



Australian Government
Australian Trade and Investment Commission



MEDICAL TECHNOLOGY AND LIFE SCIENCES

US CLUSTERS

Disclaimer

This report has been prepared by the Commonwealth of Australia represented by the Australian Trade and Investment Commission (Austrade). The report is a general overview and is not intended to provide exhaustive coverage of the topic. The information is made available on the understanding that the Commonwealth of Australia is not providing professional advice.

While care has been taken to ensure the information in this report is accurate, the Commonwealth does not accept any liability for any loss arising from reliance on the information, or from any error or omission, in the report. Any person relying on this information does so at their own risk. The Commonwealth recommends the person exercise their own skill and care, including obtaining professional advice, in relation to their use of the information for their purposes.

The Commonwealth does not endorse any company or activity referred to in the report, and does not accept responsibility for any losses suffered in connection with any company or its activities.

Copyright

© Commonwealth of Australia November 2016



The material in this document is licensed under a Creative Commons Attribution – 4.0 International licence, with the exception of:

- the Commonwealth Coat of Arms
- the Australian Trade Commission's logo
- any third party material
- any material protected by a trade mark
- any images and photographs.

More information on this CC BY licence is set out at the creative commons website: <https://creativecommons.org/licenses/by/4.0/legalcode>. Enquiries about this licence and any use of this report can be sent to: info@austrade.gov.au

Attribution

Before reusing any part of this document, including reproduction, public display, public performance, distribution, dissemination, communication, or importation, you must comply with the Attribution requirements under the CC BY licence.

Using the Commonwealth Coat of Arms

The terms of use for the Coat of Arms are available from the It's an Honour website (itsanhonour.gov.au).

Commonwealth of Australia represented by the Australian Trade and Investment Commission (Austrade) ABN 11 764 698 227.
ISSN: 1756-8528.





TABLE OF CONTENTS

INTRODUCTION	2
INDUSTRY OVERVIEW	4
US MEDICAL TECHNOLOGY CLUSTERS	6
TIER 1 Clusters	
California (San Francisco/San Jose/Bay Area)	7
California (Southern California)	8
Massachusetts (Boston/Cambridge)	9
Minnesota (Minneapolis/St. Paul)	10
TIER 2 Clusters	
Florida (Southern Florida)	12
Illinois (Chicago)	13
Indiana (Indianapolis/Warsaw)	14
Maryland/Washington DC	15
New York/New Jersey	16
North Carolina (Research Triangle)	17
Pennsylvania (Philadelphia)	18
Texas (Austin/Houston)	19
Utah (Salt Lake City)	20
Wisconsin (Southeast)	20
TIER 3 Clusters to Watch	
Colorado (Front Range/Denver)	22
Georgia (Atlanta)	22
Michigan (Ann Arbor/Grand Rapids)	22
Ohio (Cleveland)	22
Washington (Seattle)	22

INTRODUCTION

The United States has the largest medical technology market in the world, accounting for 43 per cent of the global medical device industry.¹

The US is the world leader in research and development spend², and registers more international patents than any other country.³ The success of the US medical technology and life sciences fields can be attributed to ecosystems of innovation. Geographic clusters across the country provide the environment for success and growth; they boast innovative economies, educated workforces and access to capital. Many of the clusters are also home to some of the world's top research universities, resulting in a continual supply of innovative and skilled talent. In addition, the US provides a wide range of funding sources to help grow business - the funding is developed, liquid, efficient, and flexible.⁴

Australia and the United States have a long history as allies, as well as a shared language and similar regulatory environments. The US is an ideal location for collaboration or expansion, and a growing number of Australian companies are taking advantage of the opportunities presented in this market.

One noteworthy collaboration is the recently announced partnership between the USA Comprehensive Cancer Center and the Victorian Comprehensive Cancer Centre, which will allow for the sharing of knowledge and cancer research, as well as a fellowship program exchanging senior researchers between countries.

This report provides an overview of US capability in the medical technology and life sciences industry. In particular it focuses on specific geographic locations of life science activity, from the well-established clusters to the emerging.

Talk to your local Austrade representative or the US Austrade team for more tailored advice and information on connecting and partnering with this sector.





INDUSTRY OVERVIEW

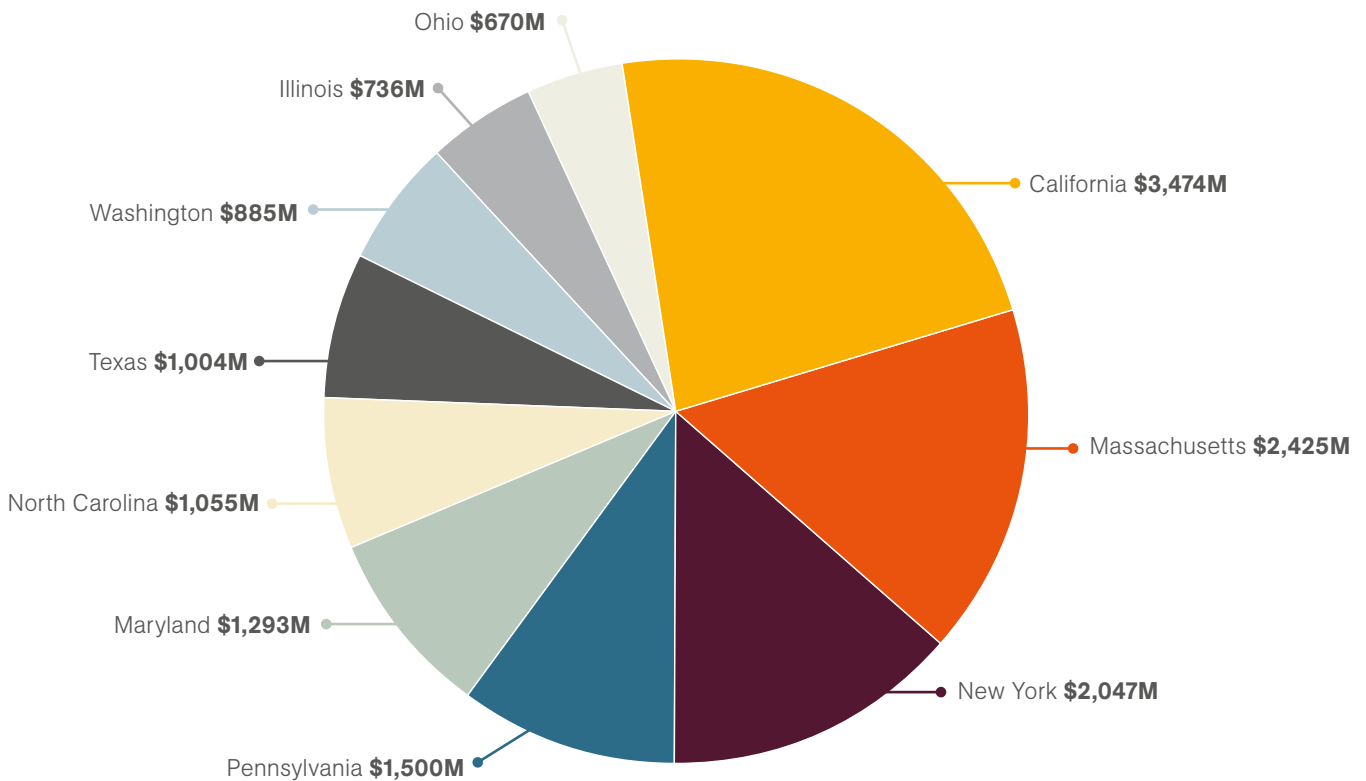
Medical technology (medtech) refers to technology or devices used to diagnose, monitor or treat health conditions. An aging population, emerging markets and chronic illness are leading to rapidly escalating health costs and continued global demand for new and innovative medical advancements.

