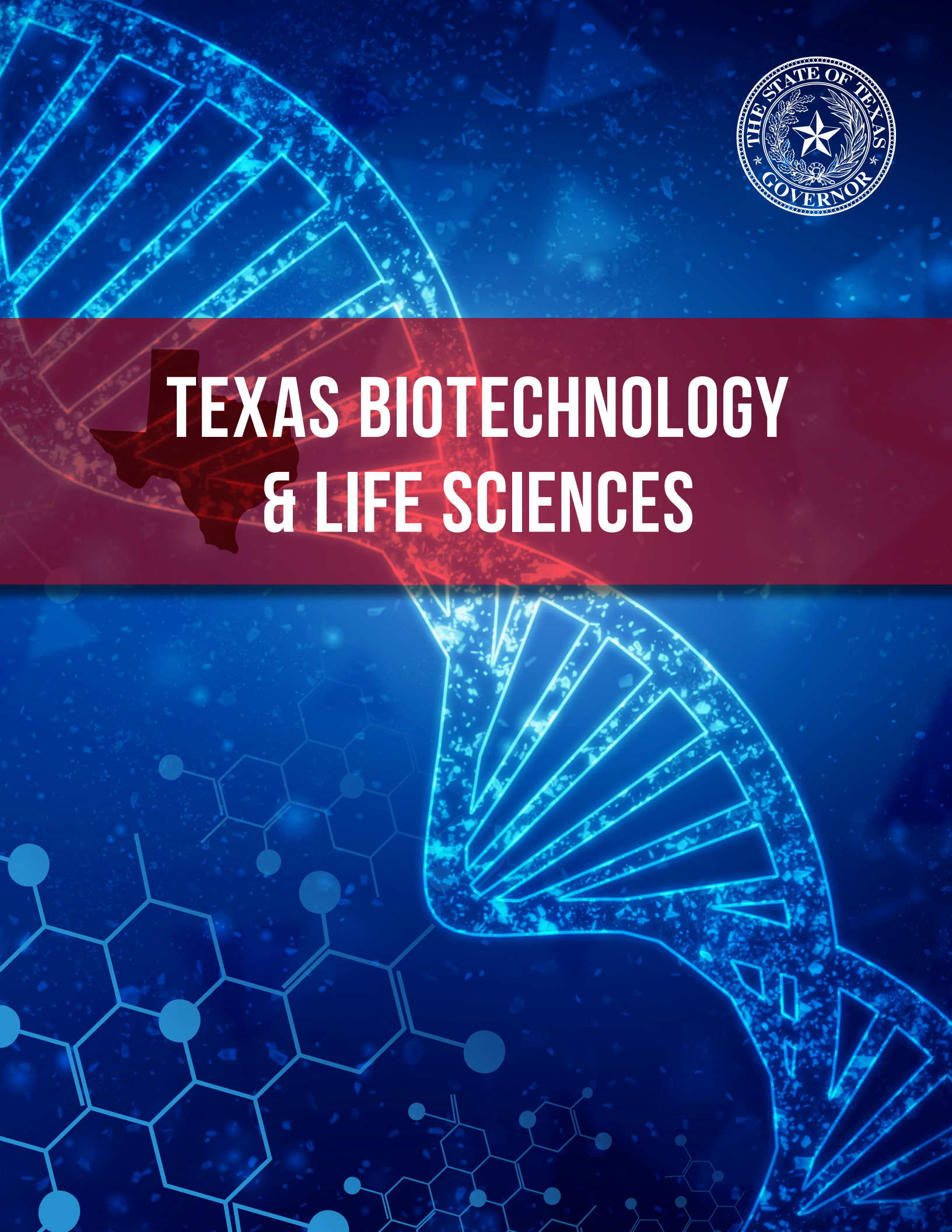


TEXAS BIOTECHNOLOGY & LIFE SCIENCES

TEXAS BIOTECHNOLOGY & LIFE SCIENCES

INTRODUCTION

There are a multitude of factors making Texas a leading hub for biotechnology and life sciences in the country. Texas' highly trained workforce, top-tier research institutions and business-friendly climate position the state as a global life sciences powerhouse. Home to more than 6,100 biotechnology-related manufacturing and R&D firms, Texas is a national leader in the industry. In fact, the state is ranked #4 in the in the U.S. for innovation and technology by CNBC's Top State for Business rankings.

