

## Overview and Summary of Recent Initiatives

In 2000, the Commonwealth of Kentucky enacted the **Kentucky Innovation Act (KIA)**, an initiative to enhance the entrepreneurial economy in the Commonwealth. KIA involves a range of integrated efforts aimed at improving research and development (R&D), technological innovation, commercialization, and the start-up and growth of technology-driven and knowledge-driven Kentucky companies.

The statewide strategic plan for developing a technology-centered economy in the Commonwealth is being coordinated by the Cabinet for Economic Development, led by the **Department of Commercialization and Innovation (DCI)** in partnership with the Council on Postsecondary Education (CPE) and other statewide organizations. The statewide strategic plan focuses on five priority research areas, of which the biosciences and human health and development are prominent. Funding priority for R&D will be given to critical technologies in the following areas as identified in the strategic plan:

- Biosciences
- Human health and development
- Environmental and energy technologies
- Information technologies and communication
- Materials science and advanced manufacturing.

The **Kentucky Life Sciences Commercialization Program** addresses one of the key recommendations from the **Governor's Life Sciences/Biosciences Consortium Report in 2005**. That recommendation called for enhancing Kentucky's current statewide biotechnology commercialization program to more adequately address the needs of the life sciences disciplines. Consequently, existing biotechnology commercialization efforts will be expanded under the direction of DCI.

## Building Bioscience R&D Capacity

### Recent state investments in facilities

The **Cardiovascular Innovation Institute** is a partnership between the University of Louisville and Jewish Hospital, with support from DCI. DCI has provided more than \$5 million to help fund the new facility and has supported the development of its programs through both the Research Challenge Trust Fund initiative (see below for additional details on the fund) and the commercialization of the resulting

technologies by an Innovation and Commercialization Center at the facility (see below for further discussion on ICCs.) The institute focuses on the testing, clinical evaluation, and development of bio-adaptive heart innovations, including heart assist devices, biofeedback sensors, and related technologies. The institute is also working to develop commercial enterprises related to its core competencies.

**Center for Pharmaceutical Science and Technology (CPST)**—The University of Kentucky (UK), with more than \$1.5 million in support from DCI, will open the “pharmaceutical manufacturing factory of the future” at the UK Coldstream Research Campus. The \$17 million, 20,000-square-foot CPST manufacturing facility will provide state-of-the-art capabilities for new pharmaceutical analysis, formulation, and FDA/DEA-approved sterile product manufacturing.

A **Regional BioSafety Laboratory** will be constructed at the University of Louisville’s (U of L’s) Shelby campus; occupation is anticipated by the end of 2008. The stand-alone BSL-3 facility will serve the Ohio River Valley region, supporting not only U of L’s research activities on biothreats and emerging infectious diseases, but also those of other members of the Ohio Valley Affiliates for Life Sciences, also known as OVALS, including the UK, University of Cincinnati, Indiana University, and Wright State University.

A new **Nutrigenomics Laboratory** is being constructed by Alltech Inc. at its Jasmine County headquarters. Kentucky is providing up to \$1 million in funding to support the R&D work that will focus on genomics and nutrigenomics in animal production systems. The research promises to provide new tools for using basic dietary manipulations and customized dietary formulations to address health and longevity issues.

## Research programs

**Research Challenge Trust Fund (Bucks for Brains).** The Research Challenge Program initiative provides funding for prospective programs of national excellence at UK and U of L. Commonly known as “Bucks for Brains,” the program uses state funds to match private donations supporting research in strategically defined areas. The program received \$6.0 million in 1997–1998 and \$6.0 million in each year of the 1998–2000 biennium. These funds were matched dollar-for-dollar by the institutions with external funds or through internal reallocation. The 1999–2000 funds were transferred to the base budgets of the institutions to provide a perpetual source of funding for Research Challenge programs.

**Endowment Match Program.** The Endowment Match Program matches state funds dollar-for-dollar with private gifts to grow endowments and encourage research at Kentucky’s public universities. Endowment proceeds are used to fund endowed chairs, professorships, research scholars, research staff, graduate fellowships, undergraduate scholarships, research infrastructure, and mission support at these institutions. The program received General Fund appropriations of \$110 million in 1998–2000 and \$120 million in 2000–2002. The 2003 Budget Bill (HB 269) appropriated \$11,856,000 to pay debt service on a bond issue that provided another \$120 million for the program in 2002–2004.

