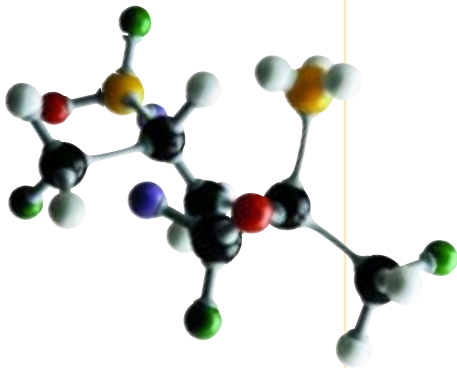




Research

2000



the university of missouri-columbia
summary of grants and contracts
research division ● fiscal year 2000

Toward a New Century of Progress

For researchers at the University of Missouri-Columbia, the 21st century brings opportunities and challenges. By Jack O. Burns, Vice Provost for Research

AS WE LOOK back upon the achievements of the soon-to-be-completed first year of the new century, it is fitting that our annual summary of grant and contract activity at the University of Missouri-Columbia, should begin by recognizing the outstanding efforts of our faculty, post-doctoral and student researchers. Through their intelligence, curiosity and hard work, MU has already emerged as a leader in what promises to become a new century of progress for our nation.

And the future looks even brighter. Thanks to our faculty's efforts — and the dedication of the many talented graduate students and staff members

who support them — research is booming at MU.

Funding on the Rise

In FY 2000, for example, the University for the first time topped the \$110 million mark in sponsored activities, thus increasing MU's total extramural funding to \$118 million, a 16.5 percent increase from our \$101.9 million total of last year. Even more impressive is our performance over the past three years. Our current sponsored research total represents a 50 percent jump over the \$78 million we garnered in FY 1997.

Almost every division posted increases again this year, and there were

several exceptional performers. Tops among them was the College of Engineering, which saw a funding increase of 25.6 percent, raising their total dollar amount to \$9.04 million. Other stellar contributions came from the School of Nursing, which increased its project activity by 30 percent; the College of Agriculture, Food and Natural Resources, which increased its funding total by 23.3 percent; and our various collaborative research centers, which increased their combined FY 2000 grant expenditures by 16.6 percent over the previous fiscal year.

Faculty proposals are also up, a sign of the continued health of the University's research enterprise. Last year MU faculty submitted 1,955 proposals, an increase of four percent over the previous year and a 21.3 percent jump from our total of five years ago.

Support for Research

As in years past, the federal government remains the largest funder of MU research. In FY 2000 — for the third fiscal year in a row — the University achieved a substantial increase in our level of federal research project activity, with funding increasing by more than 65 percent.

It is worth noting that a significant portion of our newly awarded funding has been offered in support of University of Missouri-Columbia researchers working in the multidisciplinary field of life sciences. MU's new awards from the

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Externally Sponsored Grants and Contracts FY 2000

National Institutes of Health to life sciences researchers, for example, climbed more than 60 per-

cent, from \$32 million in FY 1999 to \$51.8 million in FY 2000. The increase is particularly impressive given NIH's comparatively modest 15 percent hike in overall grant support awarded during the previous fiscal year.

Washington's enthusiasm for the life sciences notwithstanding, even a cursory glance into the history of federal support for MU research confirms a long and extraordinarily successful partnership between science and government. This experience, in turn, mirrors the historic move toward a more comprehensive federal involvement in the advancement of science that fueled our nation's previous "century of progress."

Franklin D. Roosevelt neatly summarized the rationale behind federal support for research in 1944. "New frontiers of the mind are before us," he wrote, "and if they are pioneered with the same vision, boldness and drive with which we have waged this war we can create a fuller and more fruitful employment and a fuller and more fruitful life."

As today's new technologies rapidly transform the nature of scientific enquiry, it is clear that our own "new frontiers of the mind" present even

	Research	Instruction and Public Service	Totals
Proposals Submitted	1,490	465	1,955
Active Funded Projects	1,895	687	2,582
Newly Awarded/Project Total	\$107,325,535	\$51,709,640	\$159,035,175
Expenditures	\$78,098,098	\$40,580,119	\$118,678,217

Selected Total Research Expenditures FY 2000

Research		
Science and Engineering		\$158,860,784
Other Programs		\$4,927,000
Sponsored Instruction and Public Service		\$40,580,119
Sponsored Service Agreements		\$2,047,427
Total		\$206,415,330

Note: Research expenditures includes external sponsors, state appropriations, gifts and internal funds as reported to the National Science Foundation. Sponsored services agreements are processed through Business Services.

more opportunities and challenges.

Boldness, Vision, Drive

Here at MU, federal and state government agencies continue to play a key role in assisting the vision, boldness and drive of researchers working to seize opportunities and meet challenges.