The biotech and life sciences industry has a large workforce of more than 105,000. Texas' impressive network of academic and research institutions, including seven of the nation's top 125 medical schools and $6.6 billion in annual research and development expenditures, are further developing this talent pipeline. Facilities, such as the Texas Medical Center—the world's largest medical complex—are partnering with state universities to help keep Texas on the cutting edge of discovery and innovation in medicine.

World-class medical-systems make Texas a premier environment for pharmaceuticals, biomedicine, medical devices manufacturing, laboratory testing, research and development, cancer research and more. Texas is home to top-ranked biotechnology and medical research institutions, federally designated cancer centers, innovative research collaborations and some of the world's largest medical complexes. Our state's connectivity and robust infrastructure, as well as a statewide emphasis on innovation, creates an environment that allows efficiencies through industry collaboration.

Successful public-private partnerships and supportive public policy in biotech and life sciences put Texas in the spotlight for our innovation in this arena. The Cancer Prevention Research Institute of Texas (CPRIT) is the largest taxpayer-funded cancer research organization in the country, with more than $6 billion dedicated to research grants. Texans voted in 2007 to create this institute—a testament to the citizens of our state and their support for cancer research.

Texas is also home to the largest military medical complex in the nation. Brooke Army Medical Center (BAMC) is the United States Army's premier medical institution. Located on Fort Sam Houston, the 425-bed Academic Medical Center is the Department of Defense's largest facility and only Level 1 Trauma Center.

#3 in the U.S. for biotech-related establishments
Bureau of Labor Statistics

#2 in the nation for clinical trials started and completed
U.S. National Library of Medicine

#3 in the U.S. for biotech-related doctorates
National Center for Science and Engineering Statistics

$2.13 billion in medicine & pharmaceutical exports
U.S. Census Bureau

Home to the #1 county for total testing labs
Bureau of Labor Statistics

The Lone Star State is also at the helm of solving the world's largest health crises. In San Antonio, the Texas Biomedical Research Institute is developing vaccines and treatments against infectious diseases. The department's state-of-the-art facilities include the nation's only privately owned biosafety level four (BSL-4) maximum containment laboratory.

Additionally, within weeks of the COVID-19 pandemic affecting our state, many Texas manufacturers pivoted their operations to help supply personal protective equipment (PPE) and other supplies to their communities. Texas A&M University System's Center for Innovation in Advanced Development & Manufacturing (CIADM) and its subcontractor, Fujifilm Diosynth Biotechnologies, were also contracted by the U.S. government to mass-produce two COVID-19 vaccine candidates.

These are just a few examples of how Texas is playing a pivotal role in solving global health issues. The Texas spirit of innovation and ingenuity continues to push this industry forward and our state's innovators and health care leaders will forever change the face of the biotechnology and life sciences industry.

BIOTECH & LIFE SCIENCES IN TEXAS

Texas is home to more than 6,100 biotech and life sciences firms, employing more than 105,000 workers.

TEXAS: GLOBAL LIFE SCIENCES POWERHOUSE

Texas is truly the future of life sciences and biotechnology. Home to a highly skilled and diverse workforce, world-class institutions, robust transportation and infrastructure systems, innovative public/private partnerships and supportive public policy, the Lone Star State has laid the groundwork for life science and research firms of all sizes to thrive.