The **Regional University Excellence Trust Fund** is designed to help each regional, comprehensive university to become nationally recognized in at least one academic program of distinction or one applied research program. The funds have created new teaching and research opportunities for faculty statewide and purchased equipment that meets industry standards.

**Kentucky Science and Engineering Foundation (KSEF) R&D Excellence Program** makes awards to Kentucky university faculty in the state’s five research priority areas. A total of 179 projects for more than \$9.5 million have been awarded to date. KSEF is an initiative of the **Kentucky Science and**

**Technology Corporation (KSTC)**, managed in partnership with CPE and DCI. KSTC is a private, nonprofit organization committed to the advancement of science, technology, entrepreneurship, and innovative economic development in Kentucky.

## Encouraging Academic/Industrial Interaction

The **R&D Voucher Program** is a \$3 million investment fund that enables small and medium-sized Kentucky-based firms to undertake research and development in partnership with Kentucky university researchers. Investments are made in technology refinement, prototype development, and commercial product development. Kentucky-based companies with fewer than 150 employees may seek a maximum funding of up to \$200,000 over 2 years, not to exceed \$100,000 per year. Companies must contract with an accredited postsecondary institution and match the fund's investment on a one-to-one basis. At least 25 percent of the match must be in cash. The R&D Voucher Fund is administered by the KSTC and managed in partnership with CPE.

The **Center for Nanoscale Science and Engineering (CeNSE)** at UK is a university/industry user research facility for the study and development of materials and devices at the nanoscale. An initial investment of \$2 million in specialty fabrication techniques for thin-film deposition, lithographic pattern definition, and etching has recently been augmented by a National Science Foundation (NSF) infra-structural grant (EPSCoR) of \$2.7 million. Participants include 15 UK faculty members from the Departments of Electrical and Computer Engineering, Chemical and Materials Engineering, Physics, Mechanical Engineering, and Chemistry and the Colleges of Medicine and Pharmacy. CeNSE also serves as a resource for the realization of emerging commercial opportunities. The center is located in the Advanced Science and Technology Commercialization Center (ASTeCC) on the UK campus near downtown Lexington.

## Moving Technology into the Marketplace

### Commercializing university technology

The **Kentucky Commercialization Fund** invests in university-based technology commercialization, with awards of up to \$225,000 over 3 years. Proposals must come from universities for university-based research projects.

### Supporting bioscience entrepreneurs and emerging companies

Regional **Innovation and Commercialization Centers (ICCs)** and local **Innovation Centers (ICs)** are funded through DCI and administered by KSTC. The ICCs and ICs are public/private partnerships that assist entrepreneurs and scientists in commercializing technologies that demonstrate significant market potential. The ICCs serve two groups of clients: the entrepreneur who wants to create a technology-based company and the scientist who wants to commercialize a technology. The six ICC offices help scientists and entrepreneurs understand the start-up process and investment practices, with the ultimate goal of significantly increasing quality deal flow. The ICCs work to coordinate local efforts to aggregate investors, employees, mentors, service providers, and other resources throughout the Commonwealth.

**MetaCyte Business Lab LLC** is the venture development subsidiary of Louisville Medical Center Development Corporation (LMCDC) and is focused on helping life science companies grow. MetaCyte was incorporated by Jewish Hospital HealthCare Services, Inc.; Norton Healthcare, Inc.; U of L Health

Care, and the U of L. MetaCyte benefits scientists, physicians, inventors, and entrepreneurs who are inexperienced at starting and growing a life science or healthcare technology business. MetaCyte Business Lab studies, tests, and analyzes business concepts and helps to move these concepts from the mind to the marketplace. The lab provides access to professional and technical service providers and offers facilities to clients, including a 48,000-square-foot, state-of-the-art incubator building containing wet labs, private office suites, and shared conference and office amenities.

## Making Capital Available

### Pre-seed and seed capital

The **SBIR/STTR Phase 0 Program** is managed by KSEF and is a grant program available to Kentucky's small businesses, university-affiliated small businesses, and college and university faculty entrepreneurs. These funds are earmarked for developing Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) proposals for submission to any of 11 participating federal agencies. A total of 29 awards amounting to \$91,441 have been made to date.

