



## Overview and Summary of Recent Initiatives

West Virginia has identified biotechnology as one of several key industries for development. In three targeted corridors, components for bioscience clusters already exist with the most comprehensive development in the north-central part of the state in Morgantown and along the I-79 corridor.

Morgantown is home to **West Virginia University (WVU)**, which has a specialization in biometrics. The Morgantown region includes the Federal Bureau of Investigation (FBI) Criminal Justice Identification Services Division, the largest fingerprint repository in the world; the Biometrics Fusion Center, the prime biometrics technology research and development facility within the Department of Defense; and a National Information Assurance Partnership certification laboratory with special expertise in biometrics products. Efforts to further develop this region's bioscience cluster are focused on creating collaborations with Pittsburgh-based biotech companies, establishing a strong commercialization effort at WVU with a focus on biotechnology, stimulating and promoting commercially viable innovations from faculty and graduate students, and creating an on-campus facility for commercialization and academic research.

In the western part of the state, **Marshall University (MU)** in Huntington focuses on biotechnology, with expertise in forensics, environmental science, and medical research. With MU as an anchor, the Charleston-to-Huntington corridor's concentration of chemical companies serves as a foundation for the development of biomanufacturing and industrial biotechnology. The Charleston area's Dow Tech Center houses various groups that perform scientific research in areas including biotechnology. There is an effort in this region to establish **Advantage Valley** as a biotech center including using a former Dow facility as a site for attracting production operations from biotech companies in high-cost areas, adding a bio capability (fermentation) to the existing chemical manufacturing capability of the region, exploring the technical/economic feasibility of biopolymers using wood waste as a raw material, and creating an on-campus facility that can be used for commercialization and academic research at MU.

West Virginia's Eastern Panhandle, within commuting distance of Washington DC is marketed to bioscience firms in the metro area. In this region, efforts include establishing a recruitment plan for attracting biotech businesses, stimulating entrepreneurial spin-offs, and promoting the area as a community where biotech professionals choose to live and raise their families.

On a statewide basis, the **West Virginia Development Office (WVDO)**, the state's economic development entity, concentrates its technology-based economic development strategy by focusing on intellectual and physical infrastructure, developing a technically skilled workforce, making capital readily available, fostering an entrepreneurial culture, and maintaining the state's excellent quality of life. The WVDO, which has a staff person dedicated to the biosciences, will build upon the state's three concentrated biotech clusters. One area that the state is promoting is opportunities for geriatric pharmaceutical clinical trials given its demographics

## Building Bioscience R&D Capacity

### Recent state investments in facilities

West Virginia is funding the development of bioscience facilities at MU and at WVU. These include the following:

- The MU Biotechnology Development Center will provide an environment where scientific concepts developed at MU can be guided to the marketplace and where outside biotech firms can find critical support for research and development.
- Federal, state, and private funding supports the construction and equipping of the \$48 million, 200,000-square-foot Robert C. Byrd Biotechnology Center at MU, which will facilitate interdisciplinary research between the College of Science and the School of Medicine.
- A \$1 million addition to the MU Forensic Science Center allowed for additional classroom space and DNA laboratories.
- Bond issue funding has enabled building of a medical research facility for the **Blanchette Rockefeller Neuroscience Institute**, a collaborative effort between WVU and Johns Hopkins University. The institute focuses on preventing, diagnosing, treating, and curing neurological, psychiatric and other cognitive disorders affecting the human brain. Expected occupancy of the facility is spring 2008.
- The **National Biometric Security Project** in Morgantown provides unbiased research, evaluation, and guidance to the private sector and all nondefense-related U.S. government agencies.
- A \$24.4 million funding package will allow WVU to complete a 12-year research expansion plan in as little as half that time with the addition of 600 new health sciences research positions. The funds will build new laboratories at the university's **Mary Babb Randolph Cancer Center** and new neurosciences laboratories. It also will create research space in the new **Health Sciences Library**. Three state development agencies created the funding package. The Infrastructure and Jobs Development Council will provide \$9.4 million, the Economic Development Authority \$9 million, and the West Virginia Housing Development Fund \$6 million.
- The **Edwards Comprehensive Cancer Center**, which offers advanced linear accelerator technology and other state-of-the-art diagnostic and treatment options, officially opened to patients January 16, 2006.