Top Fortune 500 companies such as Kimberly-Clark, Celanase and McKesson are based in Texas, while global industry leaders like Galderma, Novartis, Abbott, Allergan, Lonza, Johnson & Johnson and Medtronic have major operations in the state. Not only are larger corporations thriving, but smaller firms are also developing cutting-edge technologies in the Lone Star State.

EVERYTHING IS BIGGER IN TEXAS

Everything is bigger in Texas, including biotech and life sciences. The Texas Medical Center (TMC) is the world's largest medical complex and has been at the forefront of advancing life sciences through pioneering patient care, research, education and prevention. More clinical trials and heart surgeries are performed in the TMC than anywhere else on the globe. Texas is also home to one of the nation's best children's hospitals—Texas Children's Hospital—and the nation's best cancer hospital—MD Anderson Cancer Center.

#1
World's Largest Medical Center

#1
Top Rated Cancer Center in the U.S.

4
NCI-Designated Cancer Centers

7
Medical Research Schools in Nation's Top 125

$6.6B
Annual Research and Development Expenditures

11,462
Clinical Trials Completed (#2 nationally)

BIOTECHNOLOGY GROWTH IN TEXAS

Texas is home to three of the top emerging life sciences clusters in the U.S.—Houston, Austin and Dallas-Fort Worth. As this industry continues to grow, the state ranks third in the country for total number of biotech-related establishments.

In the last five years, Texas has added more than 700 new biotech-related establishments and nearly 9,500 new jobs in the sector. Moreover, Harris County has emerged as the #1 county in the U.S. for testing laboratories establishments with 251.

Texas continues to be the nation's leading exporting state for the last 20 years in a row. In 2021, Texas exported approximately $2.1 billion in pharmaceuticals and medicines throughout the world.

During the COVID-19 pandemic, the biotech industry followed an unprecedented growth path as the world saw an urgent need for personal protective equipment and other medical supplies. This resulted in an increase of 111% in biotechnology-related corporate investment between 2019 and 2020—and these numbers continued to remain strong through 2021.

BIOTECHNOLOGY EMPLOYMENT & FIRMS IN TEXAS, Q3 2021

Sector (NAICS Code)	Employment	Firms
Medical and Diagnostics Laboratories (6215)	25,917	1,705
Testing Laboratories (54138)	19,338	1,033
Physical, Engineering & Biological Research (54171)	27,399	2,012
Medical Equipment & Supplies Manufacturing (3391)	14,282	810
Pharmaceutical & Medicine Manufacturing (3254)	13,877	330
Electromedical Apparatus Manufacturing (334510)	2,653	152
Analytical Laboratory Instrument Manufacturing (334516)	1,934	62
Total	**105,400**	**6,104**

TEXAS BIOTECH & LIFE SCIENCES WORKFORCE

Texas is home to the brightest minds in medicine. With the second largest workforce in the country, Texas offers one of the largest clusters of life sciences professionals in the U.S. The state boasts 15 medical universities, 18,000 industry-related graduates annually and a current workforce of more than 105,000.

The Lone Star State is top ranked for biotech-related doctorates, issuing nearly 900 in 2020. In addition, U.S. News & World Report ranked seven Texas schools among the nation's top 125 research medical schools. There is no doubt that Texas can readily supply life science companies with a highly-skilled pool of talent.

EXPANDING MEDICAL SCHOOL SYSTEMS

Texas continues to expand its medical school network with the addition of four new and proposed medical schools. Sam Houston State University College of Osteopathic Medicine was established in Conroe in 2019 and the University of Houston College of Medicine welcomed its first class in the fall of 2020.

North Texas is home to a new MD program, a partnership between Baylor Scott & White All Saints Medical Center Fort Worth, Texas Christian University and the UNT Health Science Center. The new program welcomed their first class in the summer of 2019.