The United States has the largest medical technology market in the world, and US innovation in the life sciences will continue to grow, with the medical device market expected to reach US\$155 billion in 2017.⁵ Based on combined revenue of the top 40 medical device companies, US companies account for nearly 66 per cent of revenue, followed by Germany at 14 per cent, then Japan with 7 per cent.⁶

The US has a competitive advantage in the size and scope of its medtech market, abundance of world-class academic institutions and access to funds for research and development (R&D). It is home to 141 accredited medical schools and about 400 major teaching hospitals, making it an ideal location for academic collaboration and innovation.⁷

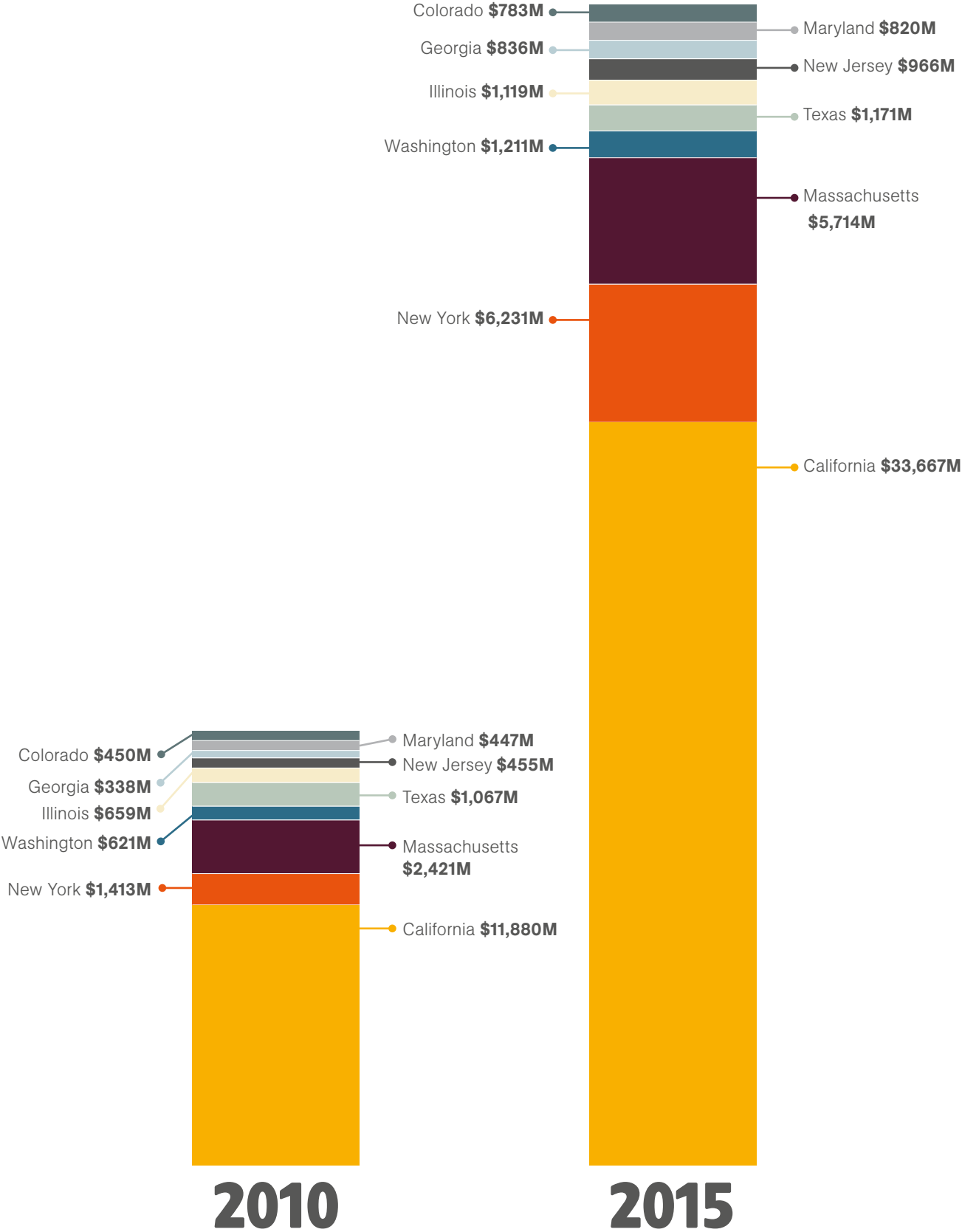
More than 80 per cent of US medical device companies have fewer than 50 employees, and of the 6,500 medical device companies in the US, most are small or medium sized.⁸ Medical technology, unlike many other manufactured goods, is a high-tech industry where quality is more important than reducing production costs. In this environment the US can continue to lead the medical technology field even if the cost of doing business is relatively high.

NIH Funding 2015 Fiscal Year (US Dollars)



Source: US Department of Health and Human Services

Top 10 States for Venture Capital (US Dollars), 2010 and 2015



Source: PricewaterhouseCoopers/National Venture Capital Association Moneytree™ Report, Data: Thomson Reuters. Prepared by SSTI

US MEDICAL TECHNOLOGY CLUSTERS

CLUSTER OVERVIEW

TIER 1 Clusters

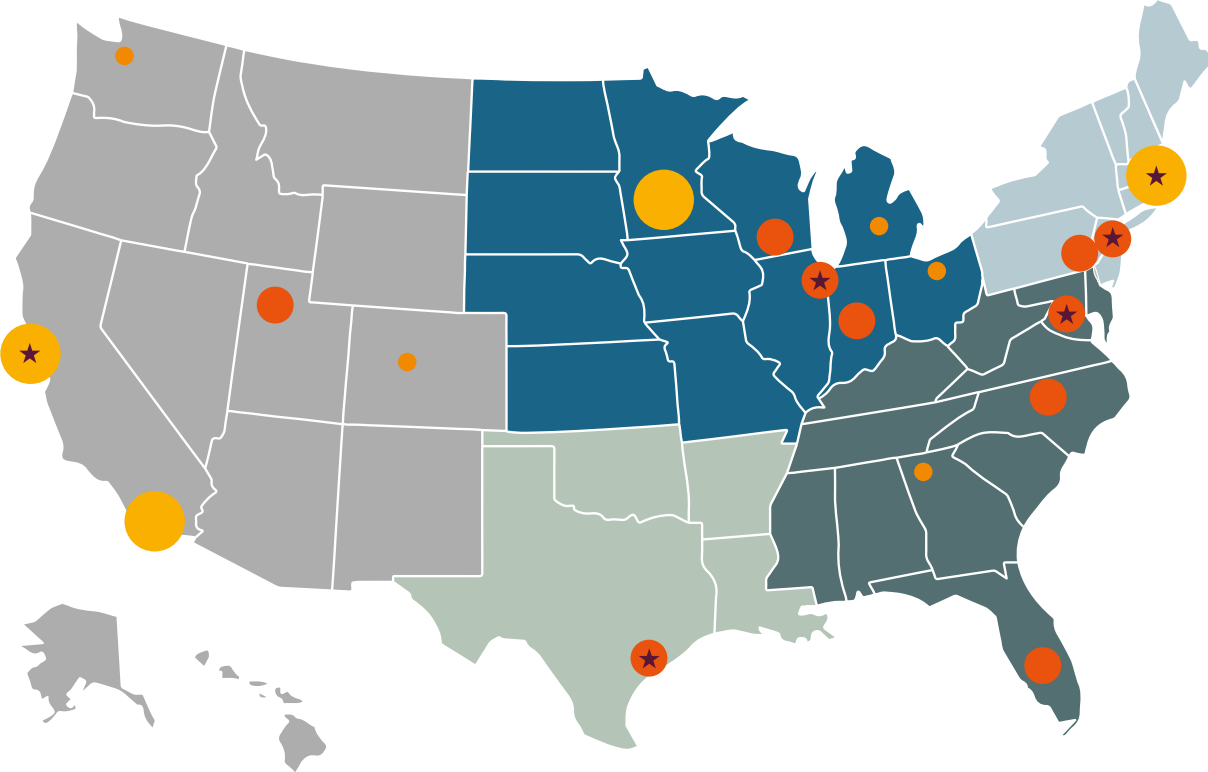
- California (San Francisco/San Jose/Bay Area)
- California (Southern California)
- Massachusetts (Boston/Cambridge)
- Minnesota (Minneapolis/St. Paul)

TIER 2 Clusters

- Florida (Southern Florida)
- Illinois (Chicago)
- Indiana (Indianapolis/Warsaw)
- Maryland/Washington DC
- New York/New Jersey
- North Carolina (Research Triangle)
- Pennsylvania (Philadelphia)
- Texas (Austin/Houston)
- Utah (Salt Lake City)
- Wisconsin (Southeast)

TIER 3 Clusters to Watch

- Colorado (Front Range/Denver)
- Georgia (Atlanta)
- Michigan (Ann Arbor/Grand Rapids)
- Ohio (Cleveland)
- Washington (Seattle)



- TIER 1 Clusters
- TIER 2 Clusters
- TIER 3 Clusters (markets to watch)
- ★ Austrade office

CALIFORNIA (SAN FRANCISCO/SAN JOSE/BAY AREA)

Description

The birthplace of biotechnology, the Bay Area continues to lead the country in medical technology innovation. The region is home to 1,377 life science and biotech companies with 140,000 employees⁹; the highest concentration of biotech companies in the nation. On average, 30 new companies are added each year.¹⁰ Underlying the success of the biotech industry is the abundance of academic research institutions. Mission Bay is the hub of the life sciences in San Francisco, home to companies such as Celgene Corp, Presidio Pharmaceuticals Inc., FibroGen, Ion Torrent Systems Inc., Bayer, Pfizer and Nextar. It also spans 303 acres which includes 4.4 million square feet of office and R&D space.¹¹

Major Australian connections

In February 2016, San Francisco became the home of Austrade's first Landing Pad. The Landing Pad program aims to immerse Australian start-ups in environments that will help them accelerate the design and development of their product or service business model. The San Francisco Landing Pad will assist companies to explore in-market business development, investment, mentorship and strategic partnership opportunities.