### Research programs

The **West Virginia EPSCoR** (Experimental Program to Stimulate Competitive Research) Office develops, administers, manages, and implements the state's experimental research improvement program. Its mission is to build research competitiveness within institutions and among individual researchers and research teams and collaborations among institutions throughout the state.

With the support of the West Virginia Department of Agriculture and the U.S. Department of Agriculture, a team of specialists at the **Marshall University Forensic Science Center** is creating bacterial source tracking databases in five major watershed regions of West Virginia. The database will help in identifying sources of bacterial contamination and lead to remediation efforts.

The **Biometrics Knowledge Center** at WVU, created with a grant from the state, conducts interdisciplinary research in the convergence of disciplines defining biometrics. The center provides a forum where researchers and potential sponsors can collectively develop a national biometrics research enterprise.

WVU's strategic plan includes a two-pronged bioscience approach calling for related facilities as well as for stepped-up faculty recruitment.

## Moving Technology into the Marketplace

### Commercializing university technology

Using the sale of \$1 million in state tax credits, West Virginia made possible the establishment of university-affiliated nonprofit centers for economic development and technology advancement to support industrial and academic R&D partnerships and technology commercialization. The **Institute for the Development of Entrepreneurial Advances (IDEA)** at MU will focus on commercializing technology findings, with an emphasis on biotechnology, from MU. IDEA will

- Connect entrepreneurs with faculty researchers;
- Establish an \$8.2 million, 22,000-square-foot **incubator**, which will nurture businesses that can commercialize university research in molecular life sciences and medicine;
- Work with the Center for Business and Economic Research, which seeks to increase the flow of research dollars to MU; and
- Build businesses around technologies developed at or in partnership with MU.

### Supporting bioscience entrepreneurs and emerging companies

**INNOVA Commercialization Group**, an initiative of the West Virginia High Technology Consortium Foundation, is a statewide commercialization group focused exclusively on West Virginia innovators. INNOVA's mission is to create real wealth for West Virginia by assisting entrepreneurs in obtaining the business development assistance and capital necessary to successfully launch new products into the commercial marketplace.

The **Mid-Atlantic Technology, Research and Innovation Center (MATRIC)** is a nonprofit research and development corporation headquartered in Charleston. MATRIC's focus is in the disciplines of chemistry and chemical products, biotechnology and the biosciences, and software systems, especially in the areas of confluence between two or more of these disciplines. Services include research incubation of new products and processes, provision of facilities and technical talent for carrying out experimental work from laboratory scale to production scale, and provision of other specialized technical services. MATRIC has developed partnerships with educational institutions, including WVU, MU, WVU Institute of Technology (WVU Tech), West Virginia State University, and the University of Charleston. MATRIC performs research and development activities for a variety of governmental and commercial clients.

## Making Capital Available

### Venture capital

**West Virginia Jobs Investment Trust (JIT)** is a public venture capital fund created to develop, promote, and expand West Virginia's economy by making investment funds available to eligible businesses, stimulating economic growth, and providing or retaining jobs within the state. JIT invests in early-stage, later-stage, and mature small companies that wish to expand. JIT has invested \$4 million in each of the following venture funds:

- **Adena Ventures** provides equity and operational assistance to qualifying businesses in central Appalachia. The company's mission is to generate market-rate returns for investors while promoting shared and sustainable economic development throughout its target region.
- **Anthem Capital** invests exclusively in the Mid-Atlantic states and seeks opportunities in IT/telecommunication and healthcare/life science industries. Anthem invests in early- to expansion-stage opportunities.
- **Mountaineer Capital LP** provides venture capital to promising new and existing businesses in West Virginia and surrounding states.
- **PA Early Stage** seeks portfolio companies in the corridor from New York to Washington DC with a primary focus on Pennsylvania companies. PA Early Stage invests in early-stage technology and life science companies, typically as a lead or co-lead investor.
- **Toucan Capital** focuses on seed and early-stage life science and advanced technology investments. Toucan invests nationwide and is an active venture capital fund in seed and early-stage life science, especially active in the mid-Atlantic region.
- **Walker Ventures** focuses on start-up and early-stage companies in the high-tech industry.

## Providing Space for Bioscience Companies

### Incubators

West Virginia committed \$1.5 million in FY 2004 for the development of a biotechnology incubator in South Charleston. The incubator was created in space that formerly housed R&D laboratories of Dow Chemical. The **Chemical Alliance Zone Biotechnology and Allied Sciences Incubation Center** provides 10,000 square feet of laboratory/office space to its tenants, as well as a full range of start-up business services from established service providers and affiliation with the Entrepreneurial League System.