DCI plans to match all Phase I and Phase II federal awards received by Kentucky businesses. This would include matching awards of up to \$100,000 to support Phase I exploration of the technical merit or feasibility of an idea or technology. Phase II federal awards, which support full-scale research and development, can be up to \$750,000, and would be matched by the Commonwealth up to the first \$500,000.

The **Kentucky Enterprise Fund** is a series of pre-seed and seed-stage capital funds that focus on the early-stage commercialization of a product, technology, or process. The funds are made available through an annual appropriation from the Commonwealth of Kentucky through CPE as part of the New Economy initiatives. There are three funds within the Kentucky Enterprise Fund: The **Rural Innovation Fund**, the **R&D Voucher Fund**, and the **Kentucky Commercialization Fund**. In each case, the program funds the biosciences as a technology area.

Funding from the **Rural Innovation Fund** is available for proof-of-concept development or early-stage prototypes. Level 1 of the program offers a one-time investment of up to \$25,000. Level 2 offers up to \$100,000 over 2 years. Eligible applicants are rural Kentucky-based companies with fewer than 150 employees.

The R&D Voucher Fund and Commercialization Fund are described above.

### Venture capital

**Commonwealth Seed Capital, LLC (CSC)**, initially capitalized with \$10 million, was organized by the Kentucky Economic Development Partnership in 2001 to invest state funds in private start-up companies and in venture capital funds committed to investing in Kentucky technology companies. CSC investments focus on many types of technology companies, including those in the biosciences and natural products areas.

CSC also manages the **Kentucky Natural Products Fund (KNPF)**, a \$5 million seed fund to encourage continued economic development efforts in the natural products arena. The natural products industry encompasses a portion of the pharmaceutical industry; the biotechnology industry; and the entire nutraceutical, functional food, and agbiotech industries. All KNPF funds are to be invested in companies for an equity position.

**Kentucky Investment Fund Act (KIFA)** provides tax credits to individuals and companies that invest in approved venture capital funds. Investors in KIFA-approved funds are entitled to a 40 percent credit against Kentucky individual or corporate income tax or Kentucky corporate license tax.

## Providing Space for Bioscience Companies

### Incubators

Kentucky supports a network of technology business incubators to provide start-ups and small firms with critical business assistance, in addition to low-cost office space, light manufacturing, and/or laboratory facilities.

The **Advanced Science and Technology Commercialization Center** is UK's incubator for multi-disciplinary collaborations and start-up ventures. ASTeCC provides research space, as well as a suite of modern research instruments, to UK faculty; their students, staff, and postdoctoral associates; and scientists and engineers from new, for-profit, high-technology businesses. The 80,000-square-foot ASTeCC building, located on the UK campus, features faculty laboratories and laboratories for high-tech business start-ups that have a connection to UK faculty or staff, or that have licensed UK intellectual property. ASTeCC currently houses six start-up companies, and 23 businesses have graduated from the facility.

The **Agricultural Technologies Commercialization Center (AgTeCC)** is housed in the Kentucky Tobacco Research and Development Center (KTRDC) building on the UK campus. AgTeCC offers a laboratory environment for start-up and emerging companies conducting research on crop-based agriculture. AgTeCC provides access to plant-growth and tissue-culture resources and services within the KTRDC. The facility is designed for the immediate-start-up phase of a new company's operation such as grant-supported (e.g., SBIR) spin-off activity initiated by UK faculty.

**Kentucky Technology Inc. (KTI)**, founded in 1988, is a for-profit company owned by the University of Kentucky Research Foundation Inc. to enhance UK's mission to promote commercialization of research by providing private research laboratory and office space in several separate, unique areas of operation on campus and at Coldstream. In addition to campus locations at the ASTeCC and AgTeCC, Coldstream facilities include the Kentucky Technology Center and the Coldstream Center.

**MetaCyte Business Lab** provides access to a number of professional and technical service providers, such as regulatory consulting and legal assistance. Facilities available to MetaCyte clients include a 48,000-square-foot incubator building containing wet labs, private office suites, and shared conference and office amenities.

Multitenant and incubation facilities are also available at Coldstream Campus (see below).

### Facilities financing

The R&D Facilities Tax Credit encourages investment in facilities that are used to pursue research. The credit is a portion of the cost of constructing or purchasing research facilities, i.e., bricks and mortar. It is available to both new businesses coming into the Commonwealth and to existing businesses that undertake construction of new facilities for research. The credit is 5 percent of the costs incurred and is allowed if the facility houses R&D activities.

