

# TENNESSEE

Tennessee has more than 6 percent of national employment and an employment specialization (location quotient of 3.14) in the agricultural feedstock and chemicals subsector, which also grew rapidly over the 6 years ending in 2006. In addition, the State had above-average job growth in both medical devices and research, testing, and medical laboratories. Total bioscience academic research expenditures grew by more than 60 percent, reaching nearly \$510 million in 2006, divided nearly evenly between biological and medical sciences. In the past 6 years, \$987 million in venture capital was invested in the biosciences, ranking 12th nationally. Most venture capital investments went to the medical/health services and medical/health information technology sectors. The 1,135 bioscience patents issued in the same period were well diversified across categories, led by surgical and medical instruments.

## Major Industry Developments and Recent Successes

- **Protein Discovery Inc.**, a developer and marketer of products that simplify biological sample preparation for mass spectrometry applications, closed a \$40 million Series C round of equity financing in 2008.
- **GTx** entered into a collaboration with Merck & Co., Inc. to develop a new class of drugs with the ability to treat age-related muscle and other musculoskeletal conditions. GTx received an upfront payment of \$40 million and \$15 million in research expenses to be paid over 3 years. In addition, Merck will make a \$30 million equity investment in GTx.

## Recent State Initiatives

In April 2008, the Tennessee Technology Development Corporation issued **Innovation Tennessee**, an economic development strategy to advance Tennessee's economy by strengthening the State's science and technology sector, including the biosciences. The strategy calls for increasing R&D and technology transfer, providing support for entrepreneurs, and increasing capital availability for high-technology companies.

Tennessee's **Governor's Chairs** program provides funds to recruit and support accomplished researchers who are given joint appointments at the University of Tennessee (UT) and Oak Ridge National Laboratory (ORNL). The initiative seeks to catalyze research under four joint institutes, one of which is focused on Biological Sciences. The State is providing \$8 million for a biological sciences building that is currently under construction at ORNL. One Center of Excellence and 17 Chairs were supported in FY 2007 and FY 2008.

Tennessee is investing significant dollars to become a national leader in the production of ethanol from cellulosic biomass. The State has committed \$72 million over 5 years to the **UT Biofuels Research Initiative**. In addition to supporting biofuels research, funds are being used to construct a pilot plant to demonstrate and refine biofuels production technology, specifically switchgrass to ethanol conversion.

Memphis BioWorks Foundation, with support from the State and Baptist Memorial Health Care, is developing the **UT-Baptist Research Park**, which will include 1.5 million square feet of lab research, education, and business development space on 10 acres in the Memphis Medical Center. The first building, a Level III biocontainment lab, is under construction. In October 2007, Memphis BioWorks launched Innova, a \$11.5 million seed fund for accelerating the development of biomedical technologies in the Memphis region.

**BioTN**, Bridging Innovations Originating in Tennessee, is a new nonprofit foundation created to advance science and technology by enhancing educational and career opportunities for Tennessee's citizens. BioTN completed an analysis that found that approximately 42,000 workers will be needed in

the State's biomedical and healthcare industries by 2017 and that 65 percent of these positions will require only a 1- to 2-year degree.

For additional information on Tennessee's bioscience policies and programs, please see <http://tnecd.gov>, <http://www.tntechnology.org>, and <http://www.tnbio.org>.