Among such government-supported projects in FY 2000 are several worthy of special recognition. Each has helped to raise MU's national research profile and has served to highlight the level of faculty talent on the Columbia campus:

- a \$7.85 million, five-year grant from the National Heart, Lung and Blood Institute for a study of exercise

and coronary disease directed by Harold Laughlin, professor of veterinary biomedical sciences;

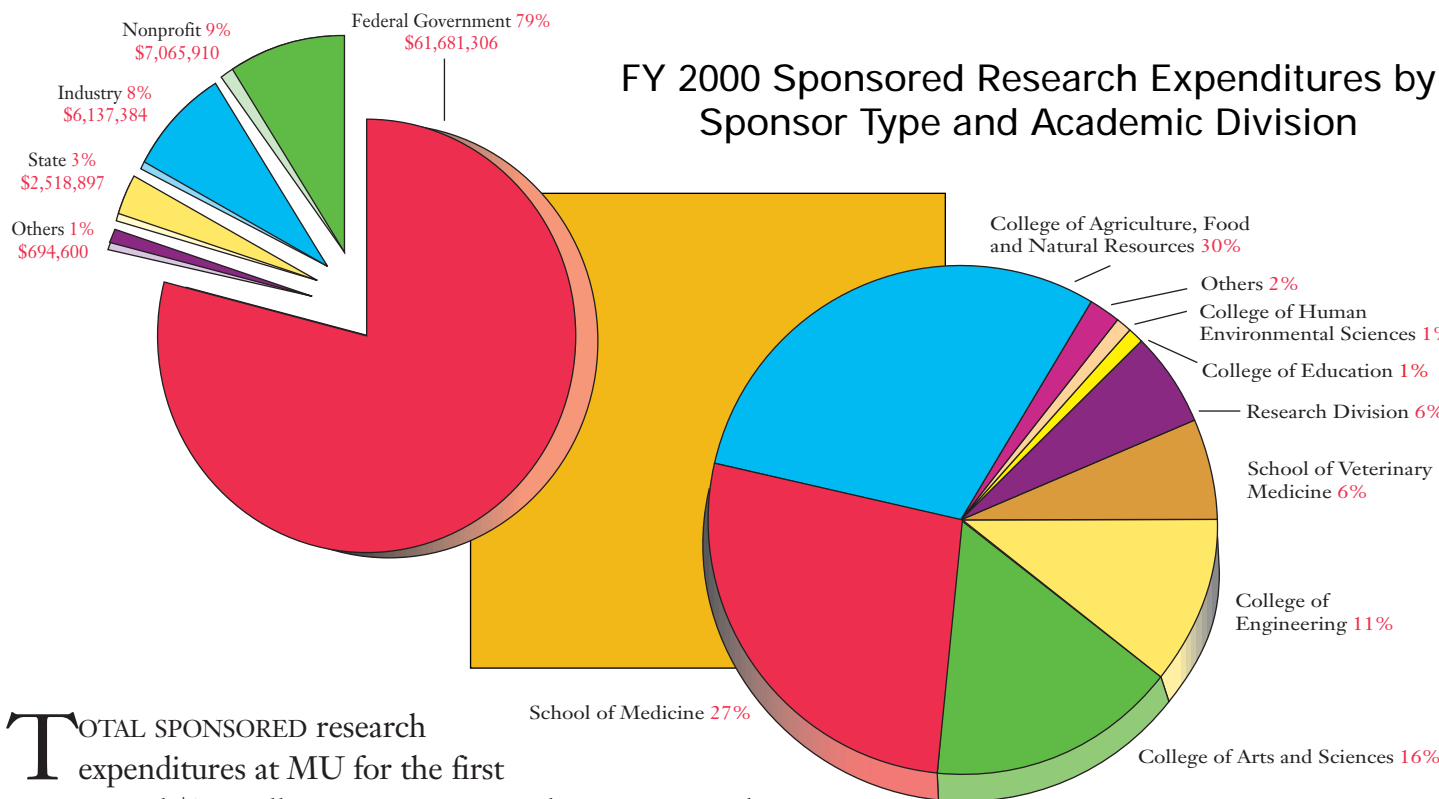
- a \$5.57 million, five-year grant from the National Institute of Environmental Health Science for a study of plant nutrients and chemicals directed by Dennis Lubahn, associate professor of biochemistry;

- a \$3 million, three-year grant from the National Science Foundation for a study of the plant genome directed by John Walker, professor of biological sciences; and

- a \$2.74 million, four-year grant from the National Institute of Alcohol Abuse and Alcoholism for an examina-

continued on Page 11

SPONSORED RESEARCH



TOTAL SPONSORED research expenditures at MU for the first time topped \$78 million in FY 2000, with scientists and scholars working in the areas of medicine, biology and agriculture accounting for slightly more than 72 percent of those funds. Research expenditures from federal sources alone totaled more than \$61 million in FY 2000, an increase of 65 percent over the past three years. “This increase is a result of a substantial effort by our very talented faculty and also consistent with one of our high priority planning goals,” says MU Chancellor Richard Wallace. “The knowledge gained through this research will return very generous benefits both to those here in Missouri and others around the world.”



Expenditures and Awards

Sponsorship by the federal government, Missouri state government and various corporate and nonprofit agencies is crucial to the health of the University’s research enterprise. In this report you will encounter charts and graphs that reflect the extent of these agencies’ involvement in MU research. Most are expressed in terms of expenditures, which represent resources spent by a researcher during a given fiscal year. Others are expressed as awards, which show the total amount of funds available for use, money often expended over a period of years.