For more information on the Landing Pad program, please visit Australia Unlimited australiaunlimited.com/Landing-Pads

Research universities

The Bay Area has the largest volume of research universities in the United States, including Stanford University, the University of California Berkeley, the University of California San Francisco, and the University of San Francisco. The Bay Area also produces more Ph.D. scientists and engineers than any other region in the country¹².

Key figures:

- › Bioscience companies reported revenue of US\$4.1 billion, US\$2.7 billion in exports, and National Institutes of Health (NIH) grant awards of US\$1.2 billion (2014).¹³
- › California accounts for nearly one-fourth of all 510(k) submissions, substantially more than any other state.¹⁴
- › The Bay Area attracts the largest share of venture capital (VC) in the US.¹⁵
- › NIH gives California more grants than any other state (about 15 per cent of total funding).¹⁶
- › The Bay Area's combined direct and indirect employment in the biomedical field is 250,000 (more than half of California's biomedical workforce).¹⁷
- › There are more than 25 biotech companies in San Francisco that are VC-funded.¹⁸

Representative facilities/companies

- › Celgene Corp
- › Presidio Pharmaceuticals, Inc.
- › FibroGen
- › Ion Torrent Systems, Inc.
- › Bayer
- › Pfizer
- › Nextar
- › Abbott
- › Intuitive Surgical Inc
- › Varian Medical Systems
- › Medtronic Plc
- › Stryker Endoscopy
- › Gilead Sciences
- › Johnson & Johnson Innovation
- › Bio-Rad Laboratories

CALIFORNIA (SOUTHERN CALIFORNIA)

Description

The corridor between San Diego and Los Angeles is a smaller medtech hub than Northern California but still employs an impressive 100,000 people in the life sciences. The three clusters in Southern California are in San Diego, Los Angeles and Orange counties. Los Angeles has a focus on large medtech companies, Orange County focuses on medical devices, particularly for cardiology, interventional neurology, orthopaedics, and ophthalmology. San Diego, the largest cluster, centres on biotech and wireless.¹⁹

Major Australian connections

The University of California, San Diego began a collaboration in 2006 with researchers from Monash University and the Australian Stem Cell Centre for innovative stem cell research.

Research universities

Research universities play a vital role in the development in southern California's medtech cluster. The University of California has 3 major campuses in the region; San Diego, Irvine and Riverside. Annually 7,000 STEM students graduate from San Diego County alone, which continues to fuel the growing medical technology environment.²⁰

Key figures

- › The San Diego region has more than 1,100 life sciences companies and 80 independent, university and college research centres.²¹
- › According to 2013 estimates, 11,300 employees work in the biopharmaceutical manufacturing industry in Southern California.²²
- › San Diego County has 12 times the national average of employees in life sciences.²³
- › Medical device and diagnostic equipment manufacturing employment was 34,000 (2013) in Southern California.²⁴
- › Research funding, rather than venture capital investment, drives research and innovation in the life sciences sector. In 2013, South Californian companies and universities received US\$939 million in NIH funding.²⁵

Representative facilities/companies

- › Johnson & Johnson
- › Medtronic
- › Arena
- › Alma Life Sciences
- › BD Biosciences
- › Cypher Genomics
- › DJO Global
- › Genentech
- › GlaxoSmithKline
- › Hologic
- › Illumina
- › Ionis
- › Pfizer
- › Thermo Fisher Scientific
- › Quidel
- › ResMed Takeda

MASSACHUSETTS (BOSTON/CAMBRIDGE)

Description

The Boston/Cambridge metro area competes with San Francisco as the top medtech/life sciences hotspot in the United States. As of 2014, Boston/Cambridge was the nation's leader in venture capital, NIH funding, and lab space.²⁶ The region's success can be attributed to the unique life-sciences ecosystem which is anchored by the world-class academic research institutions of Harvard and MIT. The Life Science Corridor is the region along the Red Line of the MBTA (public transit) consisting of Cambridge and Boston. The two most active locations are Kendall Square in Cambridge and Longwood Medical Area (LMA) in Boston. Kendall Square, which borders the MIT campus, is known for its medical technology and biotechnology. Many biotech and pharmaceutical companies have R&D facilities operating in the area, including Novartis and Pfizer. More than 2 million square feet of R&D lab and biomedical office space has been added in the last seven years.²⁷ The LMA is more focused on research hospitals and is home to 17 million square feet of clinical, research, and administrative space.²⁸ Medical institutions include Harvard Medical School, Brigham and Women's Hospital, Children's Hospital, Dana-Farber Cancer Institute, Beth Israel Deaconess, and the Joslin Diabetes Center. The LMA has more than 45,000 scientists, researchers and staff as well as 21,000 students.²⁹ The region along Route 128 in Massachusetts (north and west of Boston) is also known as a high technology hub.

Major Australian connections

Boston and Melbourne are sister cities and the connection between the two is exemplified by a number of partnerships in medical research and innovation. Collaborations include Boston Children's Hospital and Melbourne Royal Children's Hospital; the Peter MacCallum Cancer Centre and the Dana-Farber Cancer Institute; the Royal Melbourne Hospital and Brigham and Women's Hospital; and Melbourne Genomics Health Alliance and the Broad Institute of MIT and Harvard.

MassChallenge is an international startup accelerator based in Boston. In April 2016, the organisation announced the Bridge to MassChallenge in Australia, a program to connect startups in the country with the MassChallenge network.

Research universities

Massachusetts is known for its academia and is home to 122 colleges and universities (of which 40 offer advanced degrees in the life sciences). The most notable research universities are Harvard University, MIT, Tufts University, Boston University, and the University of Massachusetts.

Key figures

- › There are 450 medical device companies in Massachusetts.
- › In 2008, the state government announced a 10-year, US\$1 billion Life Sciences Initiative aimed at supporting the industries of biotechnology, pharma, and medical devices.
- › The Boston area has the highest per capita employment in the life sciences sector (30,000).³⁰
- › In the last 10 years, employment in biopharma manufacturing increased 28 per cent in Massachusetts, compared to a national drop of 2 per cent.³¹
- › Eight of the top 14 NIH-funded hospitals are in Massachusetts.³²
- › Massachusetts has the highest per capita NIH funding in the country.
- › 40 per cent of Massachusetts' workforce has a bachelor's degree or higher (US average is 29 per cent).
- › Employment in scientific R&D in the state is 2.5 times higher than the national average.
- › Biotech and pharma VC funding in Massachusetts reached US\$449.5 million in 2015.³³

Representative facilities/companies

- › Phillips Healthcare
- › Thermo Fisher Scientific
- › Covidien
- › Smith and Nephew
- › Biogen
- › Sanofi-Aventis
- › Novartis
- › Pfizer
- › J&J Innovation
- › Merck & Co
- › Vertex
- › Glaxo Smith Klein
- › Haemonetics

MINNESOTA (MINNEAPOLIS/ST. PAUL)

Description

The Twin Cities region of Minnesota consists of Minneapolis and St. Paul. Minnesota is one of the world's largest clusters for medical devices particularly in the fields of cardiology, neurology, urology, orthopaedic, spine, audiology, and combination devices.³⁴ The cluster is largely supported by the Mayo Clinic, in combination with work by researchers at the University of Minnesota. The Mayo Clinic in Rochester employs 37,200 people and services 1 million people each year. In 2013, the clinic launched a US\$6 billion Destination Medical Center (DMC) initiative to secure Minnesota as a leader in the medical field. It is expected to create 35,000 - 45,000 new jobs and US\$7.5 - 8 billion in new tax revenue over 35 years.³⁵ The state is also home to 600 life sciences companies including Medtronic, the largest medical device company in the world, headquartered in Minneapolis. The region is home to a number of breakthrough technologies including the implantable cardiac pacemaker, mechanical heart valves and implantable infusion pumps.³⁶ Venture capital funding can be more difficult to obtain (compared to California or Massachusetts) with funding averaging US\$150-200 million per year.³⁷

Major Australian connections

Many Australian companies have ties with Minnesota - for example Osprey Medical is a US-based company that is publicly traded on the Australian Stock Exchange.