On its Evansdale campus in Morgantown, WVU has an incubator with two tenants.

### ***Under development***

**IDEA** at Marshall University will establish an \$8.2 million, 22,000-square-foot incubator, which will nurture businesses that can commercialize university research in molecular life sciences and medicine. No target date for completion has been established.

In Kinetic Park in Huntington, the **Velocity Center**, a \$7 million incubator for biotech and other companies, is being built. The Velocity Center will work with the Robert C. Byrd Biotechnology Center at MU to explore and expand commercial applications to technology innovations. The 60,000-square-foot building also will house other technology businesses including AFB TECH, the American Foundation for the Blind Employment and Technology Center in Huntington.

### Facilities financing

The West Virginia Economic Development Authority provides direct financing programs for fixed assets and indirect financing programs in the form of loan insurance, including the leveraged technology loan insurance program, which expands loan insurance coverage to 90 percent for those businesses involved in the development, commercialization, or use of technology-based products and processes.

### Bioscience research parks

The 100-acre **WVU Research Park** focuses on enterprises based on engineering, agricultural, medical, and energy research. See “Pending Proposals,” below.

## Addressing Talent Needs

As part of MU’s strategic plan, the university will establish the **Marshall/West Virginia Science Technology Engineering Math (STEM) Academy**, including a West Virginia Virtual STEM Academy to serve the entire state.

### Specialized postsecondary programs

The **Forensic Identification and Biometrics Degree Program** at WVU in Morgantown is an interdisciplinary program incorporating academic and research activities in biometric and forensic investigative science. The program was initiated at the request of the FBI to create academic, research, and training programs focusing on the application of technology to assess state, local, and federal law enforcement agencies. The purpose of this program is to become a leader in identification technology and forensic and biometric research through education and training. The program operates in conjunction with the Center for Identification Technology Research, the Biometric Fusion Center, the FBI, the National White Collar Crime Center, and the National Biometric Security Project.

The **University of Charleston** has a new **School of Pharmacy**.

## Pending Proposals

In January 2006, Governor Joe Manchin announced that a new technology park will soon be created utilizing part of Dow’s South Charleston Technology Park (see “Incubators,” above). With the cooperation and coordination of Dow, WVU, WVU Tech, and MU, the current park will be transformed into an education, research, and development center.

## Contact

Mr. Jamie Gaucher  
Manager, Technology Development  
West Virginia Development Office  
Capitol Complex, Building 6, Room 553  
1900 Kanawha Boulevard, E.  
Charleston, WV 25305-0311  
(800) 982-3386  
[jgaucher@wvdo.org](mailto:jgaucher@wvdo.org)