FY 2000 Sponsored Research

	Awards	Expenditures
Federal		
National Institutes of Health	\$44,837,872	\$26,382,385
National Science Foundation	\$9,039,038	\$9,283,135
Department of Agriculture	\$9,336,060	\$8,894,126
Other Federal Government Agencies	\$3,449,356	\$4,481,206
Department of Defense	\$5,079,703	\$2,737,439
Environmental Protection Agency	\$719,785	\$2,569,646
NASA	\$3,553,197	\$2,520,177
Department of Energy	\$1,989,866	\$2,226,121
Department of Education: Non Student Aid	\$796,404	\$1,694,815
Department of the Interior	\$1,016,891	\$892,255
Total Federal	\$79,818,172	\$61,681,306
State of Missouri		
Department of Conservation	\$923,418	\$1,023,259
Other State Government Agencies	\$600,810	\$614,610
Department of Natural Resources	\$365,299	\$551,483
Department of Health	\$341,405	\$155,512
Department of Mental Health	\$113,211	\$94,568
Department of Social Services	\$302,631	\$78,998
Department of Transportation	\$366,632	\$467
Total Missouri	\$3,013,406	\$2,518,897
Nonprofit Groups	\$7,354,481	\$7,065,910
Industry	\$14,350,733	\$6,137,384
Other Universities	\$2,521,866	\$498,479
Other Private Grant or Program Income	\$110,240	\$132,954
Local and Other Government	\$156,637	\$63,169
Total	\$107,325,535	\$78,098,098

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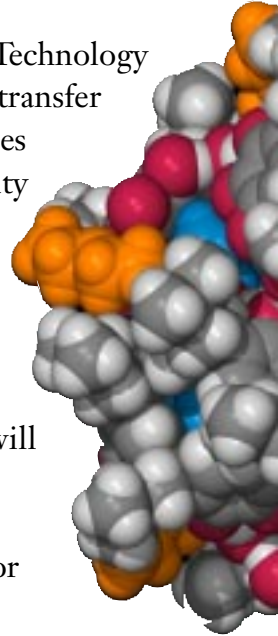
FY 2000 Expenditures By Division

Divisions	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000
College of Agriculture, Food and Natural Resources	\$15,211,131	\$14,219,066	\$15,390,332	\$15,564,864	\$19,700,082	\$23,077,327
School of Medicine	\$13,711,025	\$14,591,525	\$15,861,774	\$17,344,849	\$19,649,021	\$20,934,104
College of Arts & Science	\$6,405,644	\$7,093,899	\$7,383,145	\$8,774,101	\$10,255,355	\$12,411,490
College of Engineering	\$3,396,058	\$3,278,896	\$4,419,829	\$4,241,247	\$6,388,906	\$8,476,383
College of Veterinary Medicine	\$2,192,224	\$2,729,838	\$3,717,511	\$3,931,851	\$5,747,790	\$5,030,682
Research Division	\$2,653,910	\$3,168,854	\$3,630,380	\$4,545,301	\$4,115,937	\$4,869,308
College of Human Environmental Sciences	\$322,653	\$367,195	\$639,580	\$970,114	\$1,409,540	\$1,154,854
College of Education	\$189,167	\$223,707	\$323,580	\$381,833	\$643,764	\$737,090
School of Journalism	\$0	\$73,065	\$516,698	\$510,612	\$897,479	\$527,928
Sinclair School of Nursing	\$31,113	\$82,573	\$279,495	\$353,996	\$420,998	\$434,429
Graduate School	\$90,870	\$0	\$0	\$1,205	\$15,382	\$255,187
Student Affairs	\$0	\$0	\$0	\$675	\$66,967	\$92,591
Administrative Services	\$0	\$0	\$0	\$0	\$59,092	\$65,025
MU Extension	\$35,166	\$53,828	\$19,041	\$10,863	\$62,573	\$31,701
College of Business	\$6,397	\$1,396	\$0	\$0	\$0	\$0
Office of the Provost	\$15,035	\$9,821	\$15,143	\$4,762	\$229,679	\$0
Total	\$44,260,394	\$45,893,664	\$52,196,509	\$56,636,275	\$69,662,565	\$78,098,098

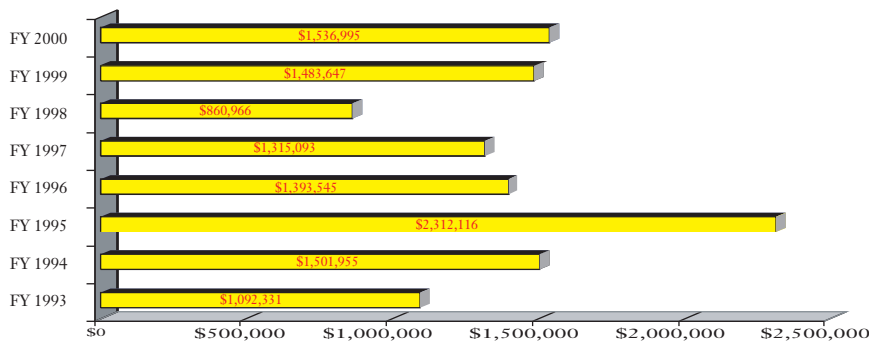
TECHNOLOGY DEVELOPMENT

ESTABLISHED IN September 1999, the University's new Office of Technology & Special Projects is pursuing an active program of technology transfer and commercialization both on the MU campus and its sister campuses in Kansas City, Rolla and St. Louis. In partnership with the University System, OTSP is revitalizing the operations of the former University Patents and Licensing Office. Already the office has doubled in size, adding four new technology transfer professionals to accommodate increased demand for OTSP services.

