



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

Research and Economic Development *at the University of North Carolina at Chapel Hill*

a briefing
October 2005

THE RESEARCH ENTERPRISE AT CAROLINA 1

RESEARCH STRENGTHS 3

CAPACITY FOR INNOVATION 6

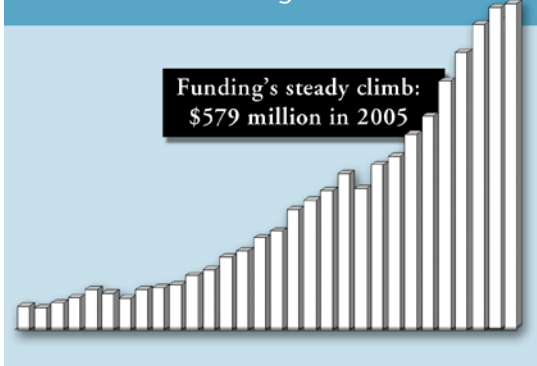
RESEARCH AS LEARNING 7

FACULTY EXCELLENCE 8

NEW INITIATIVES 9

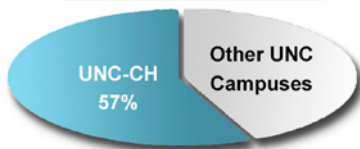
FOR MORE INFORMATION 10

Research funding at Carolina



UNC-Chapel Hill's sponsored research funding rose to \$579.6 million in fiscal year 2005, up from \$577.6 million in 2004.

Over Half of System's External Funds



Carolina receives more external funding than all of the other UNC campuses combined.

Where the research funding goes

College/School, FY 2005	Amount
Arts and Sciences	62,029,336
Dentistry	9,916,092
Education	2,066,526
Medicine	300,937,485
Nursing	9,302,415
Pharmacy	6,675,133
Public Health	68,149,453
Social Work	5,626,466
Other Schools	7,925,378
Centers and Institutes	106,961,108
Total	\$579,589,394

Carolina: a national leader in research

Carolina is making a strong bid to become the leading public research university in the nation. In a 2004 report entitled *The Top American Research Universities*, Carolina ranked **fourth among public universities**. The report, produced by the Lombardi Program on Measuring University Performance, assessed areas such as research, private support, faculty strength, and advanced training. In the Carnegie Foundation's classification of colleges and universities, Carolina qualifies at the highest level, as a **research-extensive university**. Institutions in this category award at least 50 or more doctoral degrees per year across at least 15 disciplines. Carolina awards more than 400 Ph.D.s each year.

Based on most recent available data from the National Science Foundation (FY 2003) and the National Institutes of Health (FY 2004), Carolina ranks

- 20th in federal academic science and engineering obligations for FY 2003 (\$344.6 million); **top public university in the South**.
- 11th and **first in the South** in federally financed research and development expenditures at public universities and colleges in FY 2003 (\$280.6 million)
- 15th among universities in **NIH funding** for FY 2004 (\$289.6 million)

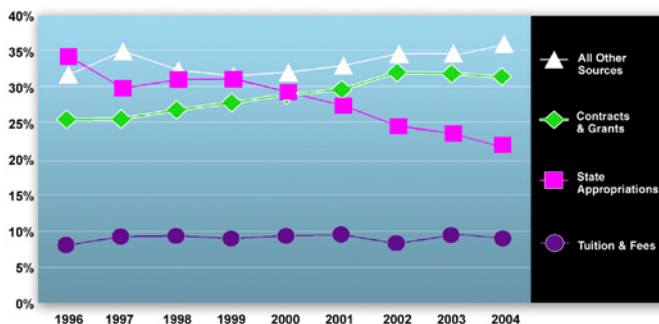
Academic peers

As a research institution, these are our closest peers. Duke University, the only private school listed here, is both a competitor and a collaborator, and we share many attributes. Frequently, these institutions compete with Carolina for research funding, faculty, and graduate students.

- Duke University
- Ohio State University
- University of California-Berkeley
- University of California, Los Angeles
- University of Florida
- University of Illinois Urbana-Champaign
- University of Michigan
- University of Texas
- University of Virginia
- University of Washington
- University of Wisconsin

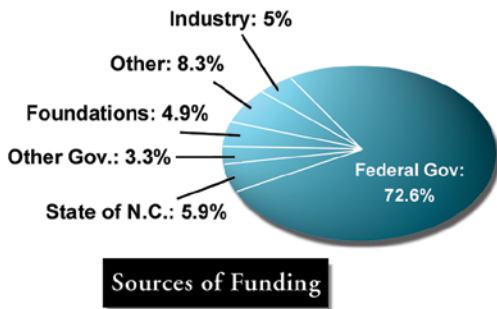
Research funding and the Carolina budget

In the year 2000, research funding surpassed State appropriations as a share of the Carolina budget. Only the "other sources" category, which includes fundraising as well as fees from services and licensing, provides a larger share of our budget.



Carolina

a Research University

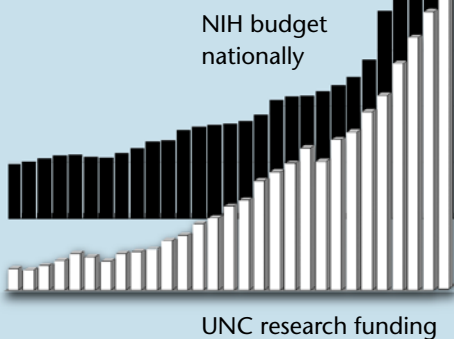


The federal government provides almost three-fourths of Carolina's external funding.

