



2016

National Institutes of Health (NIH)

Grants for Boston



**BOSTON
REDEVELOPMENT
AUTHORITY**

Produced by the BRA Research Division



Boston

Top Recipient of NIH Funding for the 21st Year

2015 marked the 21st consecutive year that Boston received the most NIH funding of any U.S. city. Forty-one Boston institutions received 3,491 NIH awards for more than \$1.74 billion in funding. This total represents 7.3% of

all NIH spending and 69.5% of all NIH funding in Massachusetts. Eight Boston organizations received over \$100 million in NIH funding, reinforcing Boston as a powerhouse in medical research.

TOP BOSTON RECIPIENTS OF NIH FUNDING FY 2015

ORGANIZATION	AWARDS	FUNDING
Massachusetts General Hospital	772	\$353 million
Brigham and Women's Hospital	535	\$334 million
Harvard Medical School	382	\$182 million
Children's Hospital Corporation	318	\$139 million
Boston University Medical Campus	240	\$128 million
Dana-Farber Cancer Institute	217	\$125 million
Harvard School of Public Health	187	\$124 million
Beth Israel Deaconess Medical Center	237	\$116 million
TOTAL of Top Boston Recipients	2,888	\$1,501 million

Source: National Institutes of Health "NIH Awards by Location and Organization FY2015," BRA Research Division Analysis

Since 1992, Boston has received over \$32 billion in NIH funding. Boston's NIH funding reached a record high in 2009 due to economic stimulus dollars created by the American Recovery and

Reinvestment Act (ARRA). After 2009, funding levels decreased as ARRA ended, but Boston's annual NIH funding has remained over \$1.7 billion since 2011.

ABOUT NIH

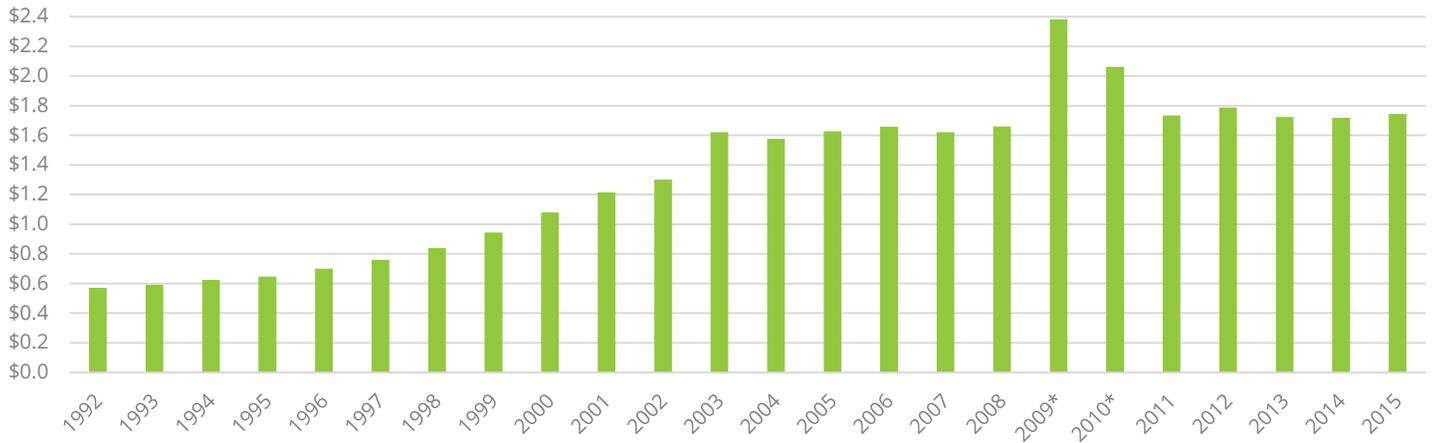
The National Institutes of Health (NIH), part of the U.S. Department of Health and Human Services, is the largest source of funding for medical research in the world. Its mission is "to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability."¹ NIH is comprised of 27 Institutes and Centers, each with a specific research agenda.² More than 80% of the \$30 billion NIH budget goes to funding researchers outside the NIH – at more than 2,500 universities and research organizations.³

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BOSTON NIH AWARDS

1992 - 2015, in billions of dollars



Source: National Institutes of Health, "NIH Awards by Location and Organization," FY1992-FY2015, BRA Research Division Analysis

Top Funded U.S. Cities

In Fiscal Year 2015, the only other U.S. city with close to Boston's level of NIH funding was New York City, a city of thirteen times Boston's population. Boston received \$2,658 in NIH funding per capita in FY2015, the highest per capita funding among the top 10 cities. Following Boston and New York are Seattle, Philadelphia and Baltimore for cities with the most NIH funding. These five cities receive around 24% of the total NIH funding.

