



Overview and Summary of Recent Initiatives

In 1990, a consortium of Georgia's business leaders conceived and founded the **Georgia Research Alliance (GRA)** to turn university research into economic growth for the state. Today, GRA is a well-known model for bringing together business, research universities, and state government to create and sustain a vibrant, technology-rich economy for the state. Since its founding, the Alliance has invested more than \$400 million of state funding into its affiliated research universities in Georgia Research Alliance Eminent Scholars®, centers of research excellence, and research commercialization programs. The majority (more than two-thirds) of the Alliance's investments are in life science areas.

The Governor's FY 2007 budget recommendations included substantial commitments in support of the life sciences, including the following:

- \$5 million expansion of the state's Biosciences Seed Fund
- \$5 million expansion of the state's Life Sciences Facilities Fund
- \$2.5 million expansion of the Georgia Research Alliance VentureLab program
- \$200,000 for a new Georgia Research Alliance Patent Accelerator Fund
- \$2 million to seed research on developing alternative fuels
- \$5 million for a marine bioscience building at Skidaway Institute of Oceanography.

(See descriptions of these programs below.)

Building Bioscience R&D Capacity

Recent state investments in facilities

In 2006, the Georgia Institute of Technology dedicated a new **Center for the Study of Systems Biology**, which houses one of the world's most powerful supercomputing clusters. The center will use IBM technologies to advance research into new drugs for the treatment of some of today's most life-threatening diseases, including cancer. The supercomputing cluster, which has processors capable of performing more than 8.5 trillion calculations per second, was funded by \$8.5 million in grants, the majority of which came from the State of Georgia.

The University of Georgia will open its new, 135,000-square-foot **Paul D. Coverdell Center for Biomedical and Health Sciences** in 2006. The facility will house the Biomedical and Health Sciences Institute, which was established in 2001 to bring together researchers in molecular medicine, infectious disease and immunity, neuroscience, and public health. The center will also house the university's Center for Tropical and Emerging Global Diseases. The state contributed \$10 million to the project; the federal government provided another \$10 million, and the University of Georgia contributed \$20 million.

The Medical College of Georgia (MCG) completed a 94,000-square-foot expansion of its **Inter-disciplinary Research Building** in 2004. The building provides both office and laboratory space and includes a vivarium. It also includes incubator space for start-up companies.

The University of Georgia will open its \$40 million, 75,000-square-foot **Animal Health Research Center Biocontainment Facility** in 2006. The center will support basic and applied research on vaccines, diagnostics, and treatments for diseases caused by microorganisms that infect humans as well as animals. The facility can accommodate a wide range of large and small animals, including animals of agricultural importance. In addition to animal-holding space, the facility houses a variety of BSL-2, BSL-3, and BSL-3-Ag research space. The laboratories will be used to develop and test vaccines for a variety of species as part of the national effort to defend against bioterrorist attacks as well as naturally emerging diseases.

Design for Georgia Tech's **Nanotechnology Research Center** began in 2004, with the center expected to open its doors in 2008. The 160,000-square-foot center will feature both organic and nonorganic clean rooms critical to research and instruction in microelectronics, semiconductors, materials, medicine, and pharmaceuticals, offering access to nanotechnology tools to researchers from other Georgia universities as well as industry partners. Georgia Tech's commitment to the center will total nearly \$100 million before the center is completed, which will be matched by up to \$45 million in state support.

The MCG opened its \$54 million, 160,000-square-foot **Cancer Research Center** in 2006. The State of Georgia provided \$10 million for the planning, design, and construction of the building, supplemented by state funding through the GRA and by funding from private sources. The GRA and the Georgia Cancer Coalition (GCC) provide additional funding for Georgia Research Alliance Eminent Scholars® and GCC Distinguished Cancer Clinicians and Scientists. The State Legislature committed \$5 million last year for cancer research at MCG, and the Governor has proposed an additional \$5 million this year.