Research universities

Minnesota is home to seven state universities, 17 private colleges and universities, and 24 two-year colleges. The Twin Cities region has the 2nd highest rate of adults with a bachelor's degree and the 2nd highest retention rate for college graduates.³⁸ The University of Minnesota plays the most prominent role in growing the medtech industry in the state and ranks 9th in research spending in the US.³⁹

Key figures

- As of 2010, 22 per cent of the workforce of the greater Twin Cities worked in medical technology (27,000).⁴⁰
- LifeScience Alley in Minnesota is the largest life science trade industry in the US, with 680 members.
- From 2000-2010 the life sciences industry grew 20 per cent in the Twin Cities region compared to 6 per cent in the US. Bio/pharma grew 54 per cent in the region, while the US posted a decline of 3 per cent.⁴¹
- Minnesota secured US\$368m in VC funds in 2014 with US\$245m going to the medical device industry.⁴²
- Minnesota ranks 1st in cumulative premarket approvals granted by the FDA (33 per cent).⁴³
- Minnesota ranks 2nd for medical technology patents granted.⁴⁴
- The state has the highest concentration of medical technology workers in the US.
- FDA 510(k) clearances are 26 per cent faster in Minnesota than the US average (about 30 days faster). The state also leads in FDA premarket approvals (about 6.5 months faster).⁴⁵
- The Minnesota Partnership for Biotechnology and Medical Genomics, a collaboration between the Mayo Clinic, the University of Minnesota and the state government, has been granted more than US\$60 million in NIH funding.⁴⁶

Representative facilities/companies

- Medtronic
- Mayo Clinic
- 3M
- Boston Scientific
- St. Jude Medical
- Starkey Hearing
- American Medical
- EV3 Inc
- Medivators
- Arizant
- Vision-Ease
- Vascular Solutions
- Cardiovascular Systems
- Stratasys



FLORIDA (SOUTHERN FLORIDA)

Description

Florida's government has placed significant emphasis on growing the life science sector over the last decade, and now Florida has a young but fast-growing sector. Key strengths in the region are biotechnology, medical devices, pharmaceuticals and healthcare. Florida is home to more than 1,100 medical device, pharmaceutical, and biotech companies employing 26,000 people. The state also has 46,000 healthcare establishments.⁴⁷ Particular fields of interest are immune-oncology, infectious disease, ophthalmology, cardiology, marine biotech, and neurodegenerative disease.⁴⁸ Relatively low operating costs, low cost of living and no personal income tax make Florida attractive, and the region is also home to a number of research universities.

Research universities

The University of Florida, The University of Miami and the University of South Florida are recipients of NIH funding. There are nine medical schools across the state.

Key figures

- › There are over 260 biotech companies in Florida - areas of excellence are therapeutics, especially cancer, infectious disease, genomics, diagnostics and regenerative medicine.⁴⁹
- › There are over 220 pharmaceutical companies in Florida - areas of excellence are generics, specialty pharma, drug delivery/release technologies, neurological diseases, cancer, ophthalmology and cardiovascular disease.⁵⁰

- › There are over 620 medical device companies in Florida - areas of excellence are surgical technologies and supplies, biomaterials and implants, cardiac and vascular devices, diagnostics and imaging.⁵¹
- › Over US\$1 billion is invested in life sciences R&D by Florida universities annually.⁵²
- › Florida is ranked 2nd for FDA registered medical device manufacturing facilities.⁵³
- › The state ranks 8th among states for biotech R&D establishments.⁵⁴

Representative facilities/companies

- › Actavis
- › Arthrex
- › Bristol-Myers Squibb
- › Johnson & Johnson
- › Medtronic
- › Noven
- › Steripak
- › Beckman Coulter
- › CAE Healthcare
- › Conmed Linvatec
- › MAKO Surgical

ILLINOIS (CHICAGO)

Description

The Chicago area's medtech sector is smaller than California and Massachusetts but the region is a leader in biotechnology and pharmaceutical development. Home to AbbVie and the US headquarters of Takeda Pharmaceuticals and Astellas Pharma, Illinois' biotechnology industry generates about US\$98.6 billion, employs 81,000 workers, and contains 3,500 biotech companies. The biotech industry in Illinois has also had the strongest revenue growth, with annual growth of 13.3 per cent.⁵⁵ The medical technology industry in the Chicago area is also prominent, with 938 medtech companies specialising in dental, surgical and medical equipment.

Research universities

The Chicago area is home to a number of reputable research universities, specifically Northwestern University, the University of Chicago and the University of Illinois at Chicago. In 2015, Northwestern University received US\$226.73 million in NIH funding, the University of Chicago received US\$170.94 million and the University of Illinois received US\$100.78 million.⁵⁶ The University of Chicago Comprehensive Cancer Center is paving the way for the growing cancer immunotherapy sector.

Key figures

- › Over the past decade, Chicago ranked 8th in patents granted, 9th in VC funding, and 10th in NIH funding.⁵⁷
- › Over the past decade the top seven universities in Illinois have nearly doubled their R&D expenditures.
- › VC funding in the state increased 209 per cent between 2009 and 2012.⁵⁸
- › The Illinois biotech industry employs 81,000 workers directly and 288,000 indirectly.⁵⁹
- › Chicago ranks 2nd in pharmaceutical manufacturing employees and 3rd in medical equipment and supplies manufacturing companies.⁶⁰
- › From 2014 to 2015, the biotech sector in Chicago grew 357 jobs and 26 companies.
- › Organisations in the Chicago area received US\$666.26 million in NIH funding in 2015.
- › In 2015 Chicago received US\$79.8 million in VC funding.⁶¹

Representative facilities/companies

- › Abbott
- › AbbVie
- › Argonne National Laboratory
- › Fermilab
- › UL
- › Astellas
- › Takeda Pharmaceuticals
- › Hospira
- › Catalent
- › Fresenius Kabi
- › Lundbek
- › Novartis
- › Labtest International
- › Wockhardt
- › W.R. Grace & Co
- › Elevance

INDIANA (INDIANAPOLIS/WARSAW)

Description

Indiana is home to a medical device manufacturing cluster which employs 20,000 workers and accounts for 40 per cent of all life science employment in the state. The medical device sector also generates US\$10 billion in annual output. Key areas of speciality are cardiovascular, urology, diagnostics, and orthopaedics.⁶² Warsaw, Indiana is known as the orthopaedics capital of the world, accounting for 50 per cent of the country's market and 33 per cent of the global market.⁶³ Indiana also provides a favourable tax environment, particularly for R&D and venture capital funding.

Research Universities

Indiana's industry is supported by the abundance of skilled workers coming from the state's major colleges such as Butler University, Indiana University, Purdue University, Rose-Hulman Institute of Technology, and the University of Notre Dame.

Key figures

- › The medical device sector in Indiana employs 20,000 people (40 per cent of life sciences in the state). It is the 5th largest state for medtech employment.⁶⁴
- › Key sectors are orthopaedic, cardiovascular, diagnostic, and urological products.⁶⁵
- › Indiana accounts for 50 per cent of the US orthopaedics market and 33 per cent of the global market.⁶⁶
- › Indiana has 2,000 life science companies with 56,000 employees.⁶⁷
- › The state is 2nd in the nation for worldwide exports at US\$9.8 billion.⁶⁸
- › Indiana has the 2nd highest concentration of biopharma jobs.⁶⁹
- › A Patent Income Exemption program offers a sales tax exemption on income from qualified utility and plan patents for new technology of processes.⁷⁰
- › A Research and Development Sales Tax Exemption offers a refund to companies for paid sales tax on R&D for equipment (including medical equipment).⁷¹
- › A Research Development tax credit is offered based on qualified research expenditure.
- › A Venture Capital Investment tax credit offers incentives to individual and corporate investors for investment in early stage firms.⁷²

Representative facilities/companies

- › Biomet
- › Boston Scientific
- › Cook Medical
- › DePuy
- › Medtronic
- › Roche Diagnostics
- › Zimmer

MARYLAND/WASHINGTON DC

Description

The Washington DC metro area has a smaller medtech industry when compared to California and Massachusetts, but it is home to the National Institute of Health (NIH), the Food and Drug Administration (FDA), the National Science Foundation (NSF), and the Center for Disease Control (CDC). Biotechnology and pharmaceuticals are key industry specialities in Metro DC. The region developed the first rapid test for Ebola, the first FDA-approved blood test for colon cancer and was the first to map the human genome.

Major Australian connections

The Walter Reed Army Institute of Research is a collaboration between the US and Australia focussed on the discovery of antimalarial drugs and treatment. The National Institutes of Health's (NIH) National Institute of Allergy and Infectious Diseases (NIAD) has a number of collaborations with Australian institutions.