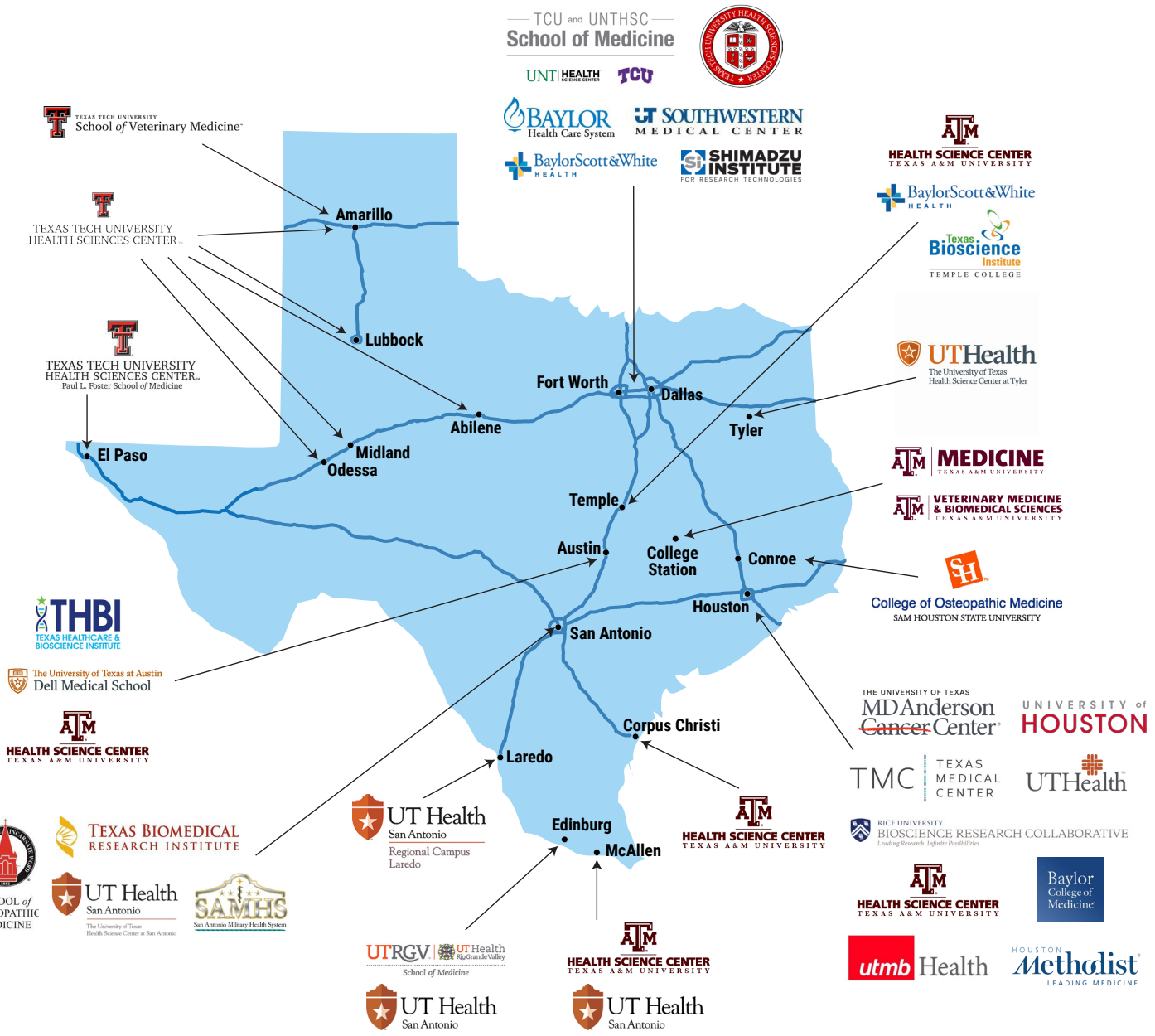
In 2020, the University of Texas Health Science Center announced their intentions to establish a new medical school in Tyler. The first class is planned for the fall of 2023.

