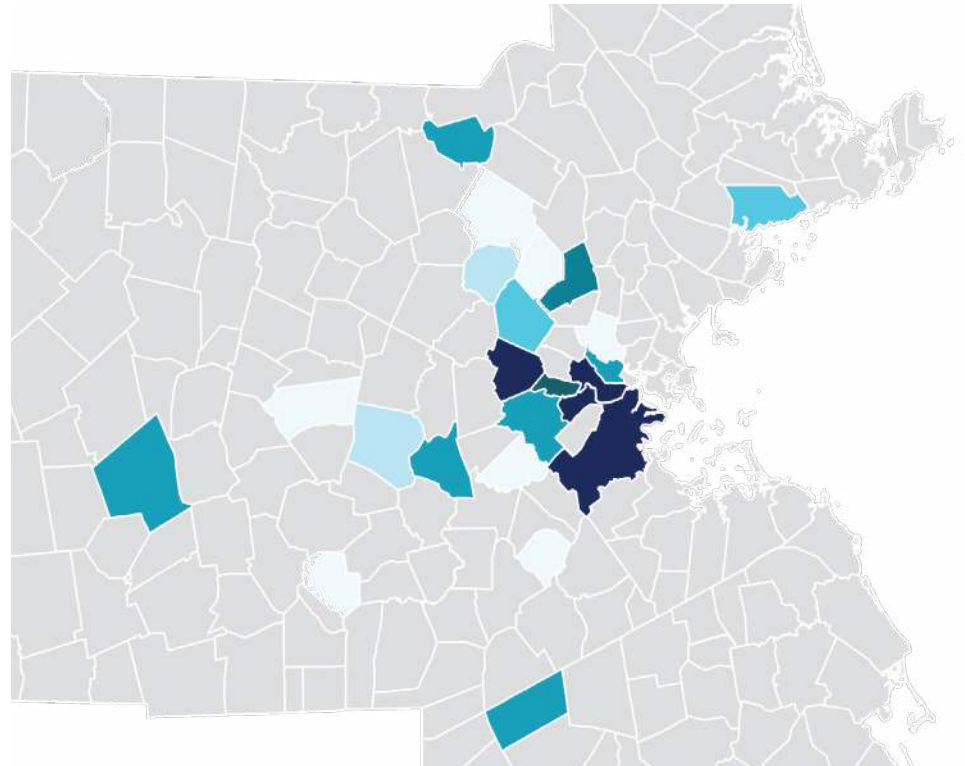
- **Julie Gilmore**, VP Global Head of Gateway Labs
- **Andrew Adams**, SVP Neurodegeneration and Co-Director Lilly Institute for Genetic Medicine

Largest New Massachusetts Lab and GMP Leases in 2022

| Tenant | City | Size (SF) | R&D/GMP |
|-----------------------------|------------|-----------|---------|
| Flagship | Andover | 700,000 | GMP |
| Takeda | Cambridge | 598,502 | R&D |
| AstraZeneca | Cambridge | 566,238 | R&D |
| Vertex | Boston | 334,000 | R&D |
| Eli Lilly & Company | Boston | 334,000 | R&D |
| Sarepta | Bedford | 288,000 | R&D |
| Broad Institute | Cambridge | 224,820 | R&D |
| Orbital | Cambridge | 166,000 | R&D |
| GSK | Cambridge | 155,856 | R&D |
| Broad Institute | Burlington | 145,705 | R&D |
| Intellia | Waltham | 134,984 | R&D |
| Dicerna | Lexington | 127,283 | R&D |
| Vericel | Burlington | 125,789 | GMP |
| Dragonfly | Waltham | 111,636 | R&D |
| Azzur | Devens | 103,496 | GMP |
| Entrada | Boston | 81,442 | R&D |
| Fractyl | Burlington | 78,000 | R&D |
| Enanta Pharmaceuticals Inc | Watertown | 73,037 | R&D |
| Repertoire Immune Medicines | Cambridge | 70,000 | R&D |
| Ring Therapeutics | Cambridge | 70,000 | R&D |