TOP FIVE U.S. CITIES IN NIH FUNDING

FY 2015, in billions of dollars



Source: National Institutes of Health, "NIH Funding by Location and Organization," FY2015, BRA Research Analysis

Top Funded Organizations

Two Boston organizations were among the top 20 funding recipients in the United States: Massachusetts General Hospital and Brigham and Women's Hospital. They received a total of 1,307 awards and over

\$687 million in funding. Their combined funding represents almost 30% of all funding in Massachusetts and around 40% of Boston's entire NIH funding.

TOP U.S. RECIPIENTS NIH FUNDING FY 2015

RANK	ORGANIZATION	CITY	AWARDS	FUNDING
1	Johns Hopkins University	Baltimore, MD	1,255	\$604 million
2	University Of California, San Francisco	San Francisco, CA	1,228	\$563 million
3	University Of Pennsylvania	Philadelphia, PA	1,095	\$458 million
4	University Of Michigan	Ann Arbor, MI	1,061	\$457 million
5	University Of Washington	Seattle, WA	901	\$447 million
6	University Of Pittsburgh at Pittsburgh	Pittsburgh, PA	957	\$436 million
7	Stanford University	Stanford, CA	928	\$423 million
8	Duke University	Durham, NC	759	\$392 million
9	University Of California San Diego	La Jolla, CA	840	\$390 million
10	University of California Chapel Hill	Chapel Hill, NC	872	\$383 million
11	Washington University	Saint Louis, MO	821	\$378 million
12	University of California Los Angeles	Los Angeles, CA	862	\$371 million
13	Massachusetts General Hospital	Boston, MA	772	\$353 million
14	Yale University	New Haven, CT	862	\$352 million
15	Emory University	Atlanta, GA	694	\$335 million
16	Brigham and Women's Hospital	Boston, MA	535	\$334 million
17	Columbia University Health Sciences	New York, NY	806	\$332 million
18	Vanderbilt University	Nashville, TN	758	\$307 million
19	Icahn School Of Medicine At Mount Sinai	New York, NY	512	\$274 million
20	University Of Wisconsin-Madison	Madison, WI	623	\$273 million

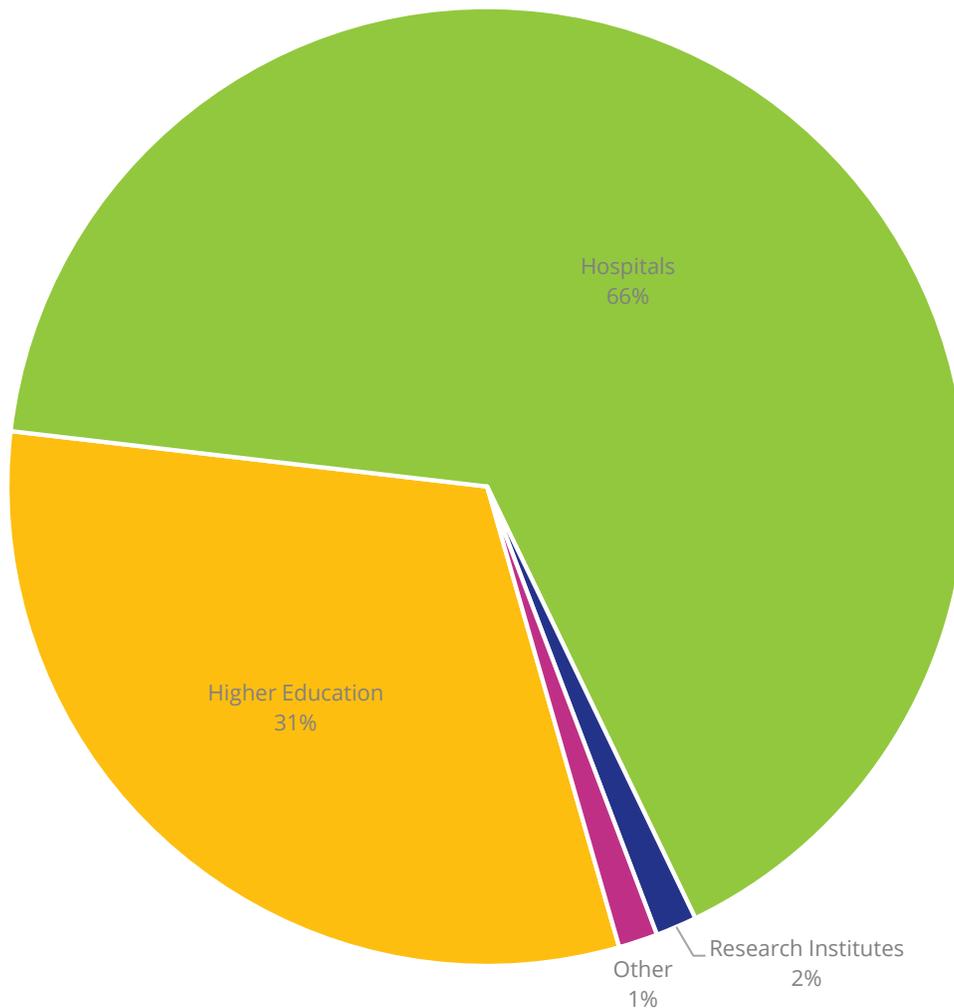
Source: National Institutes of Health, "NIH Funding by Location and Organization" FY 2015, BRA Research Analysis