Research universities

The region is home to a number of colleges, however by far the most prominent in the medical field is John Hopkins University which accounts for 71 per cent of the regions total NIH funding.⁷³

Key figures

- › In 2014, the region ranked 3rd in patents (of which roughly 50 per cent were held by the US Department of Health and Human Services). It also ranks 3rd in lab space, 5th in NIH funding, and 11th in venture capital investment.⁷⁴
- › Maryland is home to over 500 biotech firms and 2,000 life science companies.⁷⁵
- › The only FDA approved data centre is in Maryland.
- › Maryland offers a 50 per cent biotech investor incentive tax credit.⁷⁶

Representative facilities/companies

- › AstraZeneca
- › Emergent BioSolutions
- › Brace Pharmaceuticals
- › Epigenomics
- › BD Diagnostic Systems
- › BioFactura
- › BioMarker Strategies
- › Cellphire
- › Fyodor Biotechnologies
- › GetWesIINetwork
- › Mindoula Health
- › GeneDx
- › Lonza



NEW YORK/NEW JERSEY

Description

New York City and the greater New Jersey region is classified as a cluster due to the sheer size of the economy and the abundance of skilled workers and academic institutions. The region ranks highly in number of jobs in the field and also for lab space. The region receives a significant amount in federal and state funding, ranking 2nd in NIH funding. However, despite being the centre of the US financial industry, New York/New Jersey only ranks 4th in VC funding.⁷⁷ On average, biotech accounts for 6 per cent of government research dollars but less than 2 per cent of VC funding.⁷⁸ An abundance of universities and teaching hospitals provide a skilled workforce.

Major Australian connections

Rutgers University in New Jersey is collaborating with the Australian Stem Cell Centre.

Research universities

New York City has the largest concentration of academic institutions in the world. Nine academic medical centres include Columbia University, Weill Cornell Medical College, New York University, Albert Einstein College of Medicine and the Rockefeller University. New Jersey boasts Princeton University and Rutgers College.

Key figures

- › The region ranks 1st for jobs in the field and also for lab space. The region also ranks 2nd in NIH funding.⁷⁹
- › The region ranks 4th in the country for VC funding.⁸¹
- › New Jersey has 3,100 life science facilities that employ 115,000 people and has nearly 400 biotechnology companies.⁸¹
- › New Jersey specialises in pharmaceuticals, research/testing/medical labs, bioscience distribution, and medical devices.⁸²
- › The biotech industry in New Jersey grew by 400 per cent in less than 2 decades.⁸³
- › New Jersey offers a number of incentives to foster the growth of life sciences, particularly for early stage ventures and for R&D.⁸⁴
- › In April 2015, the Early-Stage Life Science Funding Initiative was announced in New York City. The NYC Economic Development Corp. will contribute US\$10 million to a fund along with Celgene, GE Ventures, and Eli Lilly. The fund will total US\$150 million and will fund early stage research under guidance of two VC firms. It is expected to create 2,000 new jobs.⁸⁵

Representative facilities/companies

- › Actavis
- › Bayer Healthcare
- › Bristol-Myers Squibb
- › Eli Lilly
- › GlaxoSmithKline
- › Johnson & Johnson
- › Merck Novartis
- › Novo Nordisk
- › Pfizer
- › Roche
- › Sanofi
- › Teva

NORTH CAROLINA (RESEARCH TRIANGLE)

Description

North Carolina's medtech region is known as the Research Triangle Region as it is centred on three world-class research universities. Duke University, the University of North Carolina at Chapel Hill, and North Carolina State University are all located within 40 kilometres of each other. This region is home to over 600 biotech companies with 60,000 employees. At the epicentre of the region is the Research Triangle Park (RTP) which is the largest research park in the United States. RTP was built 50 years ago and is home to over 300 companies and 50,000 employees who specialise in a number of areas including biotechnology and pharmaceuticals.⁸⁶

Research universities

The three universities that make up the research triangle are Duke University, the University of North Carolina at Chapel Hill, and North Carolina State University. Roughly 13,000 degrees in STEM fields are awarded every year in North Carolina.⁸⁷

Key Figures

- › This region is home to over 600 biotech companies with 60,000 employees.⁸⁸
- › North Carolina's 4 per cent corporate income tax is the lowest in the Southeast and Ernst & Young ranked the state 3rd lowest for state and local tax burden in the country.⁸⁹

- › North Carolina has the highest concentration of Tier 1 research universities in the US.⁹⁰
- › In 2012, North Carolina spent US\$2 billion on academic life sciences R&D.⁹¹
- › The North Carolina Biotechnology Center is the first state-sponsored biotech initiative in the US⁹²
- › North Carolina State University's Biomanufacturing Training and Education Center trains students in biomanufacturing technologies.⁹³
- › Also at North Carolina State University is the Nanosystems Engineering Research Center which develops nanotechnology for battery-free wearable monitoring systems.⁹⁴
- › R&D focuses on therapeutics development, genomics/proteomics, gene therapy, medical devices, diagnostics and sensors.⁹⁵

Representative facilities/companies

- › BASF
- › Bayer
- › BD
- › Biogen
- › GSK
- › Grifols
- › LabCorp
- › Merck
- › Novartis
- › Novo Nordisk
- › PPD
- › Quintiles



PENNSYLVANIA (PHILADELPHIA)

Description

Philadelphia's successful medtech industry is based on location, abundance of hospitals and access to research universities. Geographically, Philadelphia is in a desirable location relatively close to New York City (for financing) and Washington D.C. (for regulators), as well as other centres such as Boston and Baltimore. Philadelphia is also relatively cheap to operate in, compared to cities like New York and San Francisco. In addition, the state offers a number of tax incentives. The Greater Philadelphia is home to more than 2,000 medical technology companies including B. Braun and Johnson & Johnson.⁹⁶

Research Universities

In Pennsylvania there are 300 universities (including 25 medical schools) producing more than 168,000 graduates each year.⁹⁷ The most notable universities include Penn State, the University of Pennsylvania, the University of Pittsburgh, Carnegie Mellon University, Lehigh University, Temple University and Jefferson Medical College. The University of Pennsylvania and the University of Pittsburgh received by far the most NIH funding in the state with US\$180 million and US\$176 million respectively.⁹⁸

Key figures

- › The regions of Pennsylvania, New Jersey, and Delaware are known for their specialties in radiology, physical rehabilitation and pulmonology.⁹⁹
- › Pennsylvania ranks 4th in the country for R&D expenditures.¹⁰⁰
- › Pennsylvania ranks 4th in the country for research, testing and laboratory facilities.¹⁰¹
- › Pennsylvania ranks 4th in the country for pharmaceuticals industry strength.¹⁰²
- › Pennsylvania ranks 5th in the country for bioscience venture capital funds.¹⁰³
- › The state is also in the top 10 for biotech industry strength.¹⁰⁴
- › 78,000 employees work in Life Sciences in Pennsylvania.¹⁰⁵
- › There are more than 2,300 life science establishments.¹⁰⁶
- › There are more than 1,000 research, testing and medical labs in the state.¹⁰⁷
- › Pennsylvania is also only 1 of 6 states with tradable R&D tax credits.¹⁰⁸

Representative facilities/companies

- › B. Braun
- › Baxter Healthcare
- › Ethicon
- › Globus Medical
- › Johnson & Johnson
- › Kensey Nash
- › Orthovita
- › Teleflex Medical

TEXAS (AUSTIN/HOUSTON)

Description

Texas has an educated workforce and growing tech industry, leading to the development of medical technology and a medical device manufacturing sector. The state is known for being business-friendly and for low taxes. The Austin region has specialties in orthopaedics and diagnostics, the Houston region in cardiology, and San Antonio's speciality is wound care.¹⁰⁹ Houston is the birthplace of nanotechnology and is home to the largest medical complex in the world, the Texas Medical Center (TMC). The TMC is the largest employer in Houston, with an extensive campus of 21 hospitals, 50 non-profit organizations and 8 academic and research institutions. The TMC concentrates its research on genomics, regenerative medicine, innovation, clinical trials, and health policies. More broadly, Houston has more than 190 life science and biotechnology companies as well as academic partnerships and 200 hospitals and clinics.

Major Australian connections

The University of Texas MD Anderson Cancer Center has collaborated with Australia's Peter Mac on IBM Watson and Moonshots. Baylor School of Medicine (Genomics) has also collaborated with the Garvan Institute. Australian Dr. Richard Gibbs, who works at Baylor, discovered the human genome sequence. Brisbane's BiVACOR has also gone through the TMCx incubator/accelerator program and has created the world's first artificial heart. Currently it is undergoing R&D and clinical trials at the Texas Heart Institute in Houston.

Research universities

Texas is home to 208 colleges and universities. Some of the larger and most notable universities contributing to the medtech sector are Rice University, the University of Texas at Austin, the University of Texas at Dallas and Texas A&M.

Key figures

- › As of 2013, 13,967 Texans were employed in the medical device manufacturing sector.¹¹⁰
- › From 2009-2013, 1,137 medical device patents were claimed in Texas.¹¹¹
- › In 2014, medtech VC funding equalled US\$63.2 million (up from US\$40 million in 2013).¹¹²
- › NIH funding in 2014 was US\$972 million (up from US\$957 million in 2013).¹¹³
- › The Texas Medical Center is the largest employer in Houston, with an extensive campus of 21 hospitals, 50 non-profit organizations and 8 academic and research institutions.
- › Houston has more than 190 life science and biotechnology companies.