## Bioscience Industry Base, 2006

Industry Subsector	Tennessee		United States	
	2006	2001-06 Change	2006	2001-06 Change
<b>Agricultural Feedstock &amp; Chemicals</b>				
Establishments	43	14.7%	2,183	3.8%
Employment	6,832	146.9%	105,846	-6.1%
Location Quotient	3.14		n.a.	
Direct-Effect Employment Multiplier	5.22		11.22	
Total Employment Impact	35,634		1,214,709	
Average Annual Wage	\$80,982		\$67,870	
<b>Drugs &amp; Pharmaceuticals</b>				
Establishments	25	19.0%	2,654	1.9%
Employment	2,282	-26.8%	317,149	4.0%
Location Quotient	0.35		n.a.	
Direct-Effect Employment Multiplier	5.95		9.92	
Total Employment Impact	13,578		2,880,242	
Average Annual Wage	\$71,991		\$86,892	
<b>Medical Devices &amp; Equipment</b>				
Establishments	259	-1.9%	15,215	0.3%
Employment	7,987	7.5%	422,993	-0.9%
Location Quotient	0.92		n.a.	
Direct-Effect Employment Multiplier	3.42		4.85	
Total Employment Impact	27,299		1,980,128	
Average Annual Wage	\$54,049		\$59,441	
<b>Research, Testing, &amp; Medical Laboratories</b>				
Establishments	364	32.4%	22,857	32.7%
Employment	8,560	19.8%	449,991	17.8%
Location Quotient	0.93		n.a.	
Direct-Effect Employment Multiplier	2.43		3.25	
Total Employment Impact	20,826		1,440,500	
Average Annual Wage	\$60,819		\$71,284	
<b>Total Private Sector</b>				
Establishments	133,020	8.9%	8,575,730	10.2%
Employment	2,329,804	3.9%	113,463,842	3.1%
Average Annual Wage	\$37,468		\$42,272	

Note: n.a. = metric is not applicable.

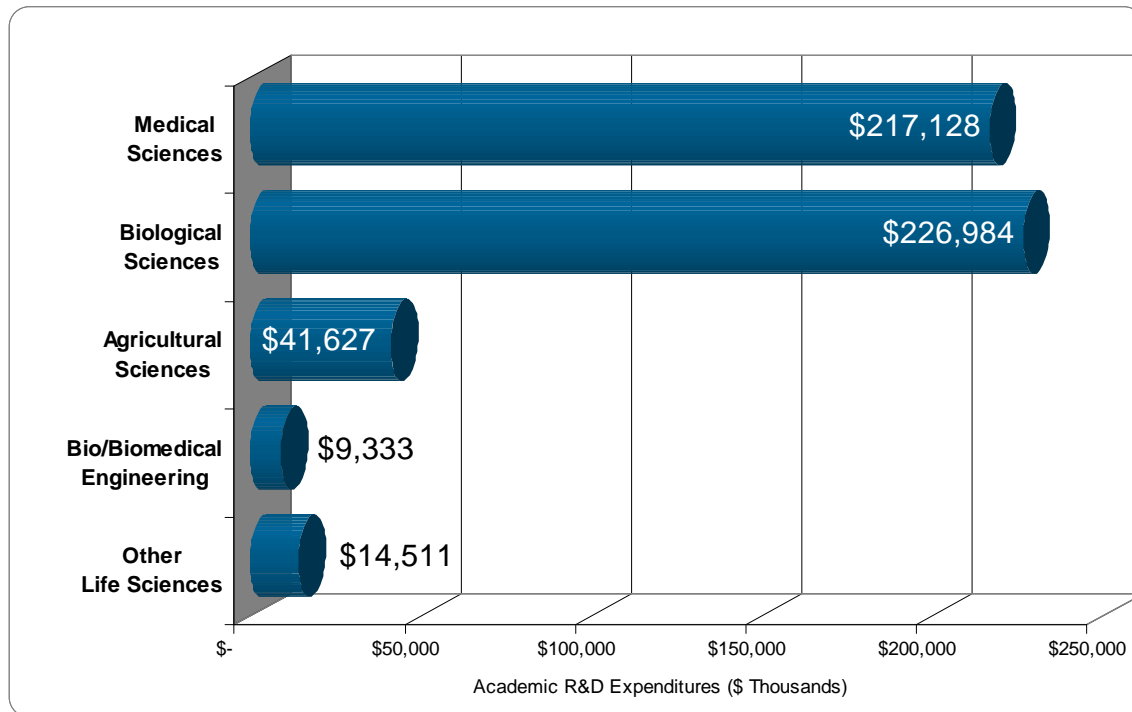
## Additional Bioscience Performance Metrics