Funding by Organization Type

The bulk of NIH funding goes toward hospitals and universities. However, NIH also provides vital funding to research institutes and other companies. The major research institutes in terms of NIH funding in Boston were the Joslin Diabetes Center and the Schepens Eye Research Institute, an affiliate of Massachusetts Eye and Ear

Infirmiry. Harvard Pilgrim Health Care Institute also received NIH funding for research in collaboration with Harvard Medical School. Other organizations receiving NIH funding included manufacturing, fitness technology, health insurance, and software companies.

NIH FUNDING BY TYPE OF INSTITUTION
FY 2015



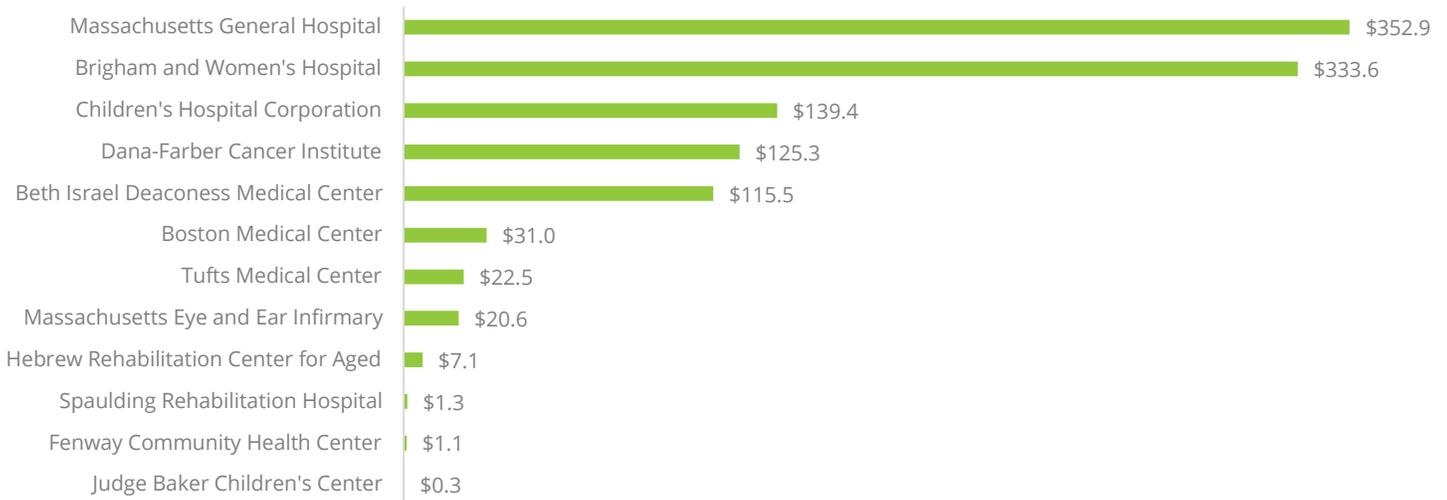
Source: National Institute of Health, "NIH Funding by Location and Organization," FY2015, BRA Research Division Analysis