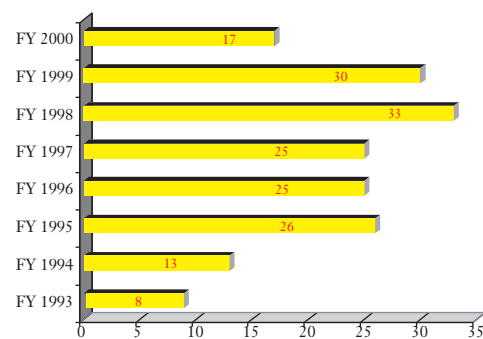
"We are assembling a team that will more effectively meet the needs of the faculty in protecting their inventions — a team that will work aggressively and creatively to move those inventions to the marketplace," says OTSP Director Thomas Sharpe. Upcoming projects include construction of a 25,000 square foot business incubator facility and creation of a technology investment fund to assist small business licensees.



Royalties from MU inventions

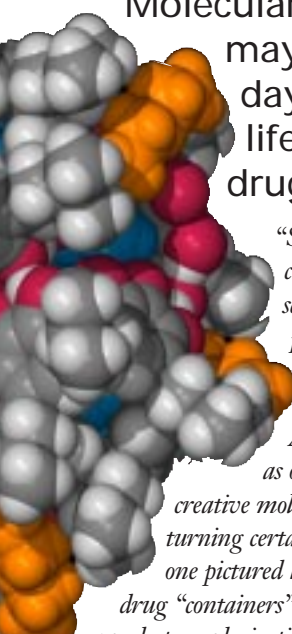


Patent applications filed



Research facilities that encourage collaboration are key to the successful transfer of biotechnology and life sciences discoveries to the private sector. In October, Sen. Christopher S. Bond announced a federal grant of \$15 million — the largest such award in the University's history — to complete funding for just such a facility. The 124,000 square foot MU Life Sciences Center, pictured at right, will bring together high-tech researchers from seven MU divisions. "We are about to see a major life sciences initiative become a reality," said Provost Brady Deaton. "It's a truly ambitious undertaking that will extend the limits of our understanding of life itself — one that will embrace the resources of Kansas City to the west and St. Louis to the east with the University of Missouri-Columbia serving as the fulcrum"

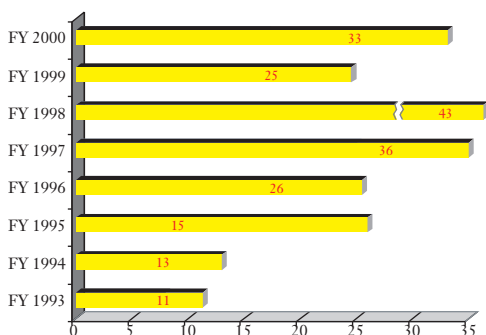




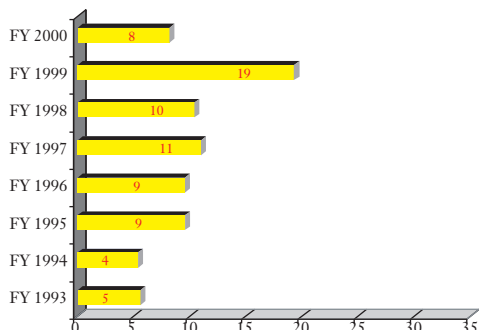
Molecular containers may one day deliver life-saving drugs

“Supra-molecular” chemistry has enormous scientific and commercial potential, says Jerry Atwood, chair of MU’s chemistry department. Atwood, widely recognized as one of the world’s most creative molecular scientists, believes turning certain molecules (such as the one pictured here) into microscopic drug “containers” could revolutionize the way doctors administer medications.

Patent applications pending



Patents issued



Tech Development: Our Reactor’s Role

FOR PEOPLE LIVING with cancer, the transfer of radiopharmaceutical technology from campus to corporation can’t come fast enough. That’s why scientists at MU’s Research Reactor, working in tandem with private sector researchers, are racing to develop radiopharmaceutical treatments.