Density of MassBio Membership of Life Sciences Companies

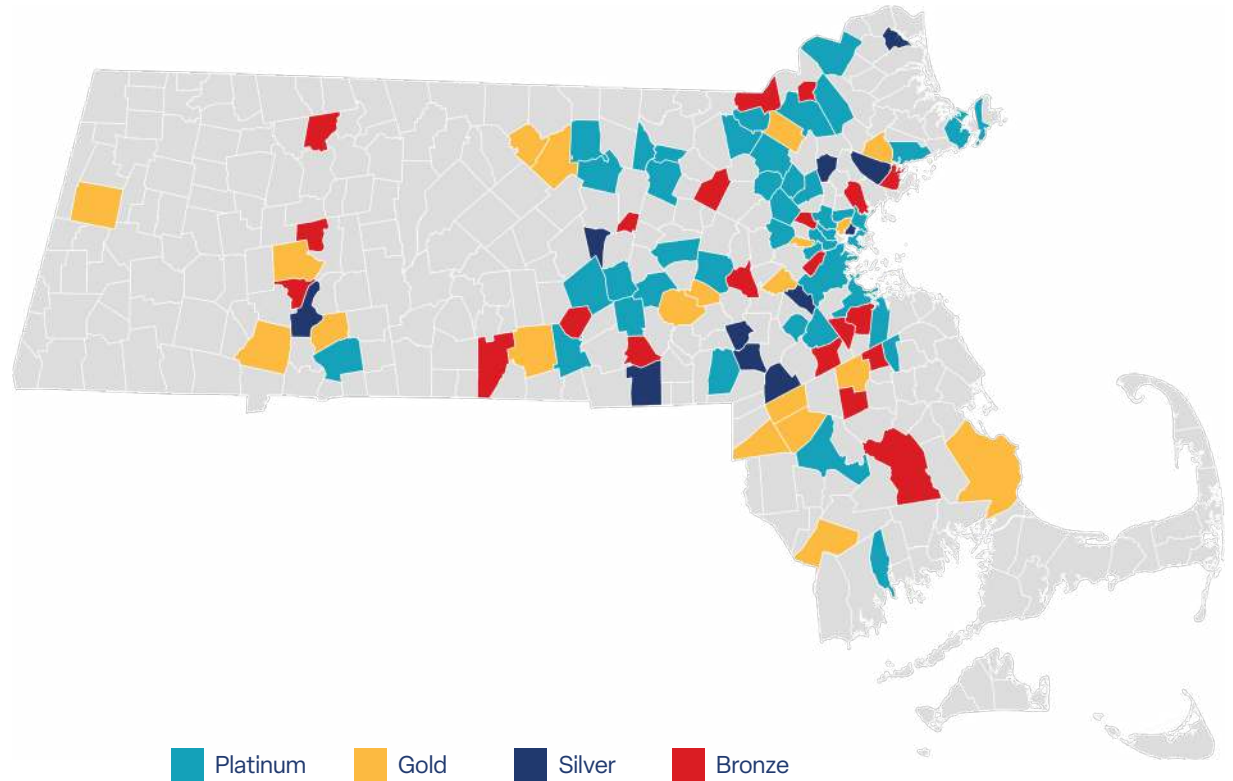
- MassBio is seeing its membership expand in eastern Massachusetts outside of Cambridge and Boston at a rate not seen in the organization's nearly 40-year history.



| | | | | |
|-------|-----------|-----|-------------|----|
| 60+ | Cambridge | 332 | Somerville | 30 |
| 51-60 | Boston | 145 | Lexington | 29 |
| 41-50 | Waltham | 64 | Bedford | 14 |
| 31-40 | Watertown | 58 | Framingham | 12 |
| 21-30 | Woburn | 46 | Marlborough | 9 |
| 10-20 | Lowell | 40 | Billerica | 8 |
| 5-9 | Natick | 36 | Burlington | 8 |
| | Worcester | 36 | Needham | 7 |
| | Newton | 33 | Milford | 6 |
| | Mansfield | 32 | Norwood | 6 |
| | Beverly | 31 | Medford | 5 |

BioReady® Communities

- BioReady® is a rating system developed by MassBio to determine a municipality's readiness to host biotechnology facilities based on the community's zoning practices and infrastructure capacity.
- BioReady® rates these communities in four tiers from Bronze to Platinum.
- Currently, 94 of Massachusetts' 351 cities and towns are BioReady®: 39 Platinum, 21 Gold, 11 Silver, and 23 Bronze.