Hospitals

Boston is a national center for health care and medical research. There are twenty-one in-patient hospitals located within the city with a combined total of 6,049 beds in 2014.⁴ Twelve Boston hospitals were granted 2,265 NIH awards totaling over

\$1.15 billion of NIH funding, representing 66% of the city's total and 46% of the state's total. The total funding amount received by Boston's hospitals alone is higher than the entire total funding received by any other city except New York.

TOP BOSTON HOSPITALS IN NIH FUNDING FY 2015, in millions of dollars



Source: National Institute of Health, "NIH Funding by Location and Organization" FY2015, BRA Research Analysis

Massachusetts General Hospital and Brigham and Women's Hospital, both teaching hospitals for Harvard Medical School, were the top two NIH-funded hospitals in the United States. Massachusetts General Hospital leads the group for the 15th consecutive year with 31% of all grants to hospitals in Boston. Massachusetts General Hospital conducts the largest hospital-based research program in the United States with over 12,000 researchers and staff and over 1 million square feet of research space, primarily in downtown Boston and Charlestown.⁵ Additional research institutions in this area include

Massachusetts Eye and Ear Infirmary, Schepens Eye Research Institute, and Spaulding Rehabilitation Hospital.

Brigham and Women's Hospital has the largest medical research program in the Longwood Medical Area, a world famous medical campus that includes Brigham and Women's Hospital, Children's Hospital, Dana-Farber Cancer Institute, Beth Israel Deaconess Medical Center, and Joslin Diabetes Center. Harvard Medical School and Harvard School of Public Health are also located in the Longwood area, making it an epicenter of health care and medical training and

research. The Longwood Medical Area has over 46,000 scientists, researchers and staff, and over 21,000 students.⁶ The Longwood Area alone received more NIH funding than all but seven states in the United States.⁷ Institutions in the Longwood area brought in over \$1 billion from the NIH last fiscal year.

Education

Boston is also a world-renowned center of higher education. Eleven of Boston's higher education institutions received 1,126 NIH awards and over \$545 million in funding, a total that represented 36% of the city's total and 25% of the state's total.

Boston's successful scientific research benefits from the city's well-educated labor force. About half of people who work in Boston have a Bachelor's degree or

higher.⁸ As of academic year 2014-2015, the city's universities and colleges had a combined enrollment of 137,000 full- and part-time students. Boston, with nearly 10% of the state's population, has about one third of the statewide college student enrollment. Boston companies and institutions are able to attract and utilize students and graduates of our world class educational institutions.

BOSTON'S NIH GRANT RECIPIENTS IN HIGHER EDUCATION FY 2015, in millions of dollars



Source: National Institutes of Health, "NIH Funding by Location and Organization" FY2015, BRA Research Division Analysis

Private Companies

Immunetics, Inc., located in the Innovation District on the South Boston Waterfront, received over \$6 million in NIH funding in FY2015 in addition to awards in FY2014. Immunetics develops diagnostic test for diseases and pathogens and prides itself in combining the development of marketable products with fundable scientific research.¹⁰

Arietis is a biotechnology company located at the Bio Square Discovery and Innovation Center on Boston University's Medical Campus in the South End. Arietis received \$2 million of NIH funding in FY2015 to fund the discovery and development of novel antimicrobial agents.¹¹

Private Companies continued...