Texas Research Medical Schools Ranked Among the Best in U.S.

2023 U.S. News & World Report Ranking of the nation's top 125 research medical schools include:

#22	Baylor College of Medicine
#25	UT Southwestern Medical Center at Dallas
#47	UT Health Science Center at San Antonio
#53	UT Health Science Center at Houston
#80	Texas A&M Health Science Center
#87	Texas Tech University Health Sciences Center
#95	University of North Texas Health Science Center

MEDICAL SCHOOLS & SELECTED RESEARCH CENTERS



Texas is Top Tier for Biotech-Related Doctorates

The Science Foundation ranked Texas among the top 10 U.S. states for number of doctorates awarded in biotech-related fields:

#1	for agricultural sciences doctorates
#2	for health sciences doctorates
#2	for biomedical engineering doctorates
#3	for biomedical sciences doctorates

BIOMEDICAL RESEARCH & DEVELOPMENT

RESEARCH & DEVELOPMENT

Research and development (R&D) is the lifeblood of the biotechnology industry. The state's leading companies, medical centers and institutions of higher learning continue to churn out new innovations and medical advancements that keep Texas on the cutting edge of discovery. In fact, Texas is #2 in the nation for the number of total clinical trials.

In Texas, the R&D pipeline is supplied in part by the state's vast network of public universities and health-related institutions, which invest heavily in R&D and intellectual property generation. In 2019 alone, Texas public institutions of higher education spent nearly $3.6 billion on medical and life sciences research, accounting for more than 65% of all higher education R&D expenditures in the state.

Public investment in biotechnology and research is complemented by the state's substantial cluster of private sector R&D activity. The state is home to more than 2,000 physical, engineering and biological research firms, which employ nearly 27,400 workers. Many of the world's largest private biotech firms have R&D operations in Texas, including PPD, Covance, Esoterix and Grifols. In addition to R&D facilities, Texas has more than 2,700 medical, diagnostic and testing labs, which employ more than 45,200 workers in the state.

In 2021, Matica Biotechnology, Inc. announced the signing of a master research agreement with the Center for Innovation in Advanced Development and Manufacturing at Texas A&M University Health Science Center. The agreement covers joint R&D projects for plasmid, protein and viral vector products in compliance with FDA regulations.

TEXAS RACING TOWARDS A CURE

Texas is leading an unprecedented fight against cancer. Premier cancer research institutions in Texas include MD Anderson Cancer Center, Baylor Scott & White Cancer Centers, Texas Oncology and Mary Crowley Cancer Research Centers.

The Lone Star State is also home to four NCI-Designated Cancer Centers, including the University of Texas MD Anderson Cancer Center, which ranks #1 for cancer care by the U.S. News & World Report's annual "Best Hospitals" survey. In 2022, MD Anderson announced a joint venture, the Cell Therapy Manufacturing Center, to accelerate the development and manufacturing of innovative cell therapies for patients with cancer.

The Cancer Prevention and Research Institute of Texas (CPRIT), a state-funded initiative, has also been instrumental in expanding Texas cancer research. CPRIT is the second-largest taxpayer-funded cancer research organization in the world. Since 2010, it has awarded 1,761 grants totaling more than $3 billion.

CLINICAL TRIALS COMPLETED & STARTED BY STATE, 2015 TO 2021

Texas has the second highest number of studies started and completed in the nation.

Rank	State	Number of Studies Completed	Number of Studies Started	Percentage of National Studies Started
1	California	14,447	16,617	25.9%
2	Texas	11,462	13,461	21.0%
3	New York	11,160	12,722	19.8%
4	Florida	9,935	11,496	17.9%
5	Pennsylvania	8,598	9,735	15.2%

THE TEXAS MEDICAL CENTER INNOVATION INSTITUTE

The Texas Medical Center (TMC) Innovation Institute—the world's largest medical center—aims to become the global leader in life sciences innovation and commercialization:

TMC Accelerator for Health Tech – The Texas Medical Center Accelerator for Health Tech (formerly TMCx) facilitates development of early-stage digital health and medical device companies. The TMC Innovation team enables access to more than 200 mentors, service providers, clinical champions and corporate partners.