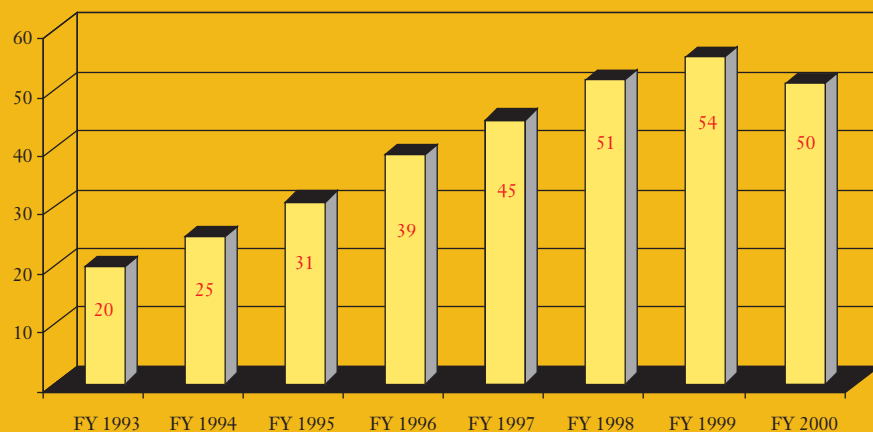
Skeletal Targeted Radiotherapy is one such treatment. STR combines drugs and a radioactive isotope, Holmium-166, to destroy forms of bone cancer. Following a clinical trial involving patients with multiple myeloma, a cancer of the marrow, researchers at the Washington-based biopharmaceutical company NeoRx Corp. reported that 18 of 40 patients achieved complete remissions. The MU Research Reactor is the only facility in the world that produces this isotope for clinical trials.



Inside the MU Research Reactor

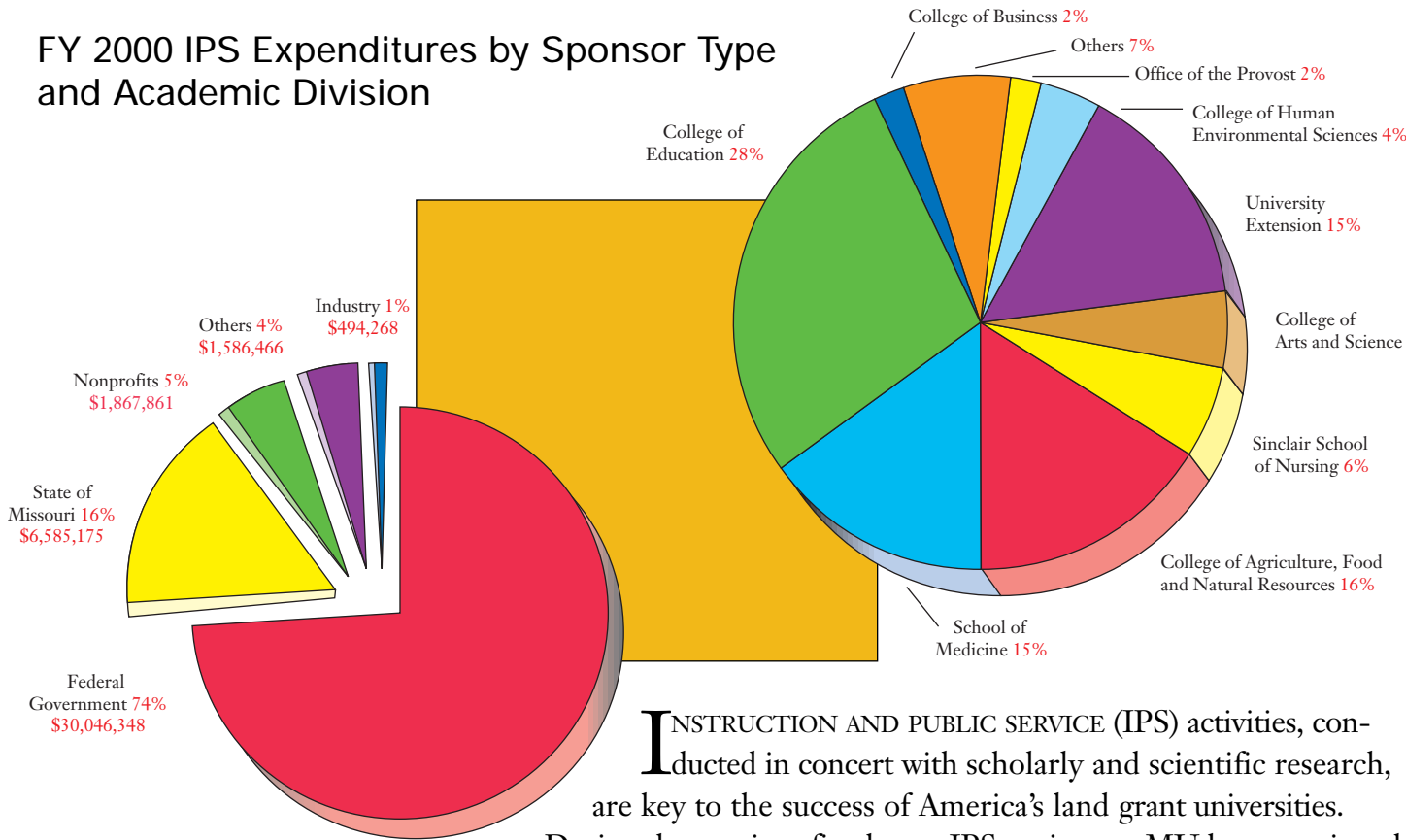
“With our combined efforts, we have been able to slow a deadly form of cancer that stops thousands of people each year from living healthy, active lifestyles,” says Ed Deutsch, MURR director. “We hope to continue to help people with other types of cancer as we battle against this terrible disease.”