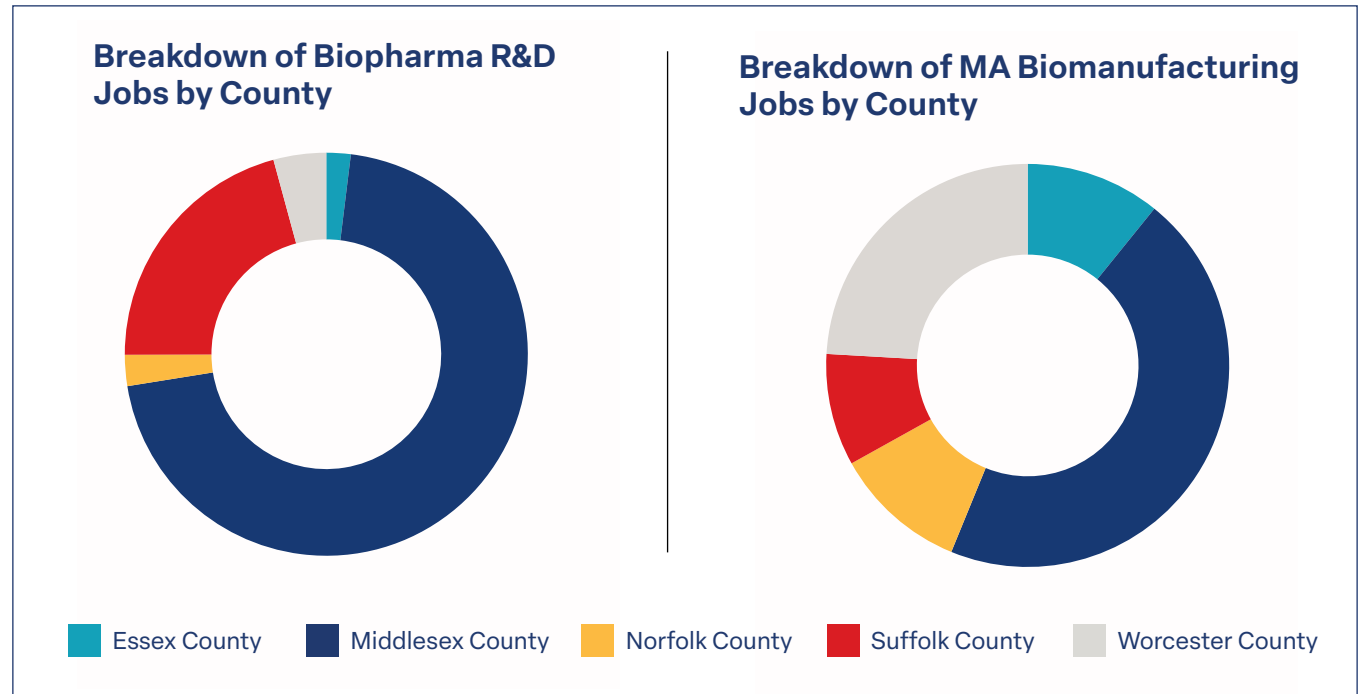


www.massbio.org/bioready

Spotlight by Region

Massachusetts Workforce by Region

- Worcester County experienced 18% growth in its biomanufacturing workforce.
- Suffolk County experienced a 17% increase in its total R&D workforce.



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW)



“MassBio’s 2023 Snapshot shows that we have a thriving, impactful, and diverse life sciences industry in Massachusetts. But we know that to continue this growth, we need an expansive, diverse, and trained workforce. Our administration is proud to support workforce development initiatives aimed at attracting and retaining the very best talent from all backgrounds and walks of life. We want to continue to support and grow the sector - and to do that, we must start by making sure we’re training a diverse workforce early.”