The University of Georgia dedicated a new 140,000-square-foot building for its **Complex Carbohydrate Research Center (CCRC)** in 2004. The CCRC is the home of three federally designated centers for carbohydrate research: the Department of Energy-funded Center for Plant and Microbial Complex Carbohydrates, the National Institutes of Health (NIH)/National Center for Research Resources (NCRR) Research Resource for Integrated Glycotechnology, and the NIH/NCRR Integrated Technology Resource for Biomedical Glycomics. The CCRC is also host to the Southeast Collaboratory for Biomolecular NMR (nuclear magnetic resonance) and is one of the first institutions in the nation to house a 900-MHz NMR spectrometer, funded jointly by NIH/National Institute of General Medical Sciences and the GRA.

Research programs

The **Georgia Cancer Research Fund**, administered by the GCC, provides grants to support research on the prevention, treatment, and cure of breast, ovarian, and prostate cancer. Funding for the program comes from the Georgia Department of Revenue, through a tax check-off on Georgia's income tax return form. Approximately \$1.4 million has been contributed by Georgians on their state tax returns since the start of the program in 2000.

Faculty development programs

The hub of the GRA investment strategy is the **Georgia Research Alliance Eminent Scholars®** program. Renowned scientists are recruited to Georgia from many parts of the world to lead research and development programs with high potential economic development impact for the state. To date, more than 50 Georgia Research Alliance Eminent Scholars have been recruited to the University of Georgia, MCG, Emory University, Clark Atlanta University, Georgia Institute of Technology, and Georgia State University. The majority of these Georgia Research Alliance Eminent Scholars are in the biosciences.

The GCC's **Distinguished Cancer Clinicians and Scientists Program** is designed to assist Georgia's research universities, medical schools, and nursing programs in recruiting top cancer researchers. The GCC provides funding to help recruit these clinicians and scientists ranging from \$50,000 to \$150,000 per year for 5 years. In FY 2005, GCC allocated \$4.8 million from the state's tobacco settlement dollars to this program.

GRA has just awarded its first **Georgia Research Alliance Distinguished Investigator Award**. These awards will be made to researchers at GRA-affiliated institutes that have demonstrated outstanding work in the biosciences or advanced communications and computing. Each distinguished investigator will receive an endowment funded by GRA and his or her home institution. The first award went to a professor of plant biology and genetics at the University of Georgia. The goal of the program is to retain Georgia's "best and brightest" scientists.

Encouraging Academic/Industrial Interaction

The goal of the **Georgia Research Alliance Innovation Fund** is to create long-term partnerships between Georgia's companies and GRA-affiliated universities for the purpose of developing and deploying technologies that lead to growing the state's economy. The program supports technology development projects in the biosciences, advanced computing and communications, and nanotechnology and advanced materials. Bioscience projects may include a broad range of biological, medical, and other life science technologies with applications in drugs/pharmaceuticals, agriculture, organic chemicals, medical device and instrument manufacturing, and bioscience research and testing. The program is open to research faculty from GRA-affiliated universities who are working in partnership with Georgia companies. In FY 2005, a total of \$2.2 million in state funds was awarded to support projects in partnership with 30 participating companies across the state. These awards were matched with \$3.5 million in private funding.

Moving Technology into the Marketplace

Commercializing university technology

VentureLab, a Georgia Research Alliance Innovation Fund program developed in partnership with the Advanced Technology Development Center (ATDC), offers a suite of pre-incubator/commercialization services that helps universities identify laboratory discoveries that have commercial potential. The program guides faculty members through the various stages of technology development so their ideas advance to the stage of company formation. VentureLab programs are in place at the Georgia Institute of Technology, the University of Georgia, Georgia State University, Emory University, and the MCG. Between 2002 and 2005, VentureLab launched 28 companies that have 54 products in development.

These companies have raised \$34 million in private equity investments. The state invested approximately \$2 million in the program during this time period.

Emtech Bio, a bioscience incubator, manages a competitive grant program for Emory University and Georgia Institute of Technology faculty. This program funds academic research with realizable commercial potential. Grants are generally in the range of \$75,000 to \$100,000 for a 1-year period. The grant program is funded through annual equal contributions from Georgia Tech and Emory.