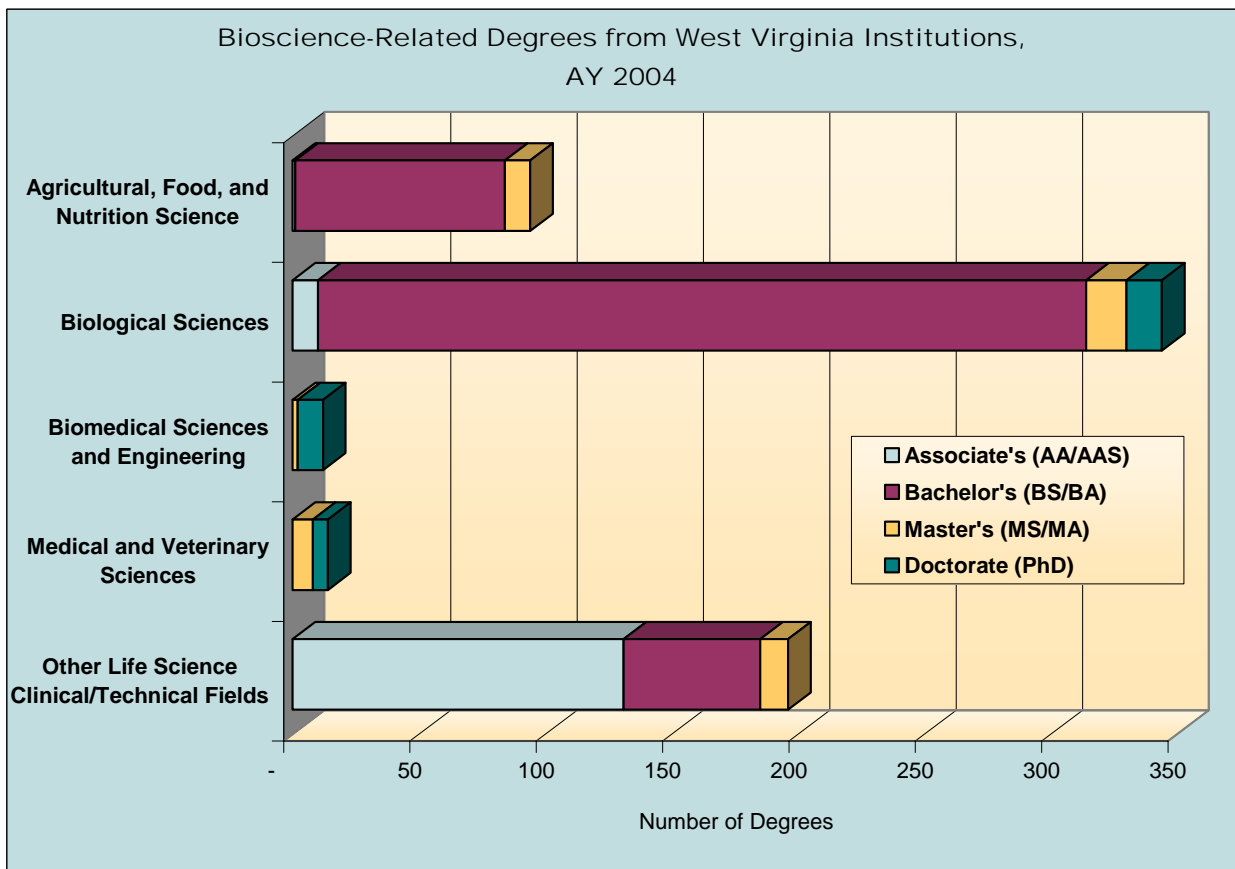
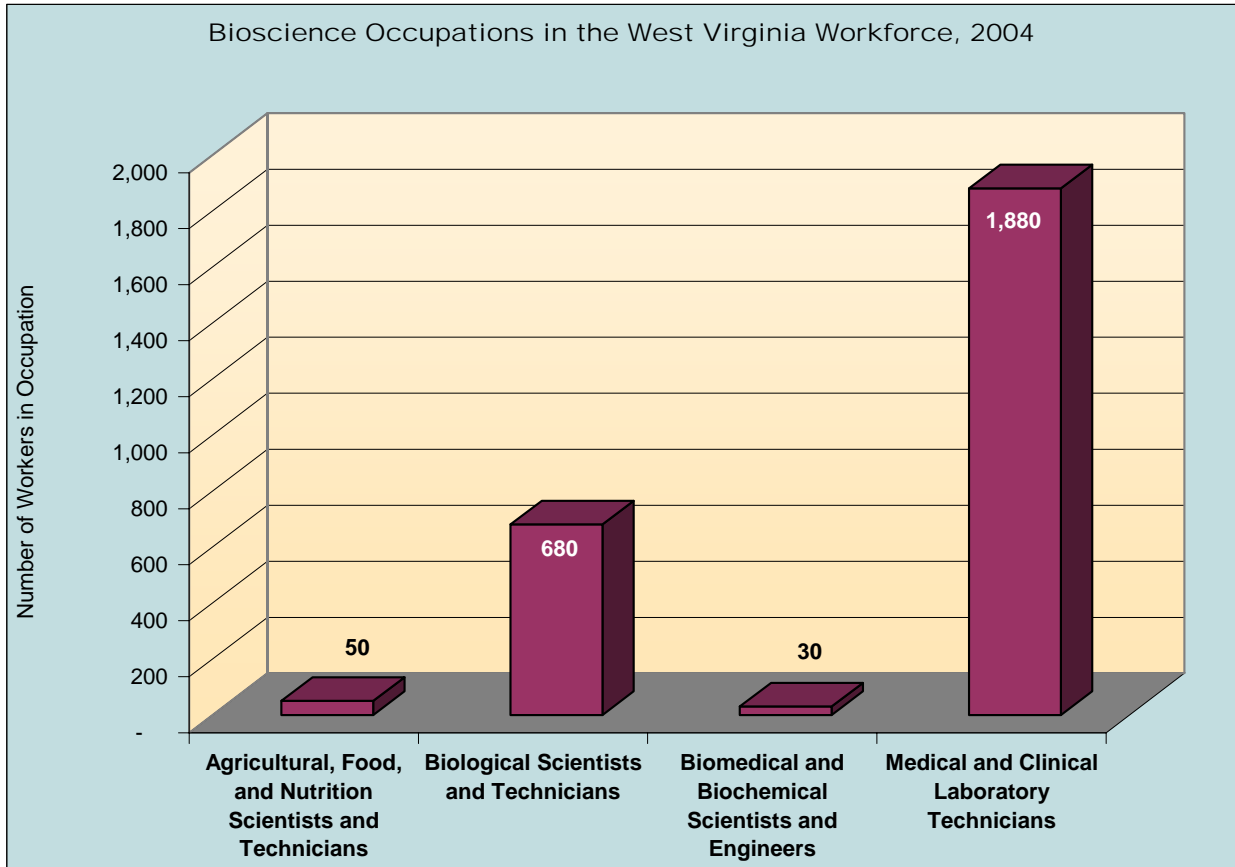
Bio-Science in West Virginia, a group of university, business, and government leaders interested in advancing West Virginia's suitability for the biotechnology industry, is focused on making an inventory of bioscience industries in West Virginia and increasing the industry profile through education and advocacy to policymakers and lawmakers. Contact: Jamie Gaucher.