TMCx+ – Located adjacent to the TMCx Accelerator, TMCx+ provides essential amenities required by early stage companies including both private/shared office space, conference rooms and a recombinant research environment.

JLABS@TMC – Part of Johnson & Johnson Innovation LLC, JLABS is a biotechnology cluster of more than 34,000 square feet of common, wet lab and office space. It is home to more than 40 resident startup companies and has more than 60 alumni companies within its network.

TMC3 – The University of Texas MD Anderson Cancer Center, Texas A&M University Health Science Center, and The University of Texas Health Science Center at Houston are developing a 3.7 million square-foot state-of-the-art collaborative research campus called TMC3.

EnMed@TCM - A triparte collaboration between Texas A&M's College of Engineering, College of Medicine and the state's top ranked Houston Methodist Hospital. Located in the TMC, EnMed is a medical education program where students receive medical doctorates and master of engineering degrees in the same four years.

There are more clinical trials conducted in the Texas Medical Center than any other single site in the world.

TOP BIOTECH & LIFE SCIENCES COMPANIES IN TEXAS

SELECT FIRMS WITH CORPORATE MANAGEMENT, RESEARCH OR MANUFACTURING FACILITIES IN THE STATE

MEDICAL DEVICE MANUFACTURING

Texas is one of the top five states in the nation for its medical device labor force. With more than 17,000 highly-skilled workers in this sector, many companies have developed robust medical, electro-medical and labroatory equpment and supplies workforces in the state. And many of the biggest players in the medical equipment and supplies industry have corporate facilities in Texas.

More than a dozen Fortune 1000 medical device giants have manufacturing or management operations in the state, including Abbott Laboratories, Agilent Technologies, Baxter International, Becton Dickinson, CareFusion, GE Healthcare, Johnson & Johnson, Thermo Fisher Scientific and Zimmer.

Medical technologies company, DJO Global, relocated their global headquarters from California to the North Texas city of Lewisville. The company cited Texas' strong talent pool, efficient access to customers and business friendly environment as reasons for the move.

A wide range of medical products are developed and produced in Texas, from surgical sutures and bandages, to molecular biology kits and medication delivery systems. While a broad spectrum of medical specializations are served by Texas device companies, the state has developed several unique clusters, including ophthalmology, orthopedics, cardiology, diagnostics, wound care and personal protective equipment.

Top Texas-Based Biotech & Life Sciences Firms

(by 2021 Revenue)

McKESSON

Health care
HQ: Irving
Revenue: $264 billion

Kimberly-Clark

Respiratory healthcare products
HQ: Irving
Revenue: $19.4 billion

Tenet Health

Health care
HQ: Dallas
Revenue: $19 billion

AMN Healthcare

Pharmacy & other services
HQ: Dallas
Revenue: $4 billion

PHARMACEUTICALS

Texas is one of the top states in the nation for pharmaceutical manufacturing workers.

A growing number of global pharmaceutical companies have established research and production facilities in Texas, including Ireland-based Allergan and Switzerland's Lonza.

Additionally, Texas has fostered the growth of pharmaceutical successes and ophthalmic leader, Alcon Laboratories (now part of global pharma giant Novartis) and wound care innovator, Smith & Nephew, which both have operations in Fort Worth.

These companies, and many others have helped developed a substantial pharmaceutical manufacturing workforce. The Lone Star State has 330 firms employing more than 13,800 workers in the sector, making Texas one of the top states in the nation for number of pharmaceutical manufacturing workers.

Texas is also a leading pharmaceutical research state. The Lone Star State ranks #2 nationally for number of clinical trials, with 33,000 studies underway, according to the National Institute of Health.