A **Georgia Research Alliance Patent Accelerator Fund** has been proposed for funding in FY 2007. (See "Pending Proposals.")

Supporting bioscience entrepreneurs and emerging companies

The ATDC has developed the **Entrepreneurs Resource Center**, which provides carefully selected resources on starting up and building a company, researching the market, developing a technology product, generating sales, financing and raising money, marketing, hiring the right people, and handling legal issues.

Georgia's Office of Innovation and Technology, a division of the Georgia Department of Economic Development, assists bioscience companies with partnering and business development needs locally, nationally, and internationally through a variety of activities, including networking opportunities, trade shows, and trade missions.

The **Life Science Innovation Center** located at MCG is one of six innovation centers supported by the One Georgia Authority. The center offers entrepreneurial assistance on a statewide basis, with an emphasis on entrepreneurs and companies located in rural areas. It also awards matching grants when industry teams with an MCG faculty member to conduct translational research.

Making Capital Available

Pre-seed and seed capital

The Georgia Bioscience Seed Fund was created in 2000 by the Georgia State Legislature. The fund invests side by side with early-stage investors and requires an investment of \$3 in private investment for every \$1 of state investment. Georgia Venture Partners, a private fund that invests in seed- and early-stage life science companies in Georgia, serves as advisor to the state for its seed fund investments.

Providing Space for Bioscience Companies

Incubators

The GRA supports a number of university-based technology incubators, many of which are joint ventures between the GRA, the host university, and the ATDC. Bioscience-related technology incubators in Georgia include

- **CollabTech** at Georgia State University, which has 8,000 square feet of office and wet-lab space and houses four tenants;

- **Georgia BioBusiness Center** at the University of Georgia, which has 20,000 square feet of office and wet-lab space and is working with seven tenants and three affiliate bioscience companies;
- **EmTech Bio**, a joint project of Emory and Georgia Tech on the Emory West campus, which has 7,000 square feet of office and laboratory space, houses three tenants, and works with several additional member companies;
- **ATDC Biosciences Center** at Georgia Tech, which was launched in 2003 and has 22,000 square feet of wet-lab and office space and houses six bioscience companies; and
- **Life Sciences Business Development Center** at the MCG, opened in 2004, which is a 12,000-square-foot incubator including five wet-lab/clean room/office suites in addition to space for shared equipment and other resources. The center, which occupies the second floor of MCG's Interdisciplinary Research Building, currently has five tenants.

The **Augusta Biobusiness Center** provides space for medical device and medical software start-up companies. The center is a program of the Georgia Medical Center Authority.

Facilities financing

The **Life Sciences Facilities Fund (LSFF)** was created in 2003 to provide funding to bioscience companies for the development of their research laboratories. The fund provides loans of up to \$2.5 million. The first company to receive funding was the biotech company Inhibitex Inc., which received a \$2.5 million loan to build research laboratories. In 2006, Altea Therapeutics received a loan to locate its headquarters at the Technology Enterprise Park that is being developed in proximity to the Georgia Tech campus. The Governor has recommended an additional \$5 million for LSFF in his FY 2007 budget request. The ATDC is responsible for oversight of the fund.

Bioscience research parks

Under development

Georgia Tech is developing an 11-acre **Technology Enterprise Park** to house emerging and established bioscience and technology companies. Construction will begin in 2006 on the first of four proposed buildings that will total 600,000 square feet. Building One will be a 128,000-square-foot, multitenant research and development building. The first tenant of the park will be Altea Therapeutics, which will occupy 40,000 square feet of the first building.

Georgia State University is developing a **University Science Park** on a 3-acre site in downtown Atlanta. The complex will include a Science Teaching Lab Building, a Science Research Facility, and an economic development and industry collaboration building. The Governor has included \$37.5 million in his FY 2007 budget for the Science Teaching Lab Building.