Representative facilities/companies

- › GE Medical Systems
- › Johnson & Johnson
- › Alcon Research
- › Flextronics
- › Abbott Laboratories
- › Medtronic
- › Baxter Healthcare
- › Thermo Fisher Scientific
- › Stryker
- › Becton Dickinson & Co

UTAH (SALT LAKE CITY)

Description

Utah's life sciences industry is growing quickly, particularly around Salt Lake City. Since 2007, employment in medical device manufacturing has gone up 6,300 per cent in Utah, compared to the US average of 25.5 per cent.¹¹⁴ Around 30,000 individuals are employed in life sciences in Utah.¹¹⁵ The state has a young and educated population (the average age is 29, the youngest in the nation). The state is business-friendly, offering incentives in key industries including life sciences. Key areas of research in the region are arterial and vascular access devices - Utah produces 70 per cent of all devices in the world. The state also claims development for the first human artificial heart, first functional prosthetic arm, the most successful heart transplant, and the first successful heart pump implant.¹¹⁶

Research universities

Utah has three research universities: Brigham Young University, Utah State University and the University of Utah. The state brings in more than US\$400 million a year in research grants.¹¹⁷

Key figures

- › Utah's cost of doing business is 10 per cent lower than the national average.¹¹⁸
- › The state produces 70 per cent of the world's arterial and vascular access devices.¹¹⁹
- › There are over 1,000 life sciences establishments in the state employing 30,000 (or 2.3 per cent of the state's population).¹²⁰
- › In 2014, Utah companies received US\$16.4 million in VC funding.¹²¹
- › In 2014, researchers in Utah received US\$176 million in NIH funding.¹²²

Representative facilities/companies

- › MasterControl
- › Nelson Laboratories
- › Moog Medical
- › Medtron Inc
- › Tauret
- › Teva Co-Diagnostics
- › Paragon Medical

WISCONSIN (SOUTHEAST)

Description

The southeast region of Wisconsin (or the Madison region) is an extension of Chicago's medtech cluster, and its manufacturing history makes it an ideal location for medical device manufacturing. The state has 50 per cent higher employment concentration in medical device manufacturing than the national average. It also provides incentives such as a low 0.4 per cent manufacturing tax rate (compared to Wisconsin's 7.6 per cent overall business rate).¹²³

Research universities

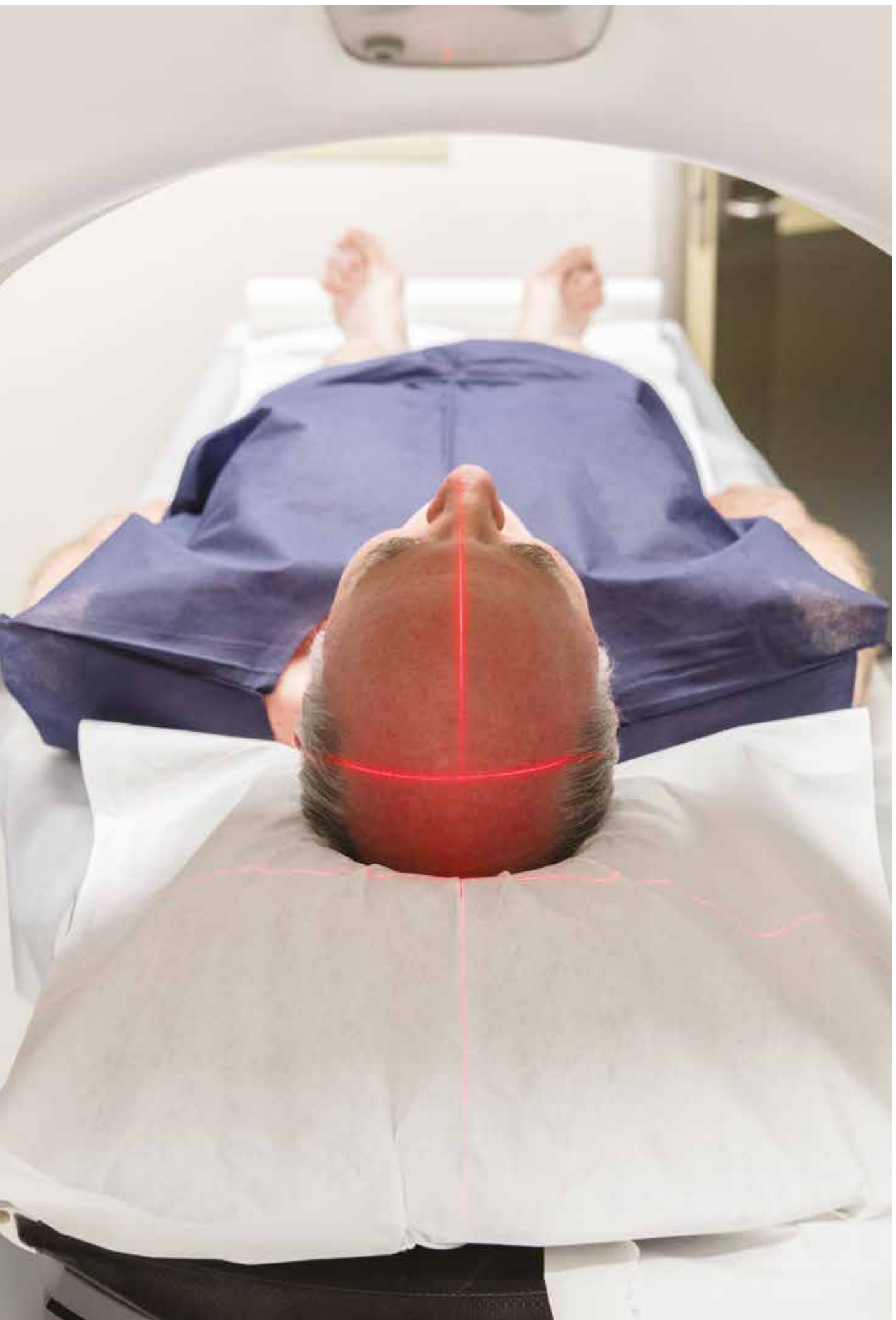
There are 73 higher education institutions in Wisconsin. The largest university and the location of most significant research is the University of Wisconsin Madison. In 2014, US\$934 million was spent on bioscience academic R&D in Wisconsin, which was 70 per cent of total R&D spending (compared to the national average of 61 per cent).¹²⁴

Key figures

- › The bioscience industry in Wisconsin employs 30,000 and produces US\$27 billion in annual economic output.¹²⁵
- › The state has 50 per cent higher employment concentration on medical device manufacturing than the national average.¹²⁶
- › The state ranks 11th in degrees in biotech fields, 13th in total academic R&D expenditure, 15th in biotech R&D expenditure, and 16th in NIH funding.¹²⁷

Representative facilities/companies

- › Mikrotech
- › GE Healthcare
- › Beere Medical
- › Xact Wire
- › Phillips Plastics



CLUSTERS TO WATCH

Colorado (Front Range/Denver)

Colorado's Front Range region has a growing bioscience cluster that includes biotechnology, medical devices, agricultural-bioscience, diagnostics, pharmaceuticals and health care. Recent developments in the region include the US\$5.3 billion Fitzsimons Life Science District and the US\$300 million BIO Frontiers Institute. This sector is a priority for the government, as exemplified by initiatives such as a US\$25 million grant program for technology licensed out of research institutions in Colorado.¹²⁸

Georgia (Atlanta)

The medical device sector is expanding in the Atlanta area. Medical devices and diagnostics account for 50 per cent of Georgia's life science companies and 27 per cent of the sector's workers.¹²⁹ There are roughly 200 organizations and companies in the medical device sector in Georgia. Emory University and Georgia Institute of Technology have the 2nd highest ranking biomedical engineering degree program in the country.¹³⁰

Michigan (Ann Arbor/Grand Rapids)

Michigan, known for its automotive manufacturing history, is now turning into a medical device manufacturing sector. The region also offers relatively low costs, low taxes and a skilled workforce coming primarily from the University of Michigan.¹³¹

Ohio (Cleveland)

The Cleveland region is an up-and-coming medical device cluster. Ohio has an established industrial and manufacturing infrastructure which is helping to attract medical device manufacturers. In addition it is home to the Cleveland Clinic and is one of the biggest networks of teaching hospitals and research institutions in the country. In 2014, medical device companies in Ohio received US\$22 million in VC capital and US\$670 million of NIH funding went to Ohio researchers.¹³²

Washington (Seattle)

The Seattle area is known for its tech and start-up environment which bodes well for its growing medtech sector. The University of Washington, the Gates Foundation, PATH, Juno Therapeutics and Fred Hutchinson Cancer Research Center are all driving the cluster, which is centred in South Lake Union, Seattle. The key area of focus is immunotherapy.¹³³

HOW AUSTRADE CAN HELP

If you are an Australian company ready to internationalise your medical technology or life sciences business, Austrade can assist with market entry and expansion. We provide some tailored services, as well as access to a range of specialists, including:

- › market research
- › channel marketing consultants
- › lead generation agencies
- › legal, accounting, tax and immigration advisory services
- › banking and financial service providers
- › commercial real estate agencies
- › relevant industry network specialists.