Texas-Made Pharmaceutical Products

A wide variety of pharmaceuticals and related products are manufactured in Texas, including leading products ranging from Alcon's eye care products to Galderma's dermatological treatments and skin care products.

ANIMAL & AGRICULTURAL BIOTECH

Texas has been at the forefront of animal and agricultural research for more than 100 years. As the nation's leading producer of cattle and cotton, and the #4 overall producer of agricultural products in the U.S., Texas is the natural choice for agricultural biotechnology. The state is also home to established agricultural feedstock and chemicals manufacturing industries concentrated in the Texas Panhandle and Gulf Coast regions.

World-class agricultural education and research facilities are located in the Lone Star State, particularly through the Texas A&M and Texas Tech University Systems—and Texas ranked #1 nationally in 2020 for Agricultural Sciences Doctorates by the National Science Foundation.

AGRIBUSINESS INDUSTRY LEADERS INVEST IN R&D

Because Texas is the nation's largest producer of cotton, the state is an optimal location for the R&D operations of Fortune 500 firm, **Bayer**. In 2015, the company opened the Bayer CropScience Lubbock Seeds Innovation Center to house global cotton business operations. The $16 million, 100,000-square-foot complex is designed to boost seed research and innovation not only for cotton, but for Bayer's soybean and canola research as well.

Monsanto, a subsidiary of Bayer, operates the Texas Cotton Breeding and Technology Center in Lubbock. The "research megasite" exemplifies its commitment to the Texas cotton industry and to developing cotton varieties adapted to the region. In 2016, Monsanto announced that Lubbock would become its primary U.S. hub for cotton seed processing.

Monsanto, Bayer CropScience and Advanta Seeds have all developed R&D partnerships with Texas universities, including two of the state's leading research institutions, Texas Tech University and Texas A&M University.

Texas' Top Rankings for Biotechnology Workers in the U.S. (2020)

#1	Chemical Engineers
#1	Ophthalmic Medical Technicians
#1	Veterinary Technologists & Technicians
#2	Animal Scientists
#2	Medical & Clinical Lab Technologists
#2	Biological Technicians

TEXAS' LEADING AGRICULTURE BIOTECH RESEARCH CENTERS

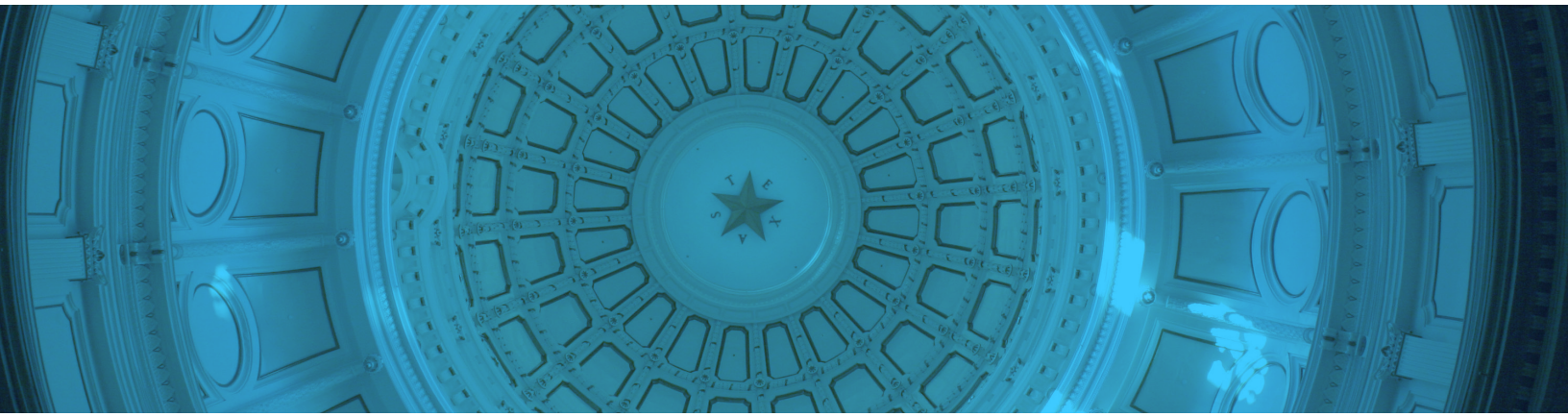
Texas A&M University Department of Soil & Crop Sciences: The department is one of the largest such facilities in the world with a global reputation. It develops technologies to sustain environmentally and economically sound production systems and to promote the wise use and management of soil, plant and water resources.