Addressing Talent Needs

Recruiting management talent

The Georgia Research Alliance VentureLab Program connects faculty researchers with experienced entrepreneurs and professional managers (**VentureLab Fellows**) who serve as coaches and drive the commercialization process forward. The Georgia Biomedical Partnership (GBP) and the GRA jointly host the **Corporate Research Leaders Forum**, which brings together chief scientific officers of life science

companies to address common issues, including recruitment and retention of talent. GBP has a similar CEO Roundtable, Emerging Companies Committee, and Emerging Leaders Network—all aimed at networking and retention.

Specialized postsecondary programs

Georgia colleges and universities offer many specialized postsecondary programs relevant to the life sciences, including a Ph.D. in Bioinformatics (Georgia Tech, Emory), M.S. in Bioinformatics (Georgia Tech), B.S. in Biotechnology (Kennesaw State), and B.S. in Applied Biotechnology (University of Georgia). Associate's degrees are also available in Biotechnology (Athens Technical College) and Biomedical Engineering Technology (Chattahoochee Technical College). In addition, the University of Georgia offers Certificates in Regulatory Affairs and Computational Biology, and Gwinnett Technical College offers Certificates in Advanced Clinical Research and Basic Clinical Research.

Georgia's Intellectual Capital Partnership Program (ICAPP) helps businesses tap into the resources of the University System of Georgia, providing customized, accelerated educational programs to meet the specific needs of employers. The ICAPP recently launched a new bioscience initiative, a public/private partnership at the University of Georgia focused on regulatory science. Two certificates are currently available—one offering an overview of regulatory affairs and the other focused on regulatory issues for GMP. These certificates are cumulative and targeted toward the working professional. If desired, candidates can proceed with additional courses of study to achieve an advanced degree in regulatory science. The ICAPP is also collaborating with Georgia's technical schools to advance a biomanufacturing curriculum

The Georgia Tech/Emory Center (GTEC) for the Engineering of Living Tissues **Industrial Internship Program** enables selected graduate students to perform research at bioengineering companies in 3- to 6-month internships.

The **Center for Behavioral Neuroscience (CBN)** offers several opportunities for college and graduate students at Georgia's research institutions:

- **Behavioral Research Advancements in Neuroscience (BRAIN)** is a 10-week summer research internship program for college students focused on increasing student interest in behavioral neuroscience and, ultimately, in the pursuit of research and other science careers (e.g., science policy, science education, and science journalism).
- **CBN Graduate Scholars Program** provides doctoral students who have an interest in behavioral neuroscience in participating departments at Emory University, Georgia Institute of Technology, Georgia State University, and Morehouse School of Medicine the opportunity to gain a broader breadth of experience by working in CBN laboratories. CBN Graduate Scholars receive some stipend support and are eligible to receive an additional \$1,000 per year for use on supplies and travel to meetings.
- **CBN Postdoctoral Fellows Program** awards 2-year fellowships to individuals no more than 5 years after receiving their Ph.D. These fellowships are available to candidates seeking to work primarily with center faculty at either Georgia State University or Emory University. Aside from receiving salary support, postdoctoral fellows may apply for venture grant funds and have access to the center's core technologies, workshops, courses, teaching opportunities, and resources for other forms of education at the postdoctoral level.

K-12 outreach programs

Georgia State University's **Bio-Bus** is a science outreach program that provides hands-on science activities and demonstrations for students in grades 4 through 12. The program has two 30-foot, self-contained mobile laboratories (each with multiple laboratory stations) that travel to area schools. The program also offers in-class demonstrations and teacher workshops. Schools can choose from eight learning modules, covering a range of scientific concepts in the physical sciences and earth science as well as in biology. The program is supported in part by the National Science Foundation as part of its Graduate Teaching Fellows in K-12 Education program.

The GTEC has several K-12 outreach programs for middle schools and high schools in Georgia, including presentations of "**Prosthetic Pete**," an interactive display with mechanical devices for replacements and improvements in the body, plus descriptions of tissue-engineered replacements being developed. GTEC also provides a summer research program for K-12 classroom teachers.

