



## Overview and Summary of Recent Initiatives

The Commonwealth of Puerto Rico has targeted the biosciences for development as a logical outgrowth of its 40-year track record as a major center of pharmaceutical manufacturing. Puerto Rico also is a leader in agricultural biotechnology research and seed production. In March 2006, the U.S. Department of Agriculture's Animal and Plant Health Information Service noted that, over the course of the past decade, Puerto Rico is the third leading state or territory for plant biotechnology research with just under 1,500 plant biotech field tests permitted by the Agency.

Bioscience strategy is steered by the **Puerto Rico Industrial Development Company (PRIDCO)**, the commonwealth's agency for economic development. Individual cluster initiatives target biotechnology, pharmaceuticals, and medical devices. The commonwealth also allocated \$14 million this year for a **Puerto Rico Science, Technology and Research Trust**, a separately governed entity that will be capable of making grants, loans, or other investments supporting research and infrastructure projects across three fields, including life sciences and healthcare.

Some elements of this strategy are managed in partnership with **INDUNIV**, the nonprofit Industry/University Research Consortium established in 1985 to manage public/private partnerships for technology-based economic development. INDUNIV administers a **Pharmaceutical Industry Cluster** organization and in 2001 created the **Puerto Rico Biotechnology Alliance**. In 2005 PRIDCO and INDUNIV jointly began to implement a Life Science Roadmap.

## Building Bioscience R&D Capacity

### Recent commonwealth investments in facilities

PRIDCO and the University of Puerto Rico (UPR) jointly established the **Centennial Fund**, a \$40 million endowment to support the development of research facilities. UPR will start construction of a 152,000-square-foot **Molecular Sciences Complex** that will house existing faculty (and incubator space) across a range of bioscience-related disciplines. The project is fully funded through grants from NIH and PRIDCO as well as an appropriation through the Commonwealth budget.

The Molecular Sciences Complex is located in the **Puerto Rico Knowledge Corridor**, which links main and medical campuses of UPR with the newly formed Puerto Rico Cancer Center. A joint venture of UPR and the M.D. Anderson Cancer Center of Houston, this center will soon begin construction on a plot of land adjacent to the Puerto Rico Medical Center. The facility will include 20,000 square feet of laboratory space. Other recent investments in the corridor include a new education and research building for the School of Pharmacy at the UPR-Medical Sciences campus and upgrades to animal facilities at the **Neuroscience Institute** and the **Caribbean Primate Institute**.

Construction will start this year on a 28,751-square-foot, \$12.5 million **Biotechnology Center for Research and Training in BioProcesses** to be located at Guanajibo Industrial Park in Mayaguez, not far from the UPR campus. The facility will house a pilot plant with suites for mammalian cell culture and microbial cell fermentation. It will also serve as a training center for biotechnology companies and will include space for business incubation and contract production. The project is a joint venture of PRIDCO, UPR, and the U.S. Economic Development Administration.

### Research programs

The Science, Technology and Research Trust will substantially expand Puerto Rico's capability to fund research projects with technology-transfer components. Up until now, INDUNIV has provided seed funding to

- A UPR Chapter (at the Pharmacy School) of the **Center for Pharmaceutical Processing Research**, an NSF Industry/University Cooperative Research Center based at Purdue; and
- The **Center for Advanced Packaging Technologies**, which will operate as a free-standing nonprofit center serving the pharmaceutical and medical device sectors, with participation from UPR-Mayaguez and Puerto Rico Polytechnic University.

## Moving Technology into the Marketplace

### Supporting bioscience entrepreneurs and emerging companies

One project under development is a Technology Transfer Consortium in partnership with the National Technology Transfer Center of West Virginia. The Science, Technology and Research Trust will participate in this project in the future. The goal of the consortium is to support commercialization of federal technologies by Hispanic entrepreneurs both islandwide in Puerto Rico and across Latin America, through the Central American Free Trade Agreement (CAFTA).

The Puerto Rico Small Business Development Center includes a **Technology Development Commercialization Center** that assists entrepreneurs in commercializing technology-based products and services.