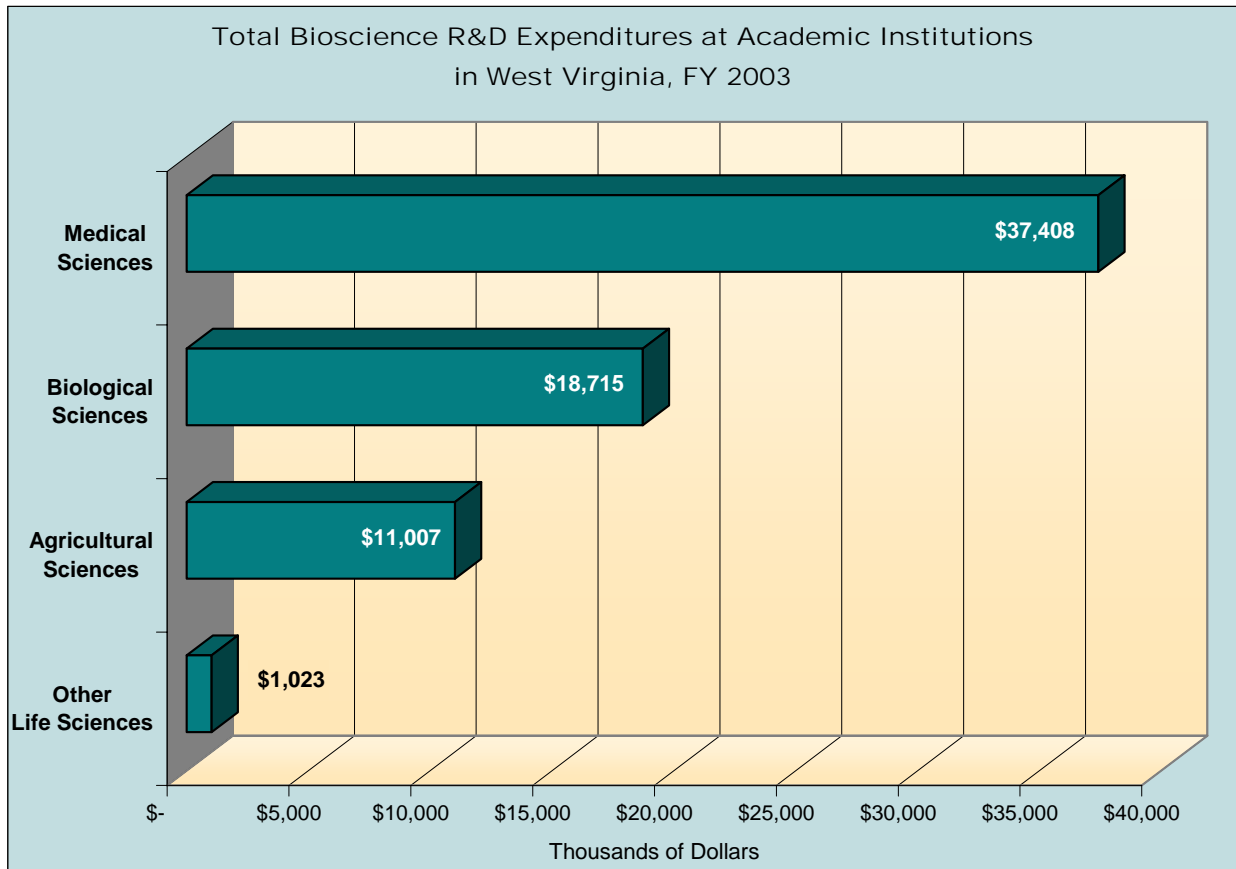
The Governor's Ambassador Council on Biotechnology includes high-level leaders from industry with a connection to West Virginia who are willing to help/share expertise. Contact: Jamie Gaucher.