CBN has extensive educational programs, including classroom visits, teacher workshops, a "**Brain Bee**" trivia competition for high school students, a summer **Brain Camp**, and an 8-week **Institute on Neuroscience** for rising high school seniors who excel in science. The CBN also provides professional development workshops and educational resources for K-12 teachers, including classroom materials such as models and videos.

The Center for Behavioral Science and Zoo Atlanta present an annual **Atlanta Neuroscience Exhibition** to improve the general science literacy of the public by increasing their awareness of neuroscience through demonstrations of important interconnections among basic, diagnostic, clinical, and applied neuroscience related to everyday life and function. During the exposition, 90 middle school students are invited to participate in a "reverse science fair" at which scientists and health professionals create exhibits and children critique the presentations for their ability to explain a basic or applied concept in neuroscience.

Pending Proposals

The Governor has recommended funding of \$200,000 in FY 2007 to launch the **Georgia Research Alliance Patent Accelerator Fund**. This fund will improve the efficiency and throughput of the patent application process of inventions developed in GRA-affiliated laboratories. Discoveries selected for this program will demonstrate commercial feasibility and the prospect of being incorporated into a business enterprise in Georgia. The fund will provide up to 50 percent of eligible expenses to a research university to assist in valuing and assessing the commercial potential of an invention. The fund will provide up to 25 percent of eligible expenses to a research university to support the filing and prosecution of a patent. The Georgia Research Alliance Patent Accelerator Fund will run as a pilot program in its first year. The program's impact and operations will be reviewed and adjusted for continuation of the program. During the pilot phase, funding provided by GRA is non-repayable. If the program is deemed successful over time, funding provided by GRA would be repayable out of income from successful commercializations.