— **Lieutenant Governor Kim Driscoll**, Commonwealth of Massachusetts

Spotlight by Region

Suffolk County Deep Dive

Real Estate:

- 16 million SF of inventory
- 4.4 million SF under development
- 3.7% Vacancy Rate



Core Companies:



R&D and Manufacturing Employment Growth:

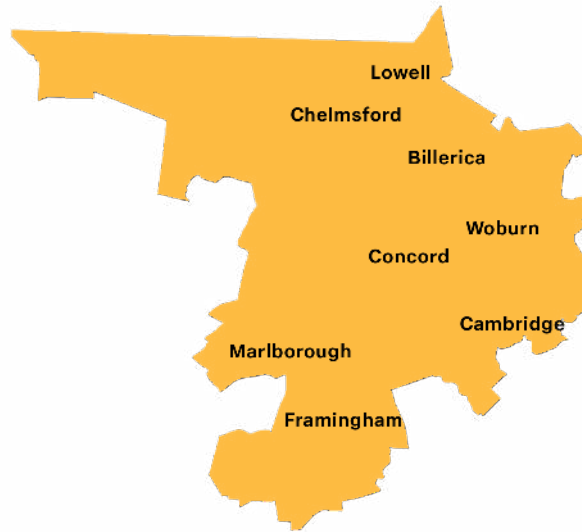
| Suffolk County | 2021 | 2022 | Over Year Growth |
|--------------------|--------|--------|------------------|
| Manufacturing Jobs | 685 | 884 | 29.1% |
| R&D Jobs | 11,139 | 11,139 | 17.4% |

Spotlight by Region

Middlesex County Deep Dive

Real Estate:

- 42.3 million SF of inventory
- 9.5 million SF under development
- 6.2% Vacancy Rate



Core Companies:



R&D and Manufacturing Employment Growth:

| Middlesex County | 2021 | 2022 | Over Year Growth |
|--------------------|--------|--------|------------------|
| Manufacturing Jobs | 4,454 | 4,462 | .2% |
| R&D Jobs | 41,883 | 44,306 | 5.8% |

Spotlight by Region

Worcester County Deep Dive

Real Estate:

- 2.2 million SF of inventory
- 950,000 SF under development
- 7.5% Vacancy Rate



Core Companies:

abbvie

 Bristol Myers
Squibb™

R&D and Manufacturing Employment Growth:

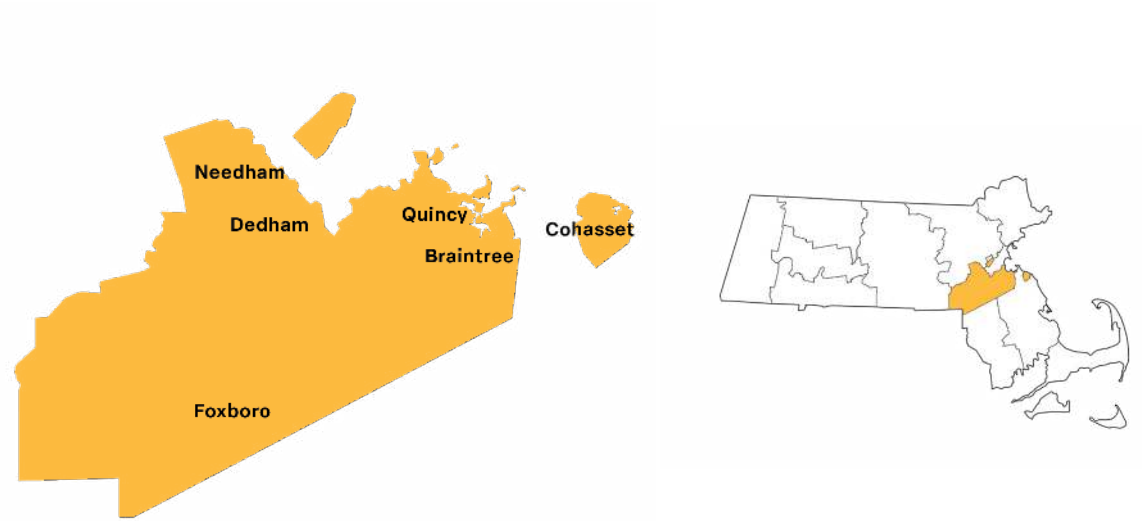
| Worcester County | 2021 | 2022 | Over Year Growth |
|--------------------|-------|-------|------------------|
| Manufacturing Jobs | 2,007 | 2,369 | 18.4% |
| R&D Jobs | 2,451 | 2,656 | 8.4% |