The Kentucky High-Tech Investment and Construction Pools provide grants and loans for building and promoting networks or clusters of technology-driven and research-intensive industries.

### Bioscience research parks

The **UK Coldstream Research Campus** is located close to UK's main campus in Lexington. It has 500 acres for development; and land leases range from 5 to 31 acres for customized, single-tenant buildings. The UK Coldstream Research Campus includes 11 buildings and more than 20 companies with approximately 800 employees.

In addition, a multilaboratory facility for start-up and emerging biotechnology companies is available, as well as several multiuse facilities that can accommodate companies in different stages of development. This development is called Coldstream's Kentucky Technology Center, or the "mini-campus." This portion of Coldstream, consisting of 27 acres, was established as a nexus for new technology-based companies that also require limited space, such as start-ups from UK. Currently, the mini-campus is a complex of six multitenant buildings on 13.5 acres. When completed, the Kentucky Technology Center will be seven multitenant buildings with a total of nearly 110,000 square feet of laboratory and office space.

The **Louisville Health Science Research and Business Park** is located within downtown Louisville and is operated by the LMCDC. The park houses three facilities providing more than 230,000 square feet of wet-lab, office, light manufacturing, and conference room space for life science and information technology companies.

## Addressing Talent Needs

### Specialized postsecondary programs

The **Biotechnology Center at Western Kentucky University** was established to facilitate hands-on educational opportunities for students in the Department of Biology's Recombinant Genetics Program and to provide technical and educational services to the State of Kentucky, the biotechnology industry, and the general public. The Biotechnology Center is a part of Western Kentucky University's Applied Research and Technology Program, which provides multidisciplinary scientific and technical assistance to help solve industrial and environmental problems.

## Contacts

Kentucky is planning a statewide assessment of its bioscience and biotechnology assets in 2006 and, based on the findings, will initiate a new state-level BIO organization.

Interim contact:

Deborah L. Clayton

Commissioner

Department of Commercialization and Innovation

Kentucky Cabinet for Economic Development

(502) 564-7670

[Deborah.Clayton@ky.gov](mailto:Deborah.Clayton@ky.gov)