Puerto Rico's tax code provides special low rates for companies that establish operations in "core pioneer industries" that utilize innovative technology not in place prior to 2000 and a 200 percent deduction for R&D expenses.

## Providing Space for Bioscience Companies

### Incubators

Both the Molecular Sciences Complex and the Biotechnology Center for Research and Training in BioProcesses will include incubation space.

## Bioscience research parks

The Local Redevelopment Authority that is converting the U.S. Naval Station Roosevelt Roads is considering use of certain acreage as a bioscience research park. Land transfer from the Navy to the commonwealth begins this year.

## Addressing Talent Needs

### Specialized postsecondary programs

Pontifical Catholic University of Puerto Rico is developing a master's program in biotechnology management. UPR-Humacao and UPR-Arecibo also offer a post-bachelor's certificate for those professionals wanting to transfer into bioscience careers.

The Industrial Biotechnology Learning Center at UPR-Mayaguez offers an Industrial Biotechnology bachelor's program and customized training programs for biopharmaceutical employees. UPR-Medical Sciences campus offers a professional master's degree in clinical research and doctoral programs through evening classes accessible to industry professionals.

PRIDCO offers fellowships up to \$18,000 for postgraduate students in the biosciences.

### K-12 outreach programs

UPR-Medical Sciences operates a **Biomedical Research Education Program** that performs K-12 outreach, co-sponsored by the NIH, the Pfizer Foundation, and other companies with local operations.

The Biotechnology Alliance is partnering with other organizations to improve teaching of bioscience, supported in part by a \$34.9 million grant from NSF awarded to UPR and an alliance of universities for improvement of K-12 math and science curricula.

Through a donation from Amgen Foundation, the Industrial Biotechnology Learning Center at UPR-Mayaguez (see above) sponsors a Biotechnology Summer Camp for high school students.

The Biotechnology Alliance also distributes material for K-12 curricula.