Spotlight by Region

Norfolk County Deep Dive

Real Estate:

- 1.5 million SF of inventory
- 380,000 SF under development
- 2.0% Vacancy Rate



Core Companies:



R&D and Manufacturing Employment Growth:

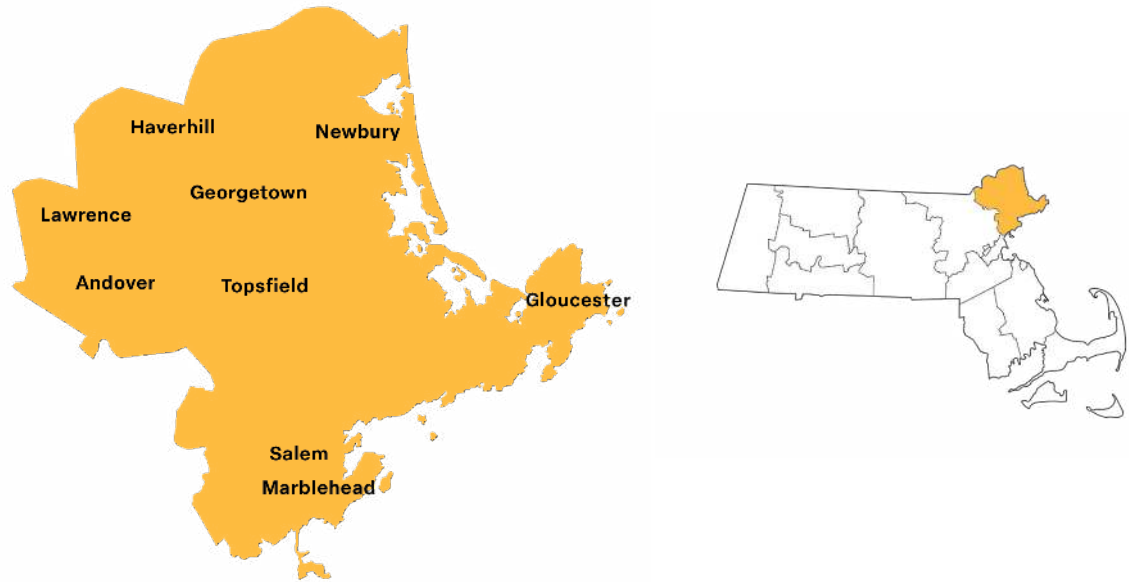
| Norfolk County | 2021 | 2022 | Over Year Growth |
|--------------------|-------|-------|------------------|
| Manufacturing Jobs | 1,038 | 1,056 | 1.7% |
| R&D Jobs | 1,314 | 1,567 | 19.3% |

Spotlight by Region

Essex County Deep Dive

Real Estate:

- 1.1 million SF of inventory
- 335,000 SF under development
- 11.4% Vacancy Rate



Core Companies:



R&D and Manufacturing Employment Growth:

| Essex County | 2021 | 2022 | Over Year Growth |
|--------------------|-------|-------|------------------|
| Manufacturing Jobs | 1,027 | 1,064 | 3.6% |
| R&D Jobs | 1,205 | 1,226 | 1.7% |

About MassBio

MassBio's mission is to advance Massachusetts' leadership in the life sciences to grow the industry, add to the healthcare system, and improve patient lives. MassBio represents the premier global life sciences and healthcare hub, with 1,600+ members dedicated to preventing, treating, and curing diseases through transformative science and technology that brings value and hope to patients.

Learn more at massbio.org

MASSBIO

As the premier source of information on life sciences in Massachusetts, MassBio tracks industry statistics over time and issues an overview Industry Snapshot each year.

For more information, contact **Ben Bradford**, Head of External Affairs,
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