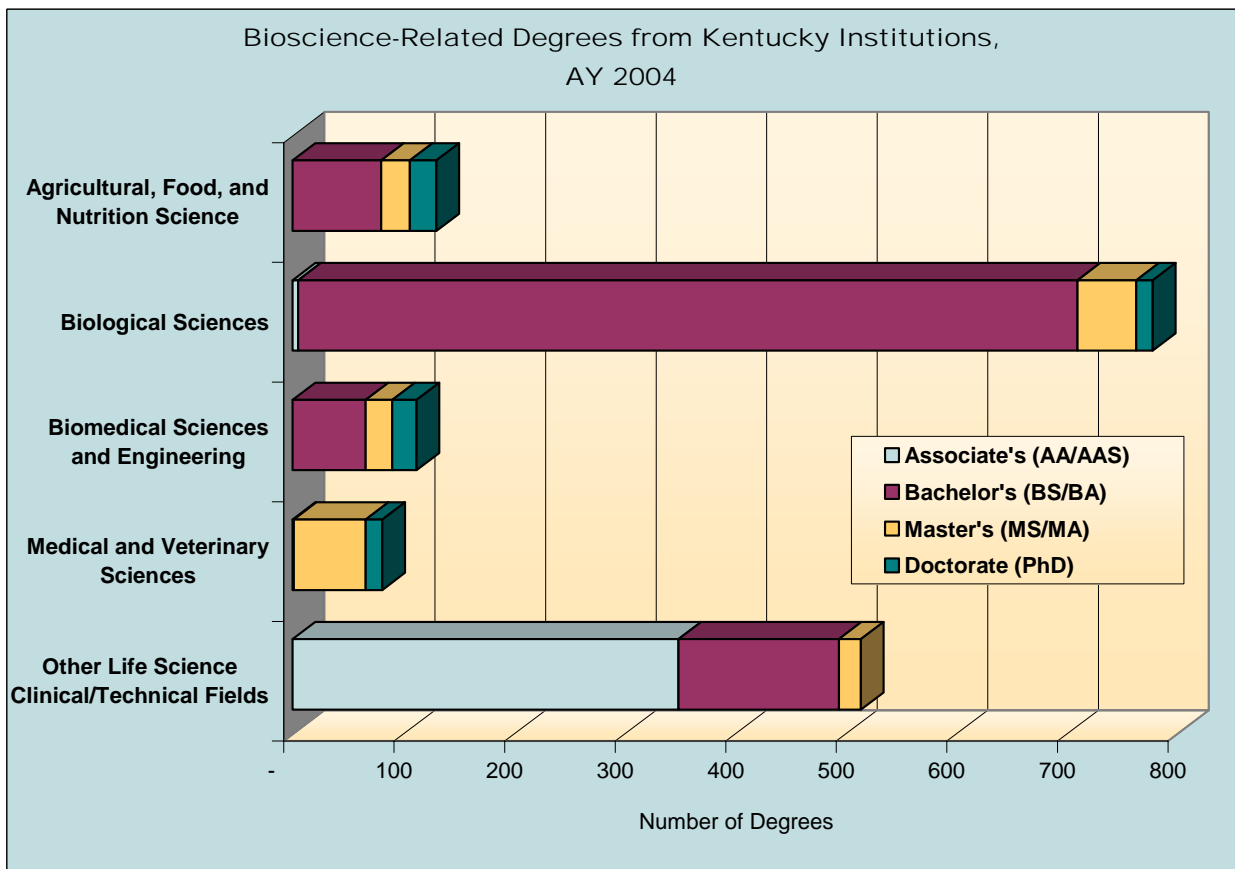
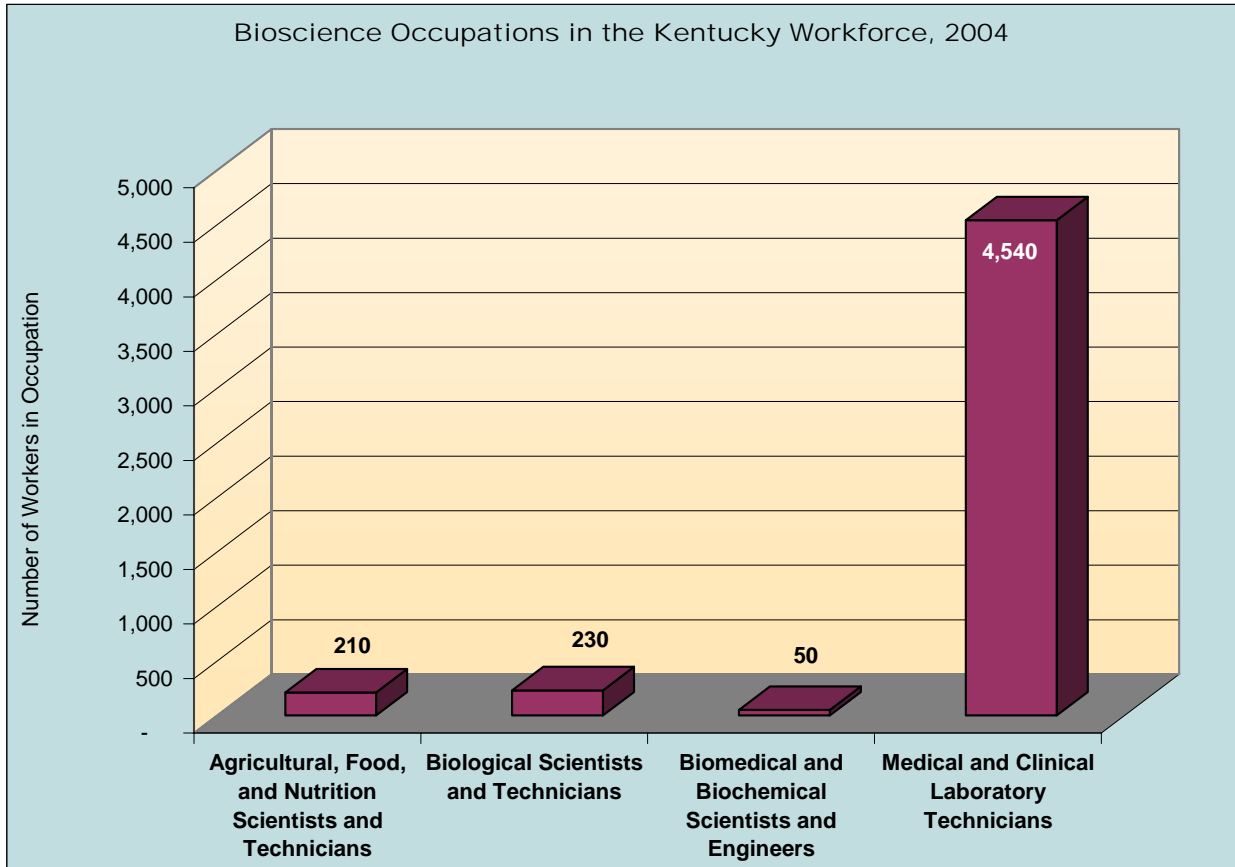
The University of Kentucky Natural Products Alliance began in December 2002 with support from the National Science Foundation Partnerships for Innovation Program and the Kentucky Department for Commercialization and Innovation. The Natural Products Alliance is a loose partnership of private natural-product companies, research institutions, business service providers, and state and local governments designed to encourage the development of the natural products sector in Kentucky. The Natural Products Alliance programs include early-stage grants to faculty, internship opportunities for students, mentoring for start-ups, educational and networking events, and courses to aid workforce development.