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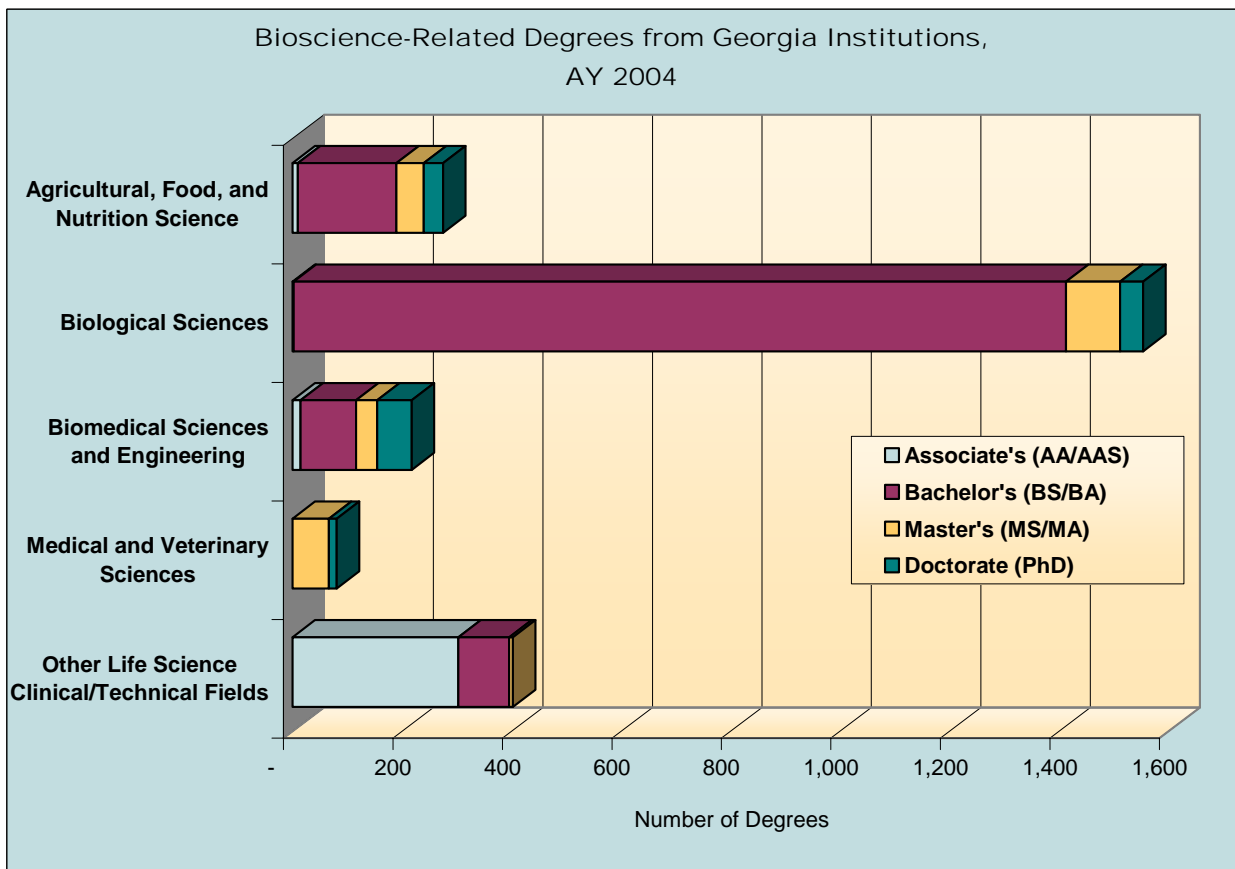
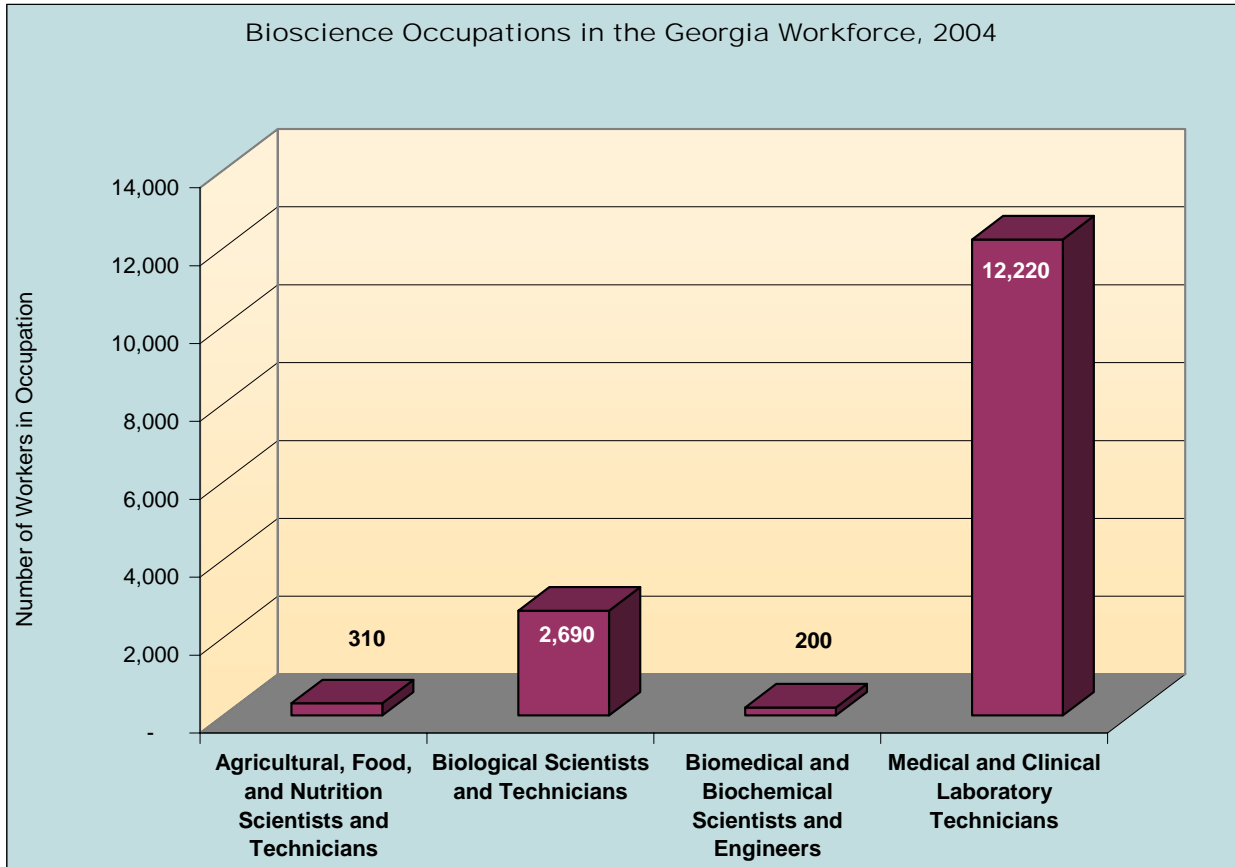
The Georgia Biomedical Partnership (GBP), founded in 1989, is a nonprofit, membership-based organization that represents the interests of companies, universities, research institutions, government groups, and other industry associations involved in discovery and application of life science products and related services that improve the health and well-being of people throughout the world. Its mission is to foster a social, political, economic, and educational environment in which life science companies can succeed in Georgia.