If you are looking to invest in Australia, Austrade can assist. We are able to provide the contacts and information you need to establish your business successfully within Australia or to make the right decision in sourcing Australian products or services. Assistance to potential international investors includes:

- › initial coordination of investment enquiries and assistance
- › information on the Australian business and regulatory environment
- › market intelligence and investment opportunities
- › identification of suitable investment locations and partners in Australia
- › advice on Australian government programs and approval processes.

METHODOLOGY

The clusters identified in this report were determined by researching top medtech and medical device locations in the United States (taking into account market size, amount of funding and employment size). In addition, major life science, pharmaceuticals, and biotechnology regions were taken into consideration. Those regions named in Tier 1 were most often at the top of these lists and are top recipients of funding and/or investment. Those listed in Tier 2 also play significant roles in the US medtech industry. Tier 3 are smaller regions but have the potential to grow. A large portion of the information used in each entry is sourced from local or state economic development or other government agencies, as well as general research. The information has been formatted to be concise and accessible.

To find out more, contact Austrade in the United States:

Austrade Boston

745 Atlantic Avenue, 8th Floor
Boston MA 02111
Tel: +1 646 344 8111
Email: USA@austrade.gov.au

Austrade Chicago

123 North Wacker Drive Suite 1325
Chicago IL 60606
Tel: +1 312 374 9401
Email: USA@austrade.gov.au

Austrade Houston

3009 Post Oak Blvd Suite 1310
Houston TX 77056
Tel: +1 832 962 8420
Email: USA@austrade.gov.au

Austrade New York

Australian Consulate
150 East 42nd St, 34th Floor
New York NY 10017
Tel: +1 646 344 8111
Email: USA@austrade.gov.au

Austrade San Francisco

575 Market Street Suite 1800
San Francisco CA 94105
Tel: +1 415 644 3620
Email: USA@austrade.gov.au

Austrade Washington DC

Australian Embassy
1601 Massachusetts Av. NW
Washington DC 20036
Tel: +1 202 454 9744
Email: USA@austrade.gov.au

REFERENCES

1. SelectUSA, Access to Capital. selectusa.gov/access-capital. Accessed 7 July 2016
2. JLL, Life Science Cluster Report 2014. jll.com/Research/2014-global-life-sciences-report-JLL.pdf?654be919-ae1f-45a0-bef3-ab01d0a4ece6. Accessed 7 July 2016
3. SelectUSA, Nexus of Innovation. selectusa.gov/nexus-innovation. Accessed 7 July 2016
4. SelectUSA, Access to Capital. selectusa.gov/access-capital. Accessed 7 July 2016
5. SelectUSA, Medical Technology Spotlight. selectusa.gov/medical-technology-industry-united-states. Accessed 21 June 2016
6. Medical Device Business, The U.S. Medical Device Industry: Strengths, Yair Holtz, Gleb Gorkhover, and Michael Ganz. 12 January 2015 mddonline.com/article/us-medical-device-industry-swot-analysis-strengths. Accessed 21 June 2016
7. Ibid
8. <https://www.selectusa.gov/medical-technology-industry-united-states>
9. Top 12 Hot BioPharma Regions For Growth And Expansion. BioSpace, Rennee Morad 23 September 2014. biospace.com/News/top-12-hot-biopharma-regions-for-growth-and/347389. Accessed 21 June 2016
10. San Francisco Center for Economic Development, Life Sciences & Biotech. sfced.org/case-for-business/sectors/life-sciences-biotech. Accessed 22 June 2016
11. San Francisco Center for Economic Development, Sector Data. sfced.org/case-for-business/sectors/life-sciences-biotech/sector-data/. Accessed 22 June 2016
12. Ibid
13. Top 12 Hot BioPharma Regions For Growth And Expansion. BioSpace, Rennee Morad. 23 September 2014. biospace.com/News/top-12-hot-biopharma-regions-for-growth-and/347389. Accessed 21 June 2016
14. Emergo, Medical Device Superstars: Where Innovation Happens in the US, Chris Schorre, 19 February 2016. emergogroup.com/blog/2016/02/medical-device-superstars-where-innovation-happens-us. Accessed 22 June 2016
15. Medical Device Business, California Still Tops U.S. State for Medtech, Stephen Levy 31 December 2013. qmed.com/mpmn/medtechpulse/california-still-top-us-state-medtech. Accessed 22 June 2016
16. Ibid
17. San Francisco Center for Economic Development, Sector Data. sfced.org/case-for-business/sectors/life-sciences-biotech/sector-data/. Accessed 22 June 2016
18. Ibid
19. Medical Device Business, California Still Tops U.S. State for Medtech, Stephen Levy 31 December 2013. qmed.com/mpmn/medtechpulse/california-still-top-us-state-medtech. Accessed 22 June 2016
20. San Diego Regional EDC, Life Sciences, 1 June 2016. sandiegobusiness.org/sites/default/files/Life%20Sciences%20Profile.pdf. Accessed 22 June 2016
21. Ibid
22. BayBio and BioCom, 2014 California Economic Impact Report, June 2014. biocom.org/s/Economic%20Impact%20Reports/. Accessed 22 June 2016
23. Ibid
24. Ibid
25. Ibid
26. Genetic Engineering & Biotechnology News, Top 10 U.S. Biopharma Clusters, Alex Philippidis 9 March 2015. genengnews.com/insight-and-intelligence/top-10-u-s-biopharma-clusters/77900393/. Accessed 23 June 2016
27. SpareFoot, Here's Why Boston's Life-Science Sector Is So Strong, Jay Fitzgerald 24 July 2014. sparefoot.com/self-storage/blog/6608-life-science-sector-in-boston/. Accessed 23 June 2016
28. Ibid
29. The Life Sciences Corridor (<http://lifesciencescorridor.com/about-us/>). Accessed 23 June 2016
30. SpareFoot, Here's Why Boston's Life-Science Sector Is So Strong, Jay Fitzgerald 24 July 2014. sparefoot.com/self-storage/blog/6608-life-science-sector-in-boston/. Accessed 23 June 2016
31. MassBio, Industry Snapshot. massbio.org/why-massachusetts/industrynapshot. Accessed 23 June 2016.
32. Ibid
33. Boston Business Journal, Biotech Deals Top VC Funding in Mass. In 2015, Jessica Bartlett, 22 December 2015. bizjournals.com/boston/blog/bioflash/2015/12/biotech-deals-top-vc-funding-in-mass-in-2015.html. Accessed 23 June 2016
34. U.S. Economic Development Administration, Investing in Manufacturing Communities Partnership. eda.gov/challenges/imcp/files/2nd-round/IMCP-2-Page-Handout-minnesota.pdf. Accessed 23 June 2016
35. Minnesota Department of Employment and Economic Development, Health Care Services. mn.gov/deed/business/locating-minnesota/industries-sectors/health-care/. Accessed 23 June 2016
36. Minnesota Department of Employment and Economic Development, Innovation in Action. mn.gov/deed/business/locating-minnesota/industries-sectors/biosciences/medical-devices/innovation-action.jsp. Accessed 23 June 2016
37. MPMN, September/October 2014, Volume 29, No. 5, William Betten. qmed.com/mpmn/article/minnesotas-life-science-ecosystem-retains-world-class-status. Accessed 23 June 2016
38. Ibid
39. Medical Alley. greatermsp.org/clientuploads/Publications/Minnesota_Medical_Alley_Booklet.pdf. Accessed 23 June 2016
40. MPMN, September/October 2014, Volume 29, No. 5, William Betten. qmed.com/mpmn/article/minnesotas-life-science-ecosystem-retains-world-class-status. Accessed 23 June 2016
41. Ibid
42. Minnesota Department of Employment and Economic Development, Innovation in Action. mn.gov/deed/business/locating-minnesota/industries-sectors/biosciences/medical-devices/innovation-action.jsp. Accessed 23 June 2016
43. Medical Alley. greatermsp.org/clientuploads/Publications/Minnesota_Medical_Alley_Booklet.pdf. Accessed 23 June 2016
44. Ibid
45. Ibid
46. Ibid
47. Enterprise Florida, Life Sciences August 2016. enterpriseflorida.com/wp-content/uploads/brief-life-sciences-florida.pdf. Accessed 24 June 2016
48. BioFlorida. bioflorida.com/?page=SOI15. Accessed 24 June 2016
49. Enterprise Florida, Life Sciences August 2016. enterpriseflorida.com/wp-content/uploads/brief-life-sciences-florida.pdf. Accessed 24 June 2016
50. Ibid
51. Ibid
52. Ibid
53. Ibid
54. Ibid
55. The Economic Engine of Biotechnology in Illinois, Monique Naleway and Dan Shoenholz. ibio.org/?page=ileconomicreport. Accessed 24 June 2016
56. World Business Chicago (https://dl.dropboxusercontent.com/content_link/MSjtCGddq6wTaslOQFTbi5Uw21q4j1TO6vejwGAHtAfU1NuA2AZyQApKnCmRZF/file?dl=1). Accessed 24 June 2016
57. Genetic Engineering & Biotechnology News, Top 10 U.S. Biopharma Clusters, Alex Philippidis 10 March 2014. genengnews.com/insight-and-intelligence/top-10-u-s-biopharma-clusters/77900061. Accessed 24 June 2016
58. The Economic Engine of Biotechnology in Illinois, Monique Naleway and Dan Shoenholz. ibio.org/?page=ileconomicreport. Accessed 24 June 2016
59. World Business Chicago, Biotechnology Profile. c.yimcdn.com/sites/www.ibio.org/resource/resmgr/docs/illinoisbiotechreportovervie.pdf. Accessed 24 June 2016.