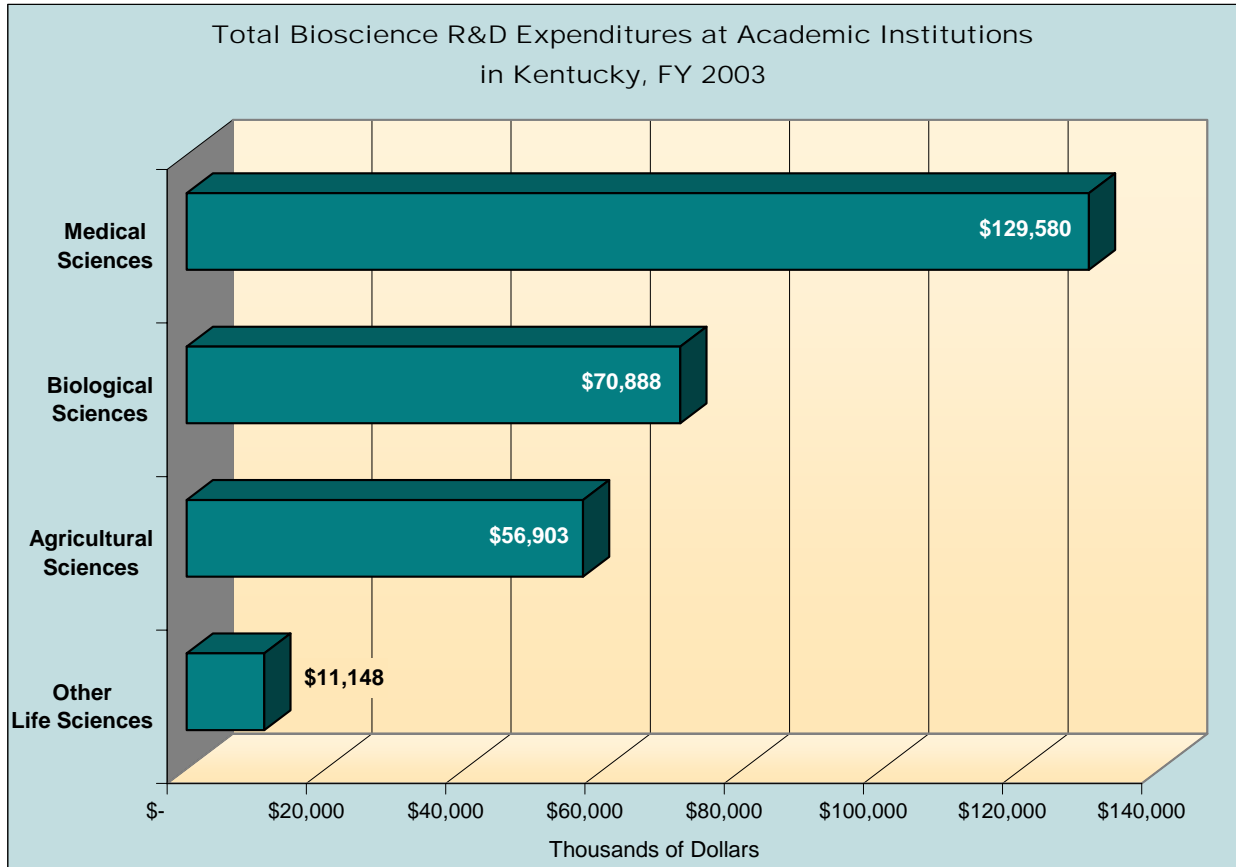
Gabriel Wilmoth  
Project Coordinator  
KTRDC Building, Room 203  
University of Kentucky  
Cooper and University Drives  
Lexington, KY 40546-0236  
(859) 608-1421  
[gcwilm2@uky.edu](mailto:gcwilm2@uky.edu)