Industry Subsector	West Virginia	United States
<b>Agricultural Feedstock &amp; Chemicals</b>		
Establishments 2004	16	2,111
2001-2004 Establishment % Change	-9.4%	0.4%
Employment 2004	1,881	104,893
2001-2004 Employment % Change	-29.7%	-6.9%
Share of U.S. Employment	1.8%	100.0%
Location Quotient	3.56	n.a.
Average Annual Wage 2004	\$74,508	\$63,383
Direct-Effect Employment Multiplier	6.05	10.91
Total Employment Impact	11,392	1,212,094
<b>Drugs &amp; Pharmaceuticals</b>		
Establishments 2004	5	2,589
2001-2004 Establishment % Change	18.5%	-0.6%
Employment 2004	1,643	313,207
2001-2004 Employment % Change	16.0%	2.7%
Share of U.S. Employment	0.5%	100.0%
Location Quotient	1.04	n.a.
Average Annual Wage 2004	\$70,656	\$79,303
Direct-Effect Employment Multiplier	4.37	9.51
Total Employment Impact	7,176	2,731,321
<b>Medical Devices &amp; Equipment</b>		
Establishments 2004	43	15,190
2001-2004 Establishment % Change	-0.6%	0.2%
Employment 2004	822	411,460
2001-2004 Employment % Change	12.6%	-3.6%
Share of U.S. Employment	0.2%	100.0%
Location Quotient	0.40	n.a.
Average Annual Wage 2004	\$33,508	\$56,449
Direct-Effect Employment Multiplier	1.97	4.56
Total Employment Impact	1,618	1,817,705
<b>Research, Testing, &amp; Medical Laboratories</b>		
Establishments 2004	78	20,565
2001-2004 Establishment % Change	19.7%	19.4%
Employment 2004	847	413,550
2001-2004 Employment % Change	13.3%	8.2%
Share of U.S. Employment	0.2%	100.0%
Location Quotient	0.41	n.a.
Average Annual Wage 2004	\$38,803	\$65,414
Direct-Effect Employment Multiplier	1.82	3.15
Total Employment Impact	1,541	1,272,936
<b>TOTAL PRIVATE SECTOR</b>		
Establishments 2004	44,227	8,156,137
2001-2004 Establishment % Change	0.6%	4.8%
Employment 2004	550,464	109,249,195
2001-2004 Employment % Change	-0.2%	-0.7%
Share of U.S. Employment	0.5%	100.0%
Location Quotient	n.a.	n.a.
Average Annual Wage 2004	\$29,576	\$39,003

Source: Battelle calculations -- based on Bureau of Labor Statistics QCEW data from the Minnesota Implan Group, RIMS II Employment Multipliers from the Bureau of Economic Analysis, and the Census Bureau's Economic Census.

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





	West Virginia	United States	Rank
<b>University R&amp;D Expenditures, FY 2003</b>			
Total (\$ thousands)	\$120,514	\$40,104,621	46
Life Science R&D (\$ thousands)	\$68,153	\$24,062,088	42
Percent of Total R&D	56.6%	60.0%	
Life Sciences Per Capita	\$37.65	\$82.74	
Change in Life Sciences FY 1999–2003	99.5%	52.7%	
<b>NIH Support to Institutions, FY 2004</b>			
Total (\$ thousands)	\$37,862	\$22,556,459	43
Per Capita Expenditures	\$20.91	\$77.56	
Change in Expenditures FY 2000–2004	258.3%	53.2%	
<b>Higher Education Degrees in Bioscience Fields, AY 2004</b>	660	111,329	38
<b>Bioscience Occupations in the Workforce, 2004</b>	2,640	616,140	38