Total MU Intellectual Property Licenses, FY 1993 - 2000



INSTRUCTION AND PUBLIC SERVICE

FY 2000 IPS Expenditures by Sponsor Type and Academic Division

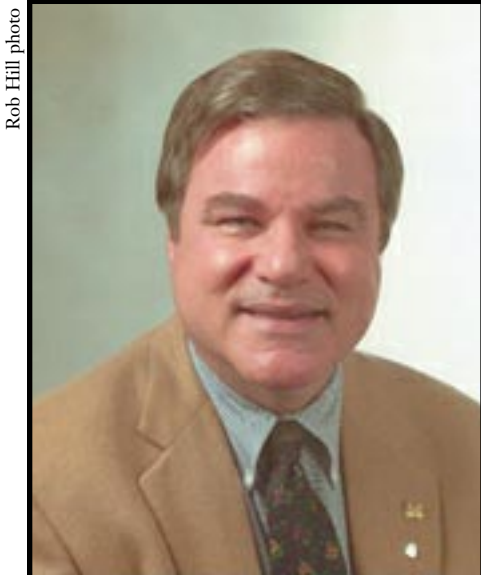


INSTRUCTION AND PUBLIC SERVICE (IPS) activities, conducted in concert with scholarly and scientific research, are key to the success of America's land grant universities.

During the previous fiscal year, IPS projects at MU have continued to show great strength, with IPS expenditures in FY 2000 for the first time topping \$40 million. The College of Education accounted for just over one quarter of all sponsored IPS funding, while programs in agriculture and medicine also performed well. The federal government remained the largest sponsor, with the National Institutes of Health and the Department of Education contributing the greatest share of federal support.

Doctor, Educator, Public Servant

Dr. William M. Crist, new dean of the MU School of Medicine, exemplifies the University's ideal of instruction and public service. As a researcher, professor of pediatrics and chair of the Department of Pediatric and Adolescent Medicine at the Mayo Clinic in Rochester, Minn., Crist has been a long-time leader in the ongoing battle to improve diagnosis and treatment of children with cancer. In addition, for almost 25 years, Crist has been active in three of the nation's most important pediatric cancer treatment groups: the Pediatric Oncology Group; the Children's Cancer Group; and the Intergroup Rhabdomyosarcoma Study Group. When these organizations decided to join forces in order to better serve children with cancer, Crist led the merger process and was elected interim chair. The new group Crist helped to create, called the Children's Oncology Group, includes all academic health centers in North America and, in collaboration with the National Cancer Institute, directs all North American clinical trials involving children with cancer.