## Contacts

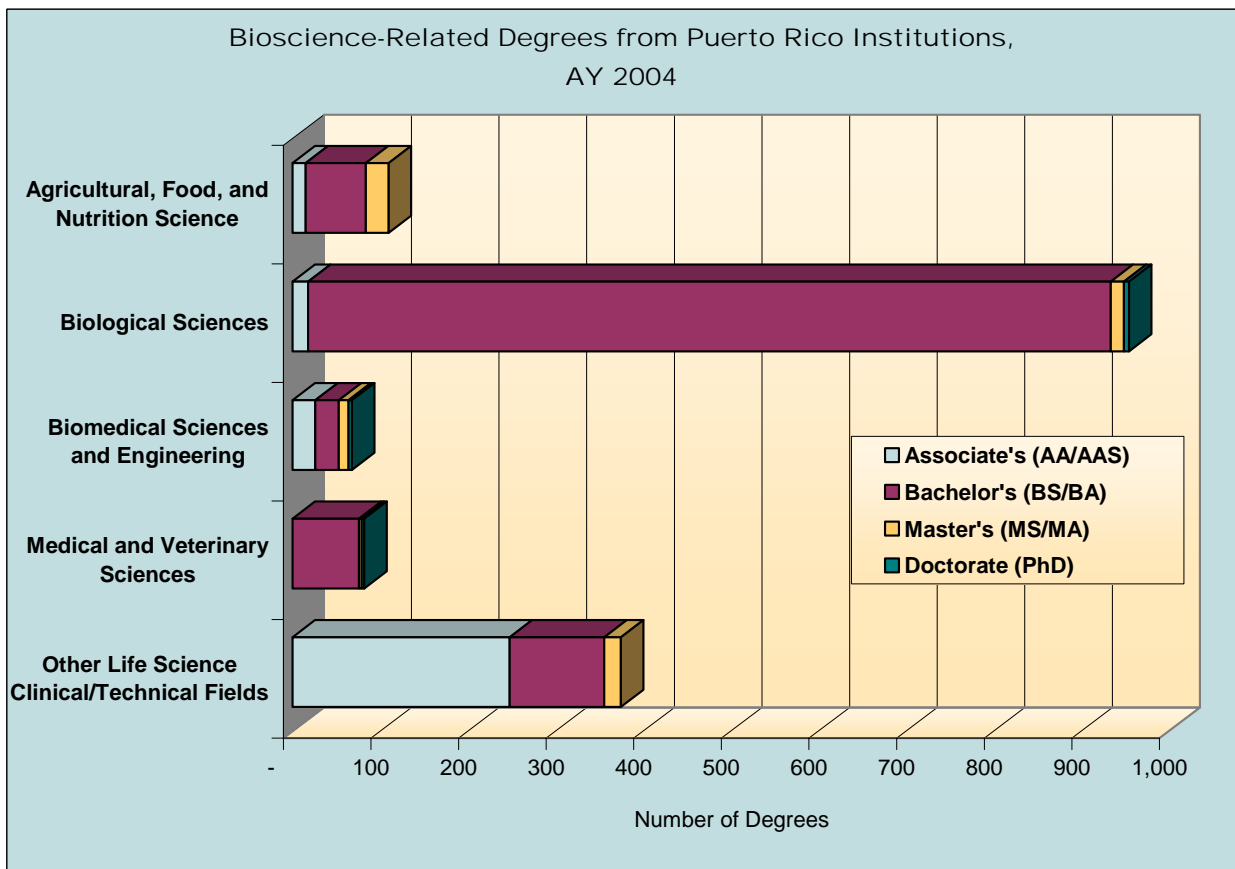
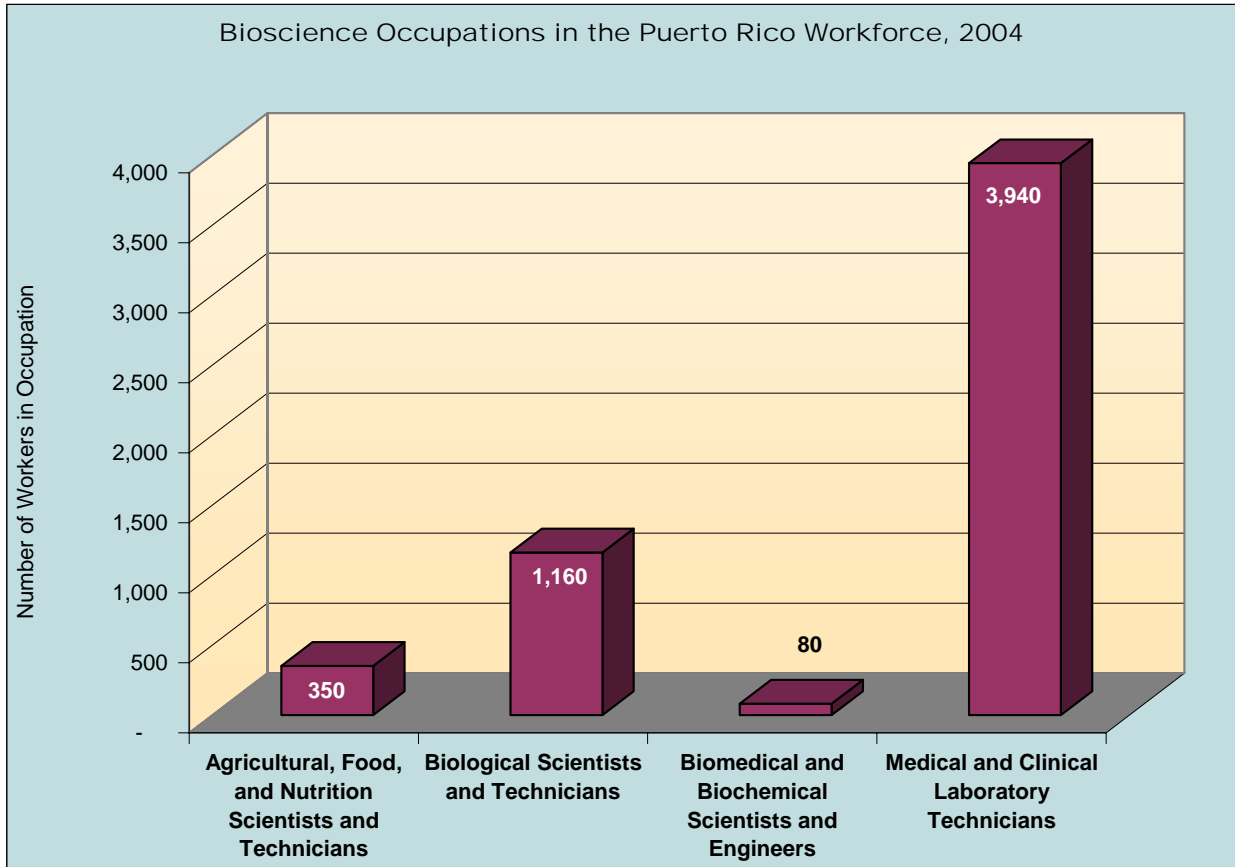
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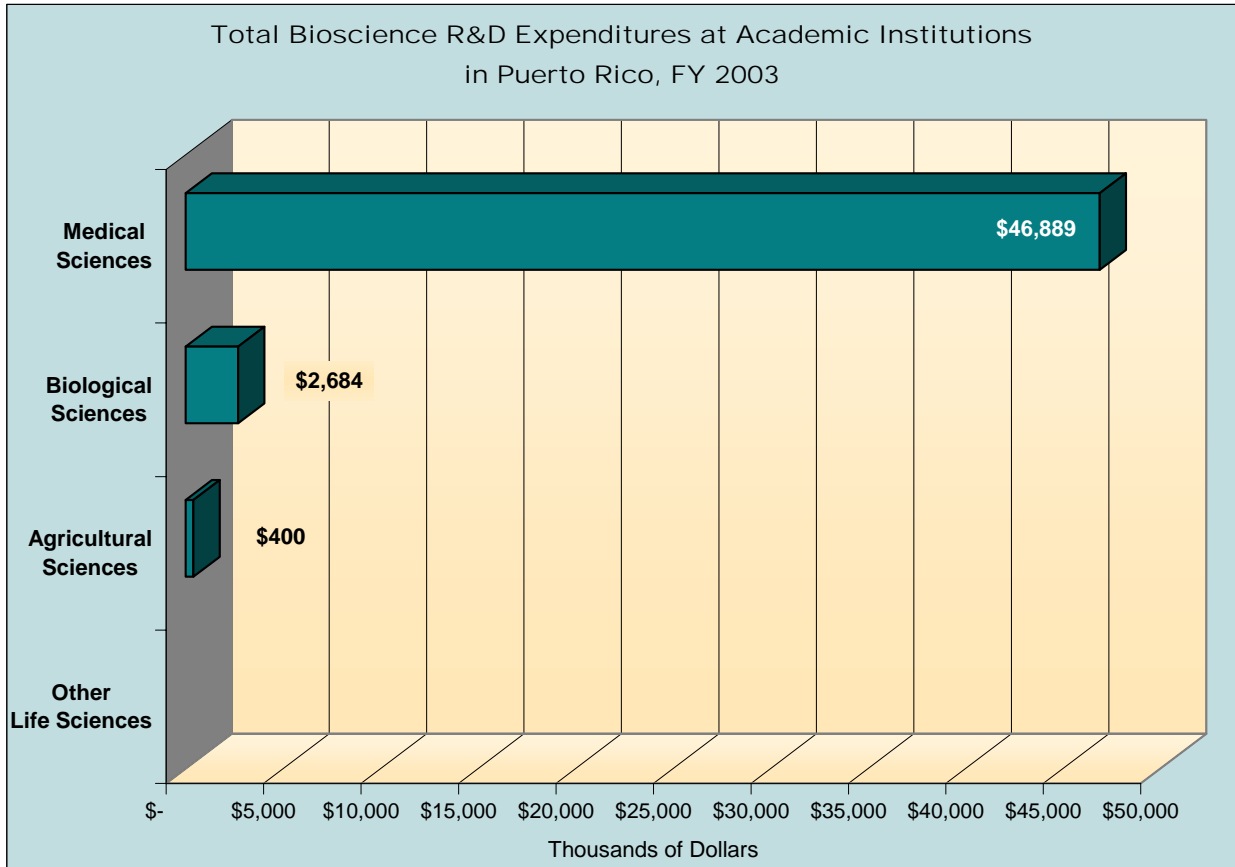
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Industry Subsector	Puerto Rico	United States
<b>Agricultural Feedstock &amp; Chemicals</b>		
Establishments 2004	17	2,111
2001-2004 Establishment % Change	325.0%	0.4%
Employment 2004	538	104,893
2001-2004 Employment % Change	50.3%	-6.9%
Share of U.S. Employment	0.5%	100.0%
Location Quotient	0.75	n.a.
Average Annual Wage 2004	\$43,174	\$63,383
Direct-Effect Employment Multiplier	NA	10.91
Total Employment Impact	NA	1,212,094
<b>Drugs &amp; Pharmaceuticals</b>		
Establishments 2004	74	2,589
2001-2004 Establishment % Change	-2.6%	-0.6%
Employment 2004	26,014	313,207
2001-2004 Employment % Change	9.5%	2.7%
Share of U.S. Employment	8.3%	100.0%
Location Quotient	12.20	n.a.
Average Annual Wage 2004	\$48,443	\$79,303