60. World Business Chicago, Key Industries. worldbusinesschicago.com/key-industries/. Assessed 24 June 2016
61. World Business Chicago (https://dl.dropboxusercontent.com/content_link/MSjtCGddq6wTasiOQFTbi15Uw21q4j1TO6vejwGAHtAfU1NuA2AZyQApKnCmRZF/file?dl=1). Assessed 24 June 2016
62. BioCrossroads, Indiana's Medical Device Industry Is Fifth Largest in U.S. Generating \$10 Billion Annually, 18 January 2016. biocrossroads.com/indianas-medical-device-industry-fifth-largest-u-s-generating-10-billion-annually/. Assessed 24 June 2016
63. Indiana Economic Development Corporation, Life Sciences. iedc.in.gov/industries/life-sciences. Assessed 24 June 2016
64. BioCrossRoads, Indiana Medical Devices Report January 2012. biointellex.com/wp-content/uploads/2014/08/2012-Indiana-Medical-Devices-Report.pdf. Assessed 24 June 2016
65. Indiana Economic Development Corporation, Life Sciences. iedc.in.gov/industries/life-sciences. Assessed 24 June 2016
66. Ibid
67. Ibid
68. Ibid
69. Ibid
70. Ibid
71. Ibid
72. Ibid
73. Genetic Engineering & Biotechnology News, Top 10 U.S. Biopharma Clusters, Alex Philippidis 10 March 2014. genengnews.com/insight-and-intelligence/top-10-u-s-biopharma-clusters/77900061. Assessed 24 June 2016
74. Ibid
75. Maryland Department of Commerce, Maryland BioHealth Story. open.commerce.maryland.gov/biohealth-technology/. Assessed 24 June 2016.
76. Ibid
77. Genetic Engineering & Biotechnology News, Top 10 U.S. Biopharma Clusters, Alex Philippidis 10 March 2014. genengnews.com/insight-and-intelligence/top-10-u-s-biopharma-clusters/77900061. Assessed 24 June 2016
78. Fast Company, The Big Apple's Biotech Dreams Are Stuck In The PetriDish, Ansley O'Connell 24 February 2015. fastcompany.com/3034774/new-york-biotech-startup-dreams. Assessed 24 June 2016
79. Genetic Engineering & Biotechnology News, Top 10 U.S. Biopharma Clusters, Alex Philippidis 10 March 2014. genengnews.com/insight-and-intelligence/top-10-u-s-biopharma-clusters/77900061. Assessed 24 June 2016
80. Ibid
81. Choose New Jersey, Life Sciences. choosenj.com/key-industries/life-sciences/. Assessed 24 June 2016
82. Ibid
83. Ibid
84. Crain's, New York City Makes \$150 Million Bet On Life Sciences, Irina Ivanova 1 April 2015. crainsnewyork.com/article/20150401/HEALTH_CARE/150409994/new-york-city-makes-150-million-bet-on-life-sciences. Assessed 24 June 2016.
85. Ibid
86. Economic Development Partnership of North Carolina, Biotechnology & Pharmaceuticals. edpnc.com/industries/biotech-pharmaceuticals/. Assessed 27 June 2016
87. Ibid
88. Ibid
89. Ibid
90. Ibid
91. Ibid
92. Ibid
93. Ibid
94. Ibid
95. Research Triangle Region, Advanced Medical Care. researchtriangle.org/clusters/advanced-medical-care. Assessed 27 June 2016
96. Select Greater Philadelphia, Medical Devices. selectgreaterphiladelphia.com/industries/life-sciences-and-healthcare/medical-device/. Assessed 27 June 2016
97. Pennsylvania Department of Community & Economic Development, Life Sciences. newpa.com/key-industries/life-sciences/. Assessed 27 June 2016
98. Ibid
99. Genetic Engineering & Biotechnology News, Top 10 U.S. Biopharma Clusters, Alex Philippidis 10 March 2014. genengnews.com/insight-and-intelligence/top-10-u-s-biopharma-clusters/77900061. Assessed 24 June 2016
100. Pennsylvania Department of Community & Economic Development, The Pennsylvania Advantage Life Sciences 18 May 2016. newpa.com/download/life-sciences-fact-sheet/?wpdmdl=63264. Assessed 27 June 2016.
101. Ibid
102. Ibid
103. Ibid
104. Ibid
105. Ibid
106. Ibid
107. Ibid
108. Ibid
109. Texas Office of the Governor, The Texas Biotechnology Industry 2014. gov.texas.gov/files/ecodev/Biotech_Report.pdf. Assessed 27 June 2016.
110. Qmed, Which U.S. State Is Best for Medical Device Companies?, Texas, Chris Newmarker and Brian Buntz 22 February 2016. qmed.com/mpmn/gallery/image/8-texas. Assessed 27 June 2016.
111. Ibid
112. Ibid
113. Ibid
114. Qmed, Which U.S. State Is Best for Medical Device Companies?, Texas, Chris Newmarker and Brian Buntz 22 February 2016. qmed.com/mpmn/gallery/image/8-texas. Assessed 27 June 2016.
115. BioUtah, Utah Life Science Facts. bioutah.org/utah-life-science-facts. Assessed 27 June 2016.
116. Economic Development Corporation of Utah, Life Sciences. edcutah.org/lifesciences.php. Assessed 27 June 2016.
117. Ibid
118. Ibid
119. Ibid
120. BioUtah, Utah Life Science Facts. www.bioutah.org/utah-life-science-facts. Assessed 27 June 2016.
121. Qmed, Which U.S. State Is Best for Medical Device Companies?, Texas, Chris Newmarker and Brian Buntz 22 February 2016. qmed.com/mpmn/gallery/image/8-texas. Assessed 27 June 2016
122. Ibid
123. Wisconsin Economic Development Corporation, Bioscience By the Numbers, 2015. inwisconsin.com/wp-content/uploads/2016/06/Bioscience-Sector-Snapshot.pdf. Assessed 27 June 2016
124. Ibid
125. Ibid
126. Ibid
127. Medical Product Manufacturing News, Badger State's Southeast Boasts Robust Medical Device Sector, Bob Michaels 2009. qmed.com/mpmn/article/badger-states-southeast-boasts-robust-medical-device-sector. Assessed 27 June 2016
128. Colorado Office of Economic Development & International Trade, Bioscience. advancecolorado.com/key-industries/bioscience. Assessed 28 June 2016.
129. Georgia Department of Economic Development, Life Sciences. lifesciences.georgia.org/medicaldevices. Assessed 28 June 2016
130. Metro Atlanta Chamber, Medical Devices. metroatlantachamber.com/business/bioscience-health-it/medical-devices. Assessed 28 June 2016
131. The Right Place, Medical Device Manufacturing. rightplace.org/industry-sectors/smart-manufacturing/medical-device-manufacturing. Assessed 28 June 2016.
132. Qmed, Which U.S. State Is Best for Medical Device Companies?, Texas, Chris Newmarker and Brian Buntz 22 February 2016. qmed.com/mpmn/gallery/image/8-texas. Assessed 27 June 2016.
133. Seattle Office of Economic Development, Sector Snapshot: Life Sciences and Global Health. seattle.gov/economicdevelopment/data/industry-snapshot-life-sciences-and-global-health. Assessed 28 June 2016.