Cogito Health, located in Downtown Boston, received \$1.3 million in NIH funding to develop voice analysis software for mental health monitoring.¹² Arisaph Pharmaceuticals, also in Downtown Boston, received \$1 million in NIH funding for their work in developing therapies for cardiometabolic diseases and cancer.¹³

Etiometry, located in Allston, is a Healthcare Information Technology company creating Predictive Patient Care Analytics to improve the quality of care in the intensive care unit.¹⁴ Etiometry received almost \$1 million in NIH funding in FY2015.¹⁵

SQZ Biotechnologies Company is located at the Venture Development Center at UMass Boston. SQZ Biotechnologies received \$474,000 in NIH funding for its work to facilitate cell therapies through technology to deliver materials directly into the cell cytosol.¹⁶

ExQor Technologies, located in Boston's West End, received \$225,000 in NIH funding to use its multi-patented bio-nanoparticle to develop a new drug to prevent neurodegeneration.¹⁷

Nexgen Arrays in Brighton is working to develop rapid diagnostic testing for viral diseases such as Ebola, Lassa, and Marburg. Nexgen Arrays received \$224,000 in NIH funding in FY2015.¹⁸

Boston: Leader of a Regional Powerhouse

The city of Boston is a center of biomedical research within the United States. It also benefits from collaborations with biomedical research institutions in other cities within the metropolitan area and the state. Boston shares its metropolitan area with other centers for scientific and medical research. Cambridge boasts premier research centers, particularly at Harvard, MIT, and in Kendall Square. In FY15, Cambridge institutions received 578 NIH awards for \$397 million in funding. One example of collaboration between institutions in Boston and Cambridge is the Broad Institute, which brings

together researchers from Harvard, MIT, and five Harvard-affiliated hospitals located in Boston. Massachusetts as a whole received \$2.5 billion dollars in NIH funding in FY2015, allocated among almost 4,914 awards. Massachusetts led the country in NIH funding per capita at \$377 – almost 5 times the national average. Massachusetts also leads the nation in per capita bioscience venture capital distributions and per capita bioscience related patents.¹⁹

Conclusion

Boston has earned the most NIH funding of any U.S. city for the 21st year in a row due to its critical mass of researchers and resources. Boston has a well-educated labor force supported by world class hospitals and universities and robust life tech industries.

NIH funding to Boston researchers has facilitated dramatic breakthroughs in science that will improve healthcare and quality of life for years to come. Examples of NIH funded research include the following:

- Researchers at MGH and Harvard-MIT Division of Health & Sciences Technology developed a microfluidic chip that can capture rare clusters of circulating tumor cells.²⁰
- Researchers at Joslin Diabetes Center in Boston found that a drug approved to treat overactive bladder can stimulate brown fat and increase energy expenditure in men.²¹
- Researchers at MGH developed new approach to find Huntington's disease therapies.²²



End Notes

- 1 National Institutes of Health. "About NIH," last modified April 9, 2015. <http://www.nih.gov/about-nih/what-we-do/mission-goals>
- 2 National Institutes of Health. "About NIH," last modified April 9, 2015. <https://www.nih.gov/institutes-nih>
- 3 National Institutes of Health. "About NIH," last modified February 17, 2016. <http://www.nih.gov/about-nih/what-we-do/budget>
- 4 General Obligation Refunding Bonds, March 15, 2016, pp160
- 5 Massachusetts General Hospital, "About Research: Facts at a Glance" <http://www.massgeneral.org/research/about/facts.aspx>
- 6 MASCO, "Longwood Medical and Academic Area Fact Sheet 2013" http://www.masco.org/system/files/downloads/thelma/fact_sheet_2013_final.pdf
- 7 Bailey M., 5 things to know about Boston's hospital hotspot, December 21, 2015. <http://www.statnews.com/2015/12/21/longwood-medical-area/>
- 8 Source: U.S. Census Bureau, 2010-2014 American Community Survey, BRA Research Division Analysis
- 9 Department of Neighborhood Development, "City of Boston Student Housing Trends, 2014-2015" Does not include MIT (located primarily in Cambridge) and Boston community colleges.
- 10 <http://www.immunetics.com/about.html>
- 11 <http://www.arietis.org/>
- 12 <http://www.cogitocorp.com/>
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- 19 Battelle/BIO State Bioscience Jobs, Investments and Innovation 2014 <https://www.bio.org/sites/default/files/Battelle-BIO-2014-Industry.pdf>, p. 46-48
- 20 National Institutes of Health, "Microchip" <http://www.nih.gov/news-events/news-releases/microchip-captures-clusters-circulating-tumor-cells-nih-study>
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John Barros
Chief of Economic Development
City of Boston
617.635.5729
CityOfBoston.gov

Alvaro Lima
Director of Research
Boston Redevelopment Authority
Research@boston.gov
BostonRedevelopmentAuthority.org/Research-Maps