Direct-Effect Employment Multiplier	NA	9.51
Total Employment Impact	NA	2,731,321
<b>Medical Devices &amp; Equipment</b>		
Establishments 2004	101	15,190
2001-2004 Establishment % Change	14.8%	0.2%
Employment 2004	13,988	411,460
2001-2004 Employment % Change	1.8%	-3.6%
Share of U.S. Employment	3.4%	100.0%
Location Quotient	4.99	n.a.
Average Annual Wage 2004	\$29,544	\$56,449
Direct-Effect Employment Multiplier	NA	4.56
Total Employment Impact	NA	1,817,705
<b>Research, Testing, &amp; Medical Laboratories</b>		
Establishments 2004	579	20,565
2001-2004 Establishment % Change	5.2%	19.4%
Employment 2004	4,461	413,550
2001-2004 Employment % Change	8.7%	8.2%
Share of U.S. Employment	1.1%	100.0%
Location Quotient	1.58	n.a.
Average Annual Wage 2004	\$19,203	\$65,414
Direct-Effect Employment Multiplier	NA	3.15
Total Employment Impact	NA	1,272,936
<b>TOTAL PRIVATE SECTOR</b>		
Establishments 2004	50,487	8,156,137
2001-2004 Establishment % Change	1.5%	4.8%
Employment 2004	743,857	109,249,195
2001-2004 Employment % Change	2.5%	-0.7%
Share of U.S. Employment	0.7%	100.0%
Location Quotient	n.a.	n.a.
Average Annual Wage 2004	\$20,871	\$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. NA = data are not available.





	Puerto Rico	United States	Rank
<b>University R&amp;D Expenditures, FY 2003</b>			
Total (\$ thousands)	\$128,383	\$40,104,621	45
Life Science R&D (\$ thousands)	\$49,973	\$24,062,088	47
Percent of Total R&D	38.9%	60.0%	
Life Sciences Per Capita	\$12.89	\$82.74	
Change in Life Sciences FY 1999–2003	-28.0%	52.7%	
<b>NIH Support to Institutions, FY 2004</b>			
Total (\$ thousands)	\$55,808	\$22,556,459	42
Per Capita Expenditures	\$14.39	\$77.56	
Change in Expenditures FY 2000–2004	34.8%	53.2%	
<b>Higher Education Degrees in Bioscience Fields, AY 2004</b>			
	1,590	111,329	27
<b>Bioscience Occupations in the Workforce, 2004</b>			
	5,530	616,140	32