Industry Subsector	Kentucky	United States
<b>Agricultural Feedstock &amp; Chemicals</b>		
Establishments 2004	27	2,111
2001-2004 Establishment % Change	9.6%	0.4%
Employment 2004	1,191	104,893
2001-2004 Employment % Change	-6.3%	-6.9%
Share of U.S. Employment	1.1%	100.0%
Location Quotient	0.86	n.a.
Average Annual Wage 2004	\$67,983	\$63,383
Direct-Effect Employment Multiplier	6.74	10.91
Total Employment Impact	8,030	1,212,094
<b>Drugs &amp; Pharmaceuticals</b>		
Establishments 2004	16	2,589
2001-2004 Establishment % Change	14.3%	-0.6%
Employment 2004	1,205	313,207
2001-2004 Employment % Change	24.2%	2.7%
Share of U.S. Employment	0.4%	100.0%
Location Quotient	0.29	n.a.
Average Annual Wage 2004	\$60,456	\$79,303
Direct-Effect Employment Multiplier	4.55	9.51
Total Employment Impact	5,477	2,731,321
<b>Medical Devices &amp; Equipment</b>		
Establishments 2004	127	15,190
2001-2004 Establishment % Change	-3.8%	0.2%
Employment 2004	1,977	411,460
2001-2004 Employment % Change	-21.8%	-3.6%
Share of U.S. Employment	0.5%	100.0%
Location Quotient	0.36	n.a.
Average Annual Wage 2004	\$38,403	\$56,449
Direct-Effect Employment Multiplier	2.40	4.56
Total Employment Impact	4,740	1,817,705
<b>Research, Testing, &amp; Medical Laboratories</b>		
Establishments 2004	242	20,565
2001-2004 Establishment % Change	40.9%	19.4%
Employment 2004	2,910	413,550
2001-2004 Employment % Change	17.8%	8.2%
Share of U.S. Employment	0.7%	100.0%
Location Quotient	0.53	n.a.
Average Annual Wage 2004	\$45,491	\$65,414
Direct-Effect Employment Multiplier	2.01	3.15
Total Employment Impact	5,849	1,272,936
<b>TOTAL PRIVATE SECTOR</b>		
Establishments 2004	101,151	8,156,137
2001-2004 Establishment % Change	-1.2%	4.8%
Employment 2004	1,439,207	109,249,195
2001-2004 Employment % Change	-0.6%	-0.7%
Share of U.S. Employment	1.3%	100.0%
Location Quotient	n.a.	n.a.
Average Annual Wage 2004	\$32,902	\$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.





	Kentucky	United States	Rank
<b>University R&amp;D Expenditures, FY 2003</b>			
Total (\$ thousands)	\$377,635	\$40,104,621	30
Life Science R&D (\$ thousands)	\$272,227	\$24,062,088	28
Percent of Total R&D	72.1%	60.0%	
Life Sciences Per Capita	\$66.11	\$82.74	
Change in Life Sciences FY 1999–2003	49.1%	52.7%	
<b>NIH Support to Institutions, FY 2004</b>			
Total (\$ thousands)	\$140,407	\$22,556,459	30
Per Capita Expenditures	\$34.10	\$77.56	
Change in Expenditures FY 2000–2004	68.2%	53.2%	
<b>Higher Education Degrees in Bioscience Fields, AY 2004</b>			
	1,615	111,329	25
<b>Bioscience Occupations in the Workforce, 2004</b>			
	5,030	616,140	34