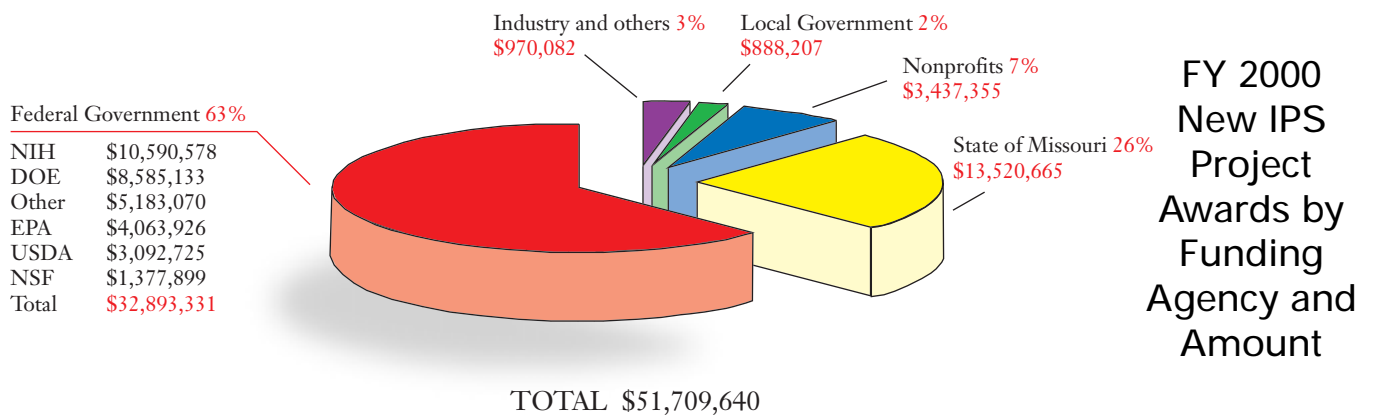
Rob Hill photo

IPS Externally Sponsored Expenditures

	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00
College of Education	\$7,311,011	\$7,819,254	\$8,012,425	\$9,225,449	\$10,014,317	\$11,168,476
College of Agriculture, Food and Natural Resources	\$1,876,300	\$1,920,888	\$1,960,579	\$6,278,779	\$4,876,383	\$6,543,284
School of Medicine	\$3,608,359	\$5,073,543	\$5,442,381	\$6,030,077	\$5,928,889	\$5,980,813
University Extension	\$7,693,946	\$8,135,693	\$7,739,441	\$6,626,060	\$6,920,903	\$5,997,721
College of Business	\$1,456,003	\$1,673,501	\$1,510,317	\$1,364,182	\$1,488,532	\$875,658
Sinclair School of Nursing	\$188,478	\$545,941	\$1,279,680	\$1,610,803	\$1,939,666	\$2,378,638
College of Arts & Science	\$1,622,600	\$2,263,862	\$2,523,997	\$2,417,365	\$2,712,316	\$2,144,178
College of Human Environmental Science	\$884,991	\$904,922	\$1,266,730	\$1,917,722	\$1,994,767	\$1,817,681
Office of the Provost	\$857,661	\$733,790	\$638,732	\$724,218	\$713,988	\$922,322
Graduate School	\$574,643	\$569,113	\$902,196	\$880,717	\$971,457	\$680,182
College of Engineering	\$422,718	\$756,819	\$720,684	\$603,596	\$838,144	\$647,171
Research Division	\$627,115	\$467,454	\$415,020	\$402,547	\$448,676	\$586,203
School of Journalism	\$520,117	\$102,901	\$131,297	\$112,754	\$101,082	\$291,459
College of Veterinary Medicine	\$198,085	\$322,372	\$281,728	\$341,418	\$415,269	\$235,748
Student Affairs	\$136,947	\$52,387	\$87,335	\$94,041	\$135,886	\$161,124
School of Law	\$93,689	\$46,908	\$99,402	\$108,900	\$34,109	\$73,786
Administrative Services	\$2,527,739	\$3,345,844	\$103,098	\$0	\$62,365	\$44,642
Development and Alumni Relations	\$0	\$0	\$0	\$0	\$61,812	\$31,035
TOTAL	\$30,600,401	\$34,735,191	\$33,115,042	\$38,738,629	\$39,658,560	\$40,580,119

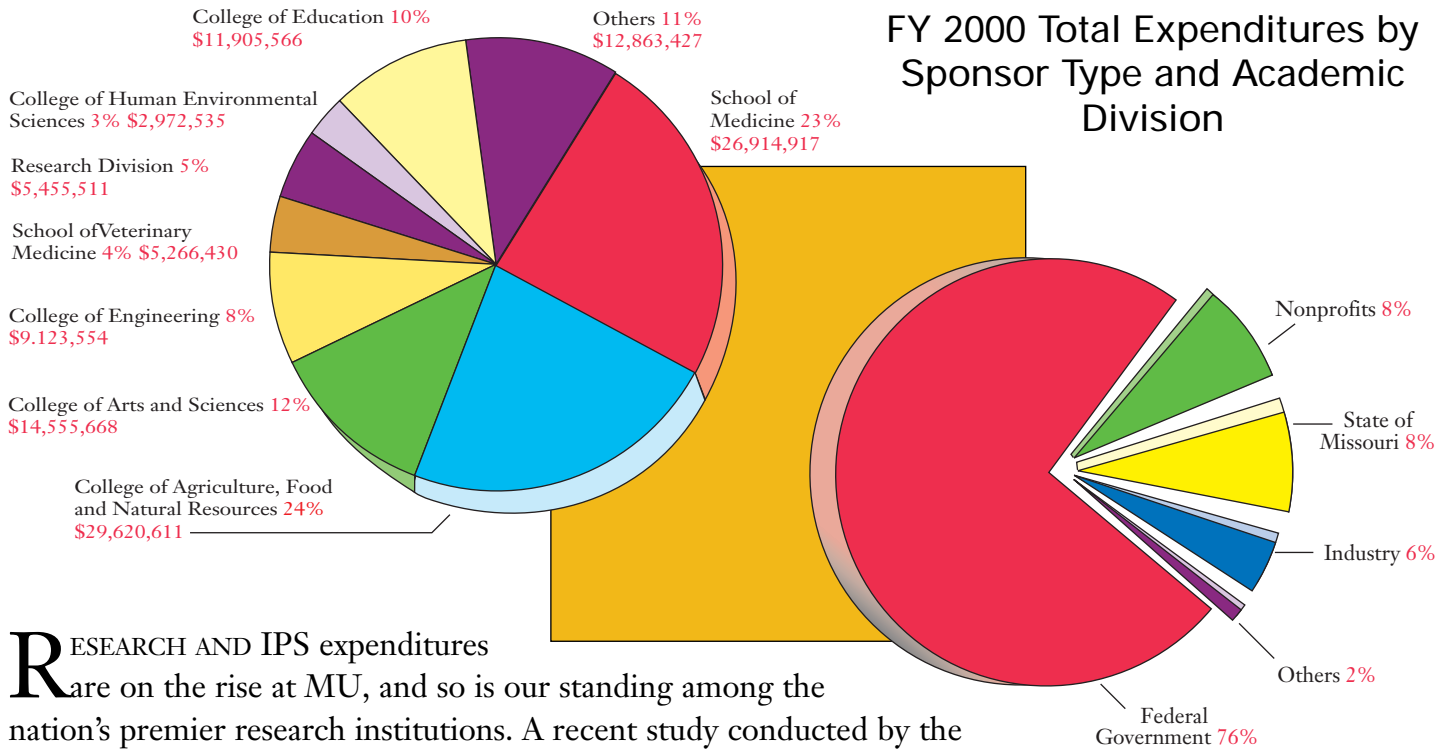
Note: Figures represent shared credit prorated expenditures processed through the MU Office of Sponsored Program Administration

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RESEARCH & IPS

FY 2000 TOTALS



RESearch AND IPS expenditures are on the rise at MU, and so is our standing among the nation's premier research institutions. A recent study conducted by the Higher Education Benchmarking Consortium, for example, found that in several key areas the University exceeded the performance of the majority of our peers among the nation's 33 Carnegie Research I institutions. Among these areas were: the percentage of new awards received per research proposals submitted; percentage of faculty working as investigators in sponsored research projects; and efficiency of sponsored program administration.