### Summary of State Performance in Selected Bioscience-related Metrics

	Tennessee	United States	Rank
Academic R&D Expenditures, FY 2006			
Total (\$ thousands)	\$742,918	\$47,760,402	21
Bioscience R&D (\$ thousands)	\$509,583	\$29,307,628	18
Bioscience Share of Total R&D	68.6%	61.4%	
Bioscience R&D Per Capita	\$83.88	\$98.10	
Change in Bioscience R&D FY 2002-2006	61.7%	36.9%	
NIH Funding, FY 2007			
Total (\$ thousands)	\$434,819	\$21,066,389	15
Per Capita Funding	\$70.63	\$69.84	
Change in Funding, FY 2002-2007	28.4%	11.2%	
Higher Education Degrees in Bioscience Fields, AY 2006	2,303	143,433	22
Employment in Bioscience-related Occupations, 2006	10,890	588,520	20
Bioscience Venture Capital Investments, 2002-2007 (\$ millions)	\$987.1	\$51,260.9	12
Bioscience and Related Patents, 2002-2007	1,135	121,817	27

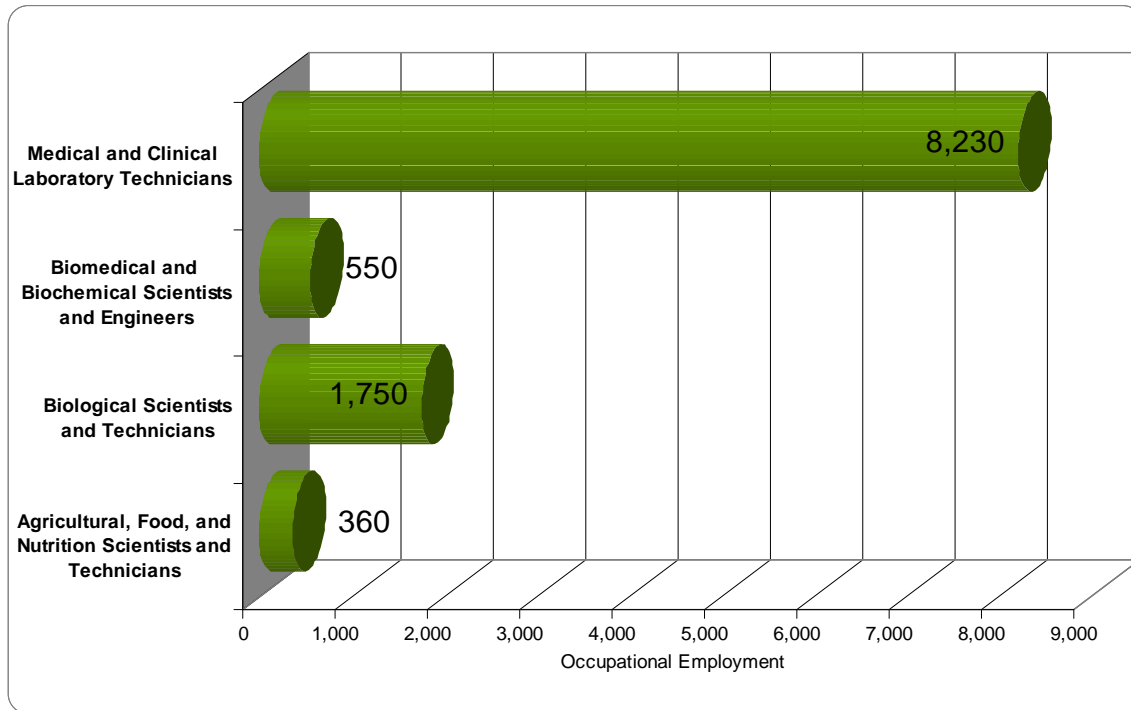
## Bioscience R&D Base

### Bioscience Academic R&D Expenditures in Tennessee, FY 2006

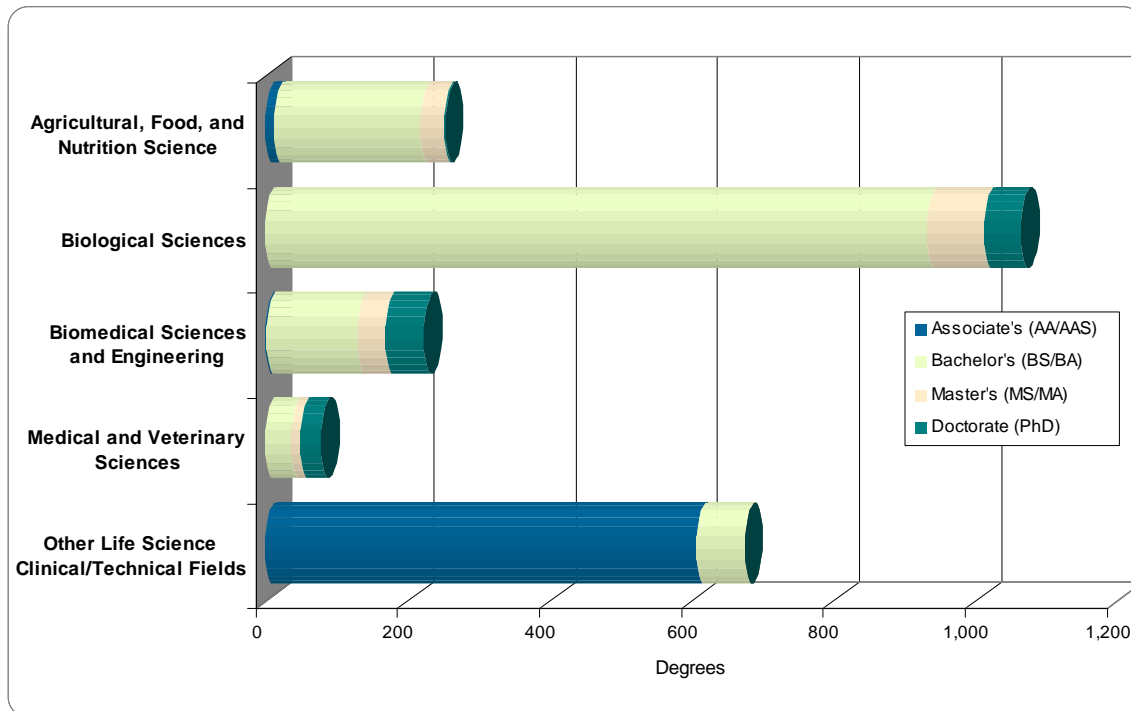


## Bioscience Talent Base

### Bioscience-related Occupational Employment in Tennessee, 2006

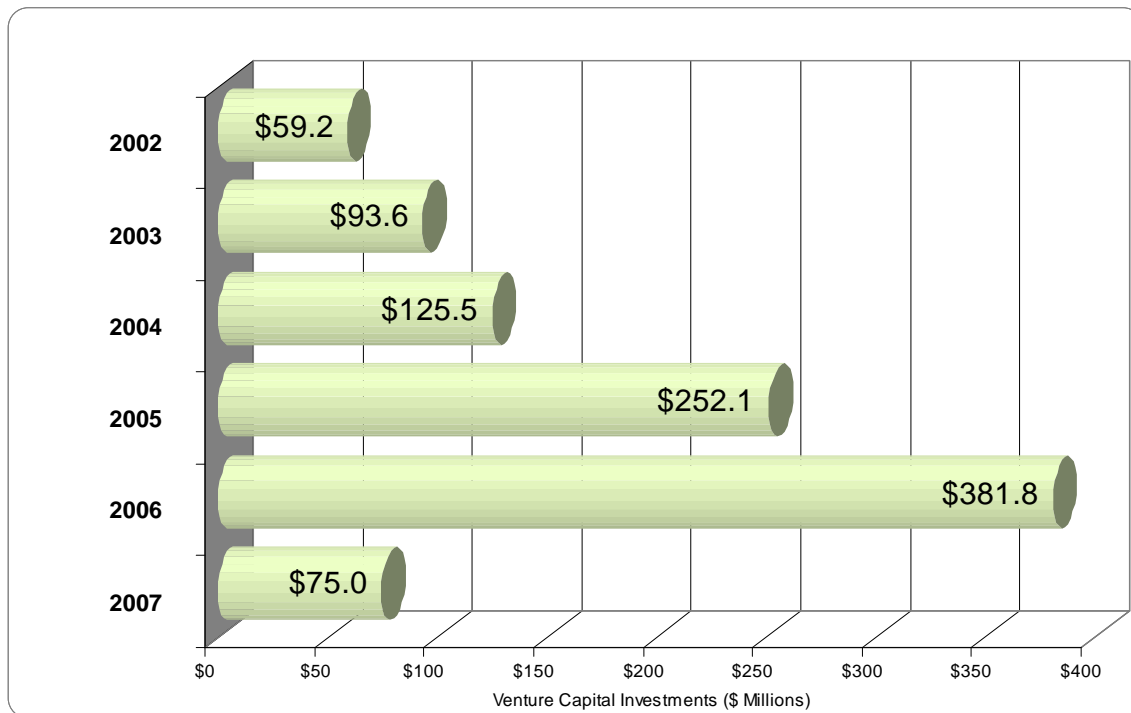


### Bioscience-related Degrees in Tennessee, AY 2006

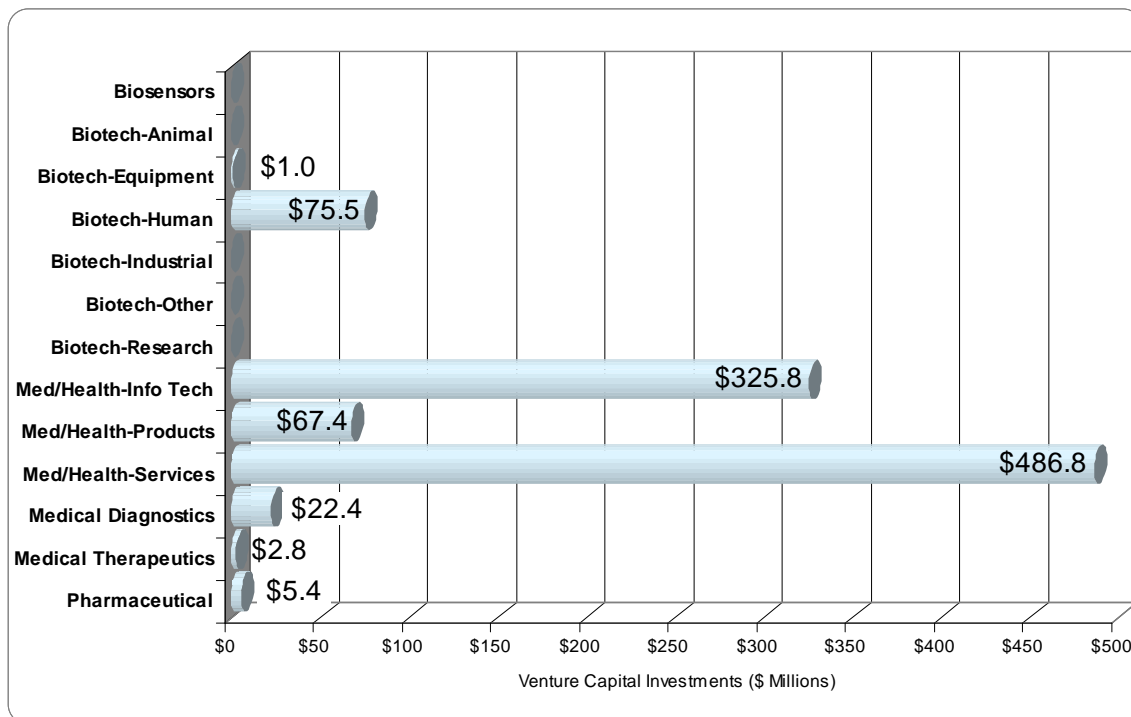


## Bioscience Venture Capital

### Bioscience-related Venture Capital Investments in Tennessee, 2002–2007

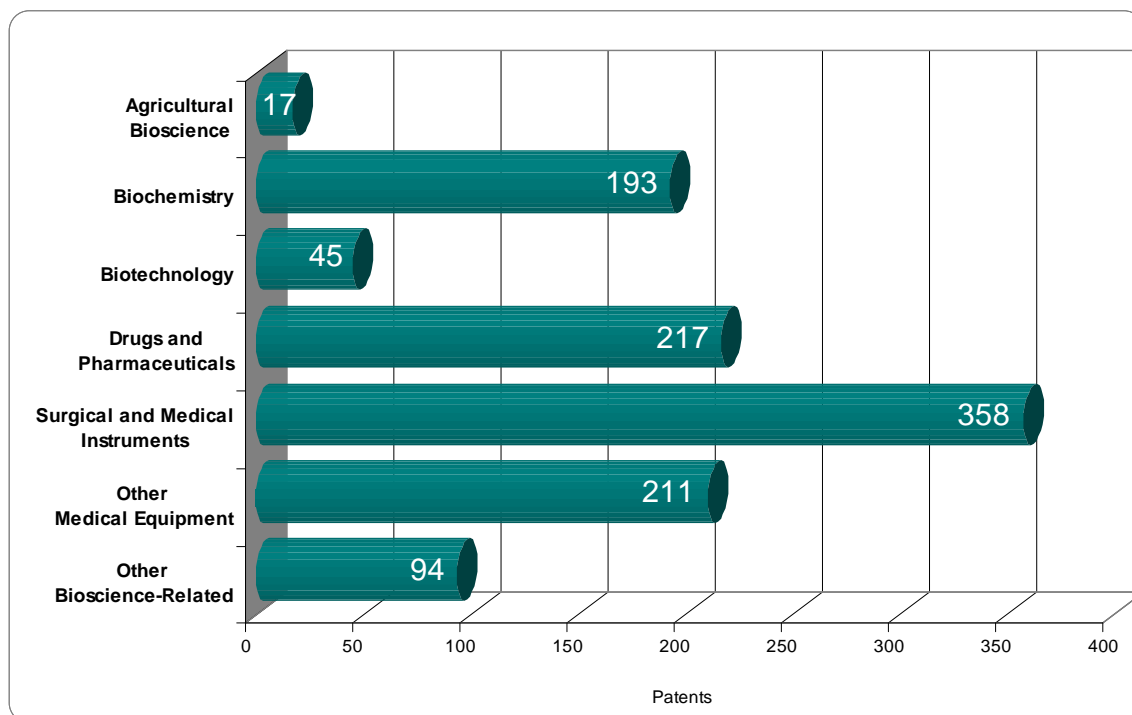