Texas A&M University AgriLife Research: The department serves as the state's premiere R&D agency in agriculture, natural resources and life sciences with 13 statewide regional centers and 575 agriculture, natural resources and life science projects each year.

Texas Tech University, Department of Animal and Food Sciences Beef Cattle Center: The center conducts research trials in the fields of cow and calf management, beef cattle genetics and receiving and backgrounding beef cattle. The facility is home to the Research Center for Receiving Cattle.

Texas Veterinary Schools: The Texas A&M College of Veterinary Medicine & Biomedical Sciences, located in College Station, focuses in areas such as infectious diseases, toxicology and environmental health science, cardiovascular sciences, neurosciences and reproductive biology. The Texas Tech University School of Veterinary Medicine, located in Amarillo, welcomed its inaugural class in the Fall of 2021.

STATE INCENTIVES & INITIATIVES



Texas invests in its future by offering competitive incentives to companies that create jobs and drive innovation. The State of Texas offers a robust incentive program portfolio for biotechnology & life sciences companies looking to expand or relocate in the state:

The **Texas Enterprise Fund (TEF)** is a performance-based financial incentive to attract businesses and new jobs to Texas. Since its inception, TEF has awarded more than $109 million to biotech, life sciences and health care-related companies, which have committed to creating nearly 14,000 new jobs in Texas.

The **Governor's University Research Initiative (GURI)** was established to help Texas public institutions of higher education recruit distinguished researchers from around the world to the state of Texas. The program seeks to bolster the standing of Texas public colleges and universities and economic development efforts statewide.

The **Product Development & Small Business Incubator Loan Program (PDSBI)** offers long-term, asset-backed loans to product development companies and small business incubators and accelerators located in Texas. The loans finance the development and production of new or improved products or the stimulation of new or existing small businesses in Texas, with preference given to entities in the areas of semiconductors, nanotechnology, biotechnology, biomedicine and other emerging technologies.

The **Cancer Prevention and Research Institute of Texas (CPRIT)**, launched in 2007, awards grants to Texas organizations and institutions for cancer-related academic and product development research and the delivery of cancer prevention programs and services.

The **Research and Development Tax Incentive** is available for companies conducting qualified research activities (QRAs) in the state. The incentive provides Texas companies the option of selecting either a sales tax exemption on property purchased by personnel engaged in QRAs or the franchise tax credit.

Texas Stem Cell Law provides guidelines which were approved by the Texas Medical Board for practices in stem cell research. Texas joins other states such as California, New York and Illinois in the enactment of rules governing this research.

Manufacturing Exemptions are available to pharmaceutical biotechnology manufacturers can claim exemption on pharmaceutical biotechnology cleanrooms and equipment. The exemption includes all tangible personal property that is used in a cleanroom environment and in connection with the manufacturing, processing or fabrication of a pharmaceutical biotechnology product.

CONTACT US

Office of the Governor
Texas Economic Development & Tourism

The Texas Economic Development & Tourism Office (EDT) serves as the state's leading economic development organization marketing Texas as the world's premier business and travel destination. The office pursues business expansion and relocation prospects, with the goal of attracting job creation and investment opportunities for Texas communities.

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