The Big Picture

WITH THE ASSISTANCE of a \$1.8 million grant from NASA, College of Engineering Professor Andrew Blanchard and a team of more than 30 MU researchers have linked up with private-sector professionals — contractors, city planners, farmers and others — to explore ways in which remote sensing technology can help tackle a variety of terrestrial troubles.

Various forms of remote sensing (a local example of which is shown at left) have long allowed NASA to collect data

Combined Research/IPS Expenditures Among Selected Peer Institutions, FY 1998

University of Illinois, Urbana-Champaign	11	\$338,841,000
University of Texas, Austin	19	\$244,843,000
University of North Carolina, Chapel Hill	20	\$235,296,000
Indiana University, Bloomington	30	\$171,754,000
Iowa State University	34	\$156,766,000
University of Missouri-Columbia	47	\$136,061,000
University of Virginia	49	\$133,049,000
University of California, Irvine	50	\$130,415,000
University of Nebraska, Lincoln	53	\$118,857,000
University of Kansas	54	\$117,115,000
University of California, Santa Barbara	60	\$96,034,000

Note: Figures as reported to the National Science Foundation in FY 1998, the most recent year available.

MU research continues its dramatic rise

continued from Page 3

tion of adolescent alcohol use and high-risk behavior directed by Lynne Cooper, a professor in the Department of Psychology.

“Nearly every school and college on this campus has contributed to the increase in funding, and I commend the faculty, chairs and deans for their commitment to our research mission,” said Provost Brady Deaton in

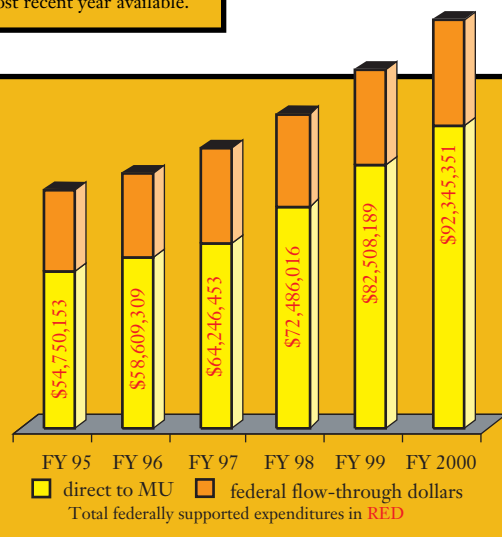
a recent interview. “In addition, as our new mission enhancement faculty begin to garner external funding in the next few years, I believe our growth in

extramural support will be sustained.”

Here at the Research Division we couldn’t agree more. We too are sure that at the commencement of a new century, the long-term trend toward greater external research support could hardly be more encouraging. ■

Total Federal Support: Combined Research/IPS Expenditures

	Direct	Federal Flow-through	Total
FY 2000	\$69,959,636	\$22,357,715	\$92,317,351
FY 1999	\$60,591,337	\$21,968,022	\$82,559,359
FY 1998	\$50,751,622	\$21,734,324	\$72,486,016
FY 1997	\$42,582,248	\$21,738,205	\$64,246,453
FY 1996	\$39,439,477	\$19,169,832	\$58,609,309
FY 1995	\$36,050,097	\$18,700,056	\$54,750,153



that is difficult to obtain through more conventional means. But civic and business leaders have often been slow to make use of it. Blanchard’s team is working to show that analysis of satellite imagery is a cost-effective way to head off potential problems in construction,

development planning, crop management and other activities. The ultimate payoff? “Every time a road is built or a subdivision is developed we are going to be able to build a better, more ecological and environmentally friendly place,” Blanchard says. ■



University of Missouri-Columbia
Office of Research
205 Jesse Hall
Columbia, MO 65211

www.research.missouri.edu

mission

THE UNIVERSITY OF MISSOURI-COLUMBIA, established in 1839, is the oldest public research institution west of the Mississippi River. MU's mission in research and student education is to provide enhanced opportunities and challenges in the humanities, arts, sciences and selected professional fields. MU also aspires to achieve national and international prominence for its research and educational contributions. As such, we are committed to building on our research strengths in basic and applied biological and biomedical sciences; nuclear and related physical and engineering sciences; and selected social and behavioral sciences. We will continue to strengthen our leadership role in agriculture and journalism. And because of our large enrollment of undergraduates, MU will enhance the core disciplines required for all those seeking baccalaureate degrees, giving special attention to areas such as languages and mathematical sciences that provide the necessary foundation for a truly educated citizenry.



Bill Denison photos



the mizzou