### Bioscience-related Venture Capital Investments in Tennessee by Segment, 2002–2007



## Bioscience Patents

### Bioscience-related Patents by Classification Group in Tennessee, 2002–2007



## State Bioscience Contacts

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### Source Notes:

**Employment, Establishment, and Wage Data:** U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) industry data provided by the Minnesota IMPLAN Group, 2001 and 2006.

**Employment Multipliers:** U.S. Bureau of Economic Analysis RIMS II Employment Multipliers, 2005 (most currently available).

**Academic R&D Expenditures:** National Science Foundation (NSF) Survey of Research and Development Expenditures at Universities and Colleges, 2002 and 2006.

**NIH Funding:** National Institutes of Health – Office of Extramural Research, Award Trends – Dollars Awarded by State, 2002 and 2007.

**Higher Education Degrees:** National Center for Educational Statistics, Integrated Postsecondary Education Data System (IPEDS), 2006.

**Occupational Employment:** U.S. Bureau of Labor Statistics, Occupational Employment Statistics (OES) survey data, 2006.

**Venture Capital:** Thomson Reuters VentureXpert Database, 2002-2007, as of May 1, 2008.

**Patents:** U.S. Patent & Trademark Office data as available from the Thomson Reuters' Delphion Patent Analysis Database, 2002–2007, as of May 1, 2008.

For a more detailed discussion of the data and methodology used please see the Appendix to the full national report