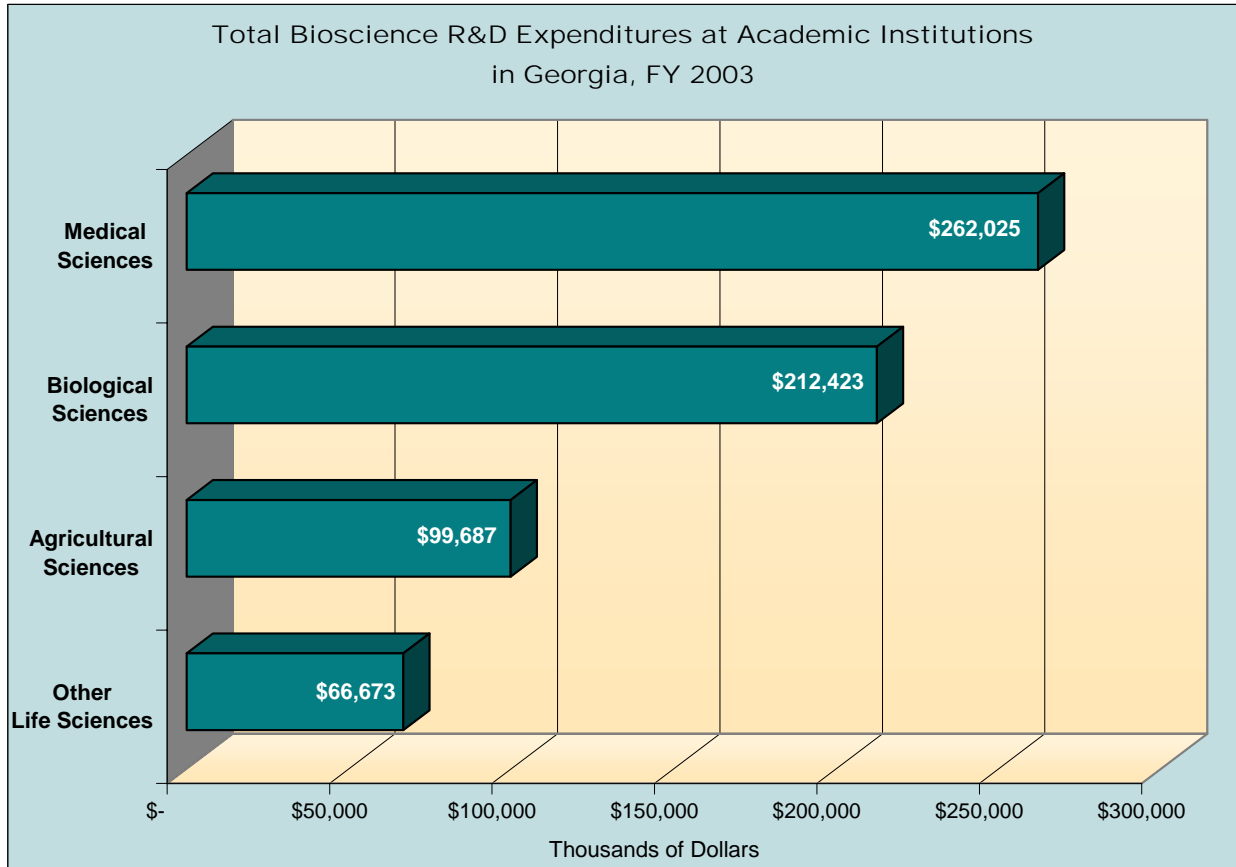
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Industry Subsector	Georgia	United States
Agricultural Feedstock & Chemicals		
Establishments 2004	70	2,111
2001-2004 Establishment % Change	-3.9%	0.4%
Employment 2004	2,287	104,893
2001-2004 Employment % Change	-17.6%	-6.9%
Share of U.S. Employment	2.2%	100.0%
Location Quotient	0.74	n.a.
Average Annual Wage 2004	\$50,289	\$63,383
Direct-Effect Employment Multiplier	5.46	10.91
Total Employment Impact	12,485	1,212,094
Drugs & Pharmaceuticals		
Establishments 2004	43	2,589
2001-2004 Establishment % Change	13.2%	-0.6%
Employment 2004	3,395	313,207
2001-2004 Employment % Change	7.1%	2.7%
Share of U.S. Employment	1.1%	100.0%
Location Quotient	0.37	n.a.
Average Annual Wage 2004	\$72,759	\$79,303
Direct-Effect Employment Multiplier	5.98	9.51
Total Employment Impact	20,307	2,731,321
Medical Devices & Equipment		
Establishments 2004	388	15,190
2001-2004 Establishment % Change	6.6%	0.2%
Employment 2004	7,071	411,460
2001-2004 Employment % Change	-5.5%	-3.6%
Share of U.S. Employment	1.7%	100.0%
Location Quotient	0.59	n.a.
Average Annual Wage 2004	\$48,057	\$56,449
Direct-Effect Employment Multiplier	3.14	4.56
Total Employment Impact	22,177	1,817,705
Research, Testing, & Medical Laboratories		
Establishments 2004	531	20,565
2001-2004 Establishment % Change	42.6%	19.4%
Employment 2004	6,455	413,550
2001-2004 Employment % Change	17.5%	8.2%
Share of U.S. Employment	1.6%	100.0%
Location Quotient	0.53	n.a.
Average Annual Wage 2004	\$48,262	\$65,414
Direct-Effect Employment Multiplier	2.24	3.15
Total Employment Impact	14,429	1,272,936
TOTAL PRIVATE SECTOR		
Establishments 2004	239,578	8,156,137
2001-2004 Establishment % Change	6.1%	4.8%
Employment 2004	3,208,935	109,249,195
2001-2004 Employment % Change	-2.0%	-0.7%
Share of U.S. Employment	2.9%	100.0%
Location Quotient	n.a.	n.a.
Average Annual Wage 2004	\$38,234	\$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.





	Georgia	United States	Rank
University R&D Expenditures, FY 2003			
Total (\$ thousands)	\$1,175,852	\$40,104,621	12
Life Science R&D (\$ thousands)	\$652,431	\$24,062,088	12
Percent of Total R&D	55.5%	60.0%	
Life Sciences Per Capita	\$75.12	\$82.74	
Change in Life Sciences FY 1999–2003	51.4%	52.7%	
NIH Support to Institutions, FY 2004			
Total (\$ thousands)	\$372,236	\$22,556,459	18
Per Capita Expenditures	\$42.86	\$77.56	
Change in Expenditures FY 2000–2004	58.5%	53.2%	
Higher Education Degrees in Bioscience Fields, AY 2004			
	2,531	111,329	12
Bioscience Occupations in the Workforce, 2004			
	15,420	616,140	13