Top sources of federal funds at Carolina

Agency, FY 2005	Amount
National Institutes of Health	\$302,263,664
National Science Foundation	24,537,126
Centers for Disease Control	18,152,575
U.S. Department of Education	15,868,100
USAID	12,743,904
Health Resources & Services	11,189,950
Dept. of Defense	11,145,727
EPA	5,770,587

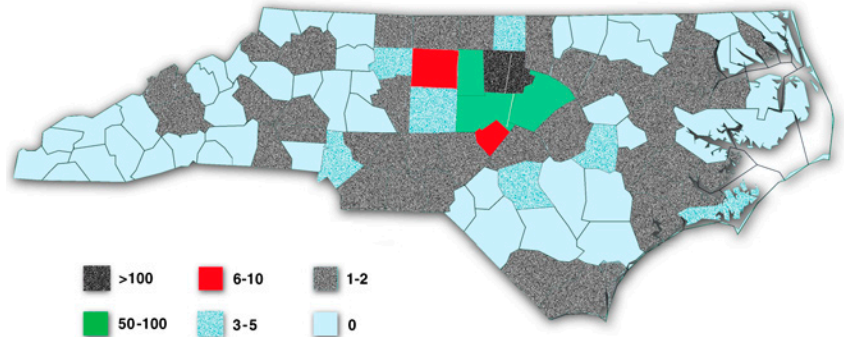
Funding growth and NIH funding



Carolina's increase in funding has tracked closely with the increase of the NIH budget nationally. As NIH funding levels off, we are seeking new sources to sustain our growth.

The vital role of F&A funds

Facilities-and-administrative funds, also known as the "overhead" from contracts and grants, enable Carolina to support and grow its research enterprise. To maintain our leadership and competitive advantage, we will need to retain the full use of our F&A funds. (For more on F&A funds, please see the fact sheet included with this presentation.)



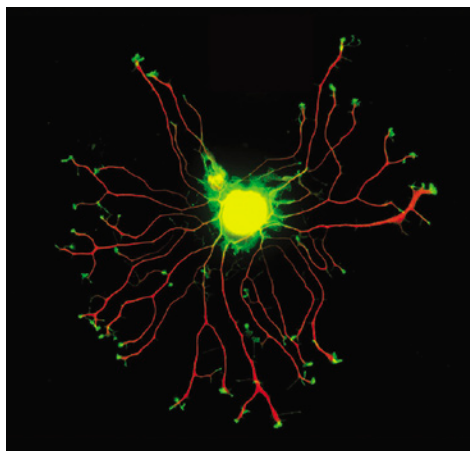
North Carolina counties with UNC-Chapel Hill employees paid from facilities-and-administrative funds (January 2005)

In many cases, F&A-funded employees provide services required by state or federal law. We estimate that the total campus F&A expenditure for the administrative activities necessary for **research compliance** is at least **\$3.7 million** a year. For example, staff paid from F&A funds monitor the use of human subjects or laboratory animals in research, satisfying federal mandates. F&A-funded employees also administer research contracts and grants, fulfill reporting requirements, oversee safety and security for research labs, administer clinical trials, report and license inventions, create start-up companies, and help manage offices and labs. Without these employees, the university could not meet its legal obligations.

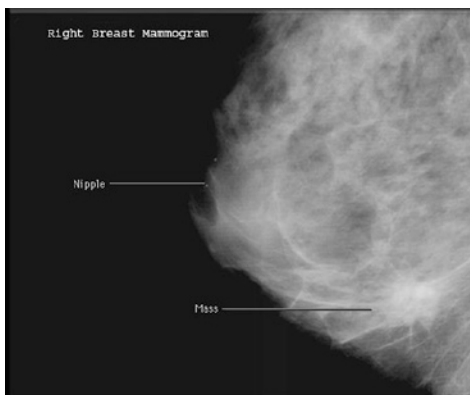
Special needs of a research university

In addition to the costs of compliance, research universities must invest to grow and compete in the international marketplace for knowledge and technology. Here are three examples:

- **Start-up funds.** New faculty members use start-up funds to relocate, set up laboratories, buy computers, obtain research animals and supplies, and conduct preliminary studies. In the sciences, the total cost of a start-up package can reach \$500,000. Without this investment, we cannot attract top faculty. In fiscal year 2004, the university spent more than \$8.5 million on start-up packages for 96 new faculty members, in addition to contributions from schools.
- **Seed funds.** A small investment in seed funding can lead to a big grant or launch new research. For example, Carolina used seed funds to develop large-scale proposals to the National Institutes of Health under the "Roadmap" initiative. In 2004, Carolina researchers won three of 21 grants awarded nationally. In 2005 we won eight, which was more than any other university. But compared to our peers, Carolina has a very small pool of seed funding. Increasing that pool is a priority.
- **Infrastructure.** Modern research requires modern tools and facilities. The cost of laboratory space, for instance, is more than double that of offices or classrooms. Since research today typically depends on high-end computing, we must also invest heavily in infrastructure and support for information technology.



A neuron (nerve cell) from an adult mouse extends multiple axons after treatment with a protein known as nerve growth factor. Studies at Carolina hold promise for regenerating nerve cells damaged by injury or disease. Image by Fengquan Zhou.



Digital mammography techniques developed at Carolina by Etta Pisano, Kenan professor of radiology and biomedical engineering in the School of Medicine, detected up to 28 percent more cancers than screen film mammography in several groups of women. The results, reported by the *New England Journal of Medicine*, will help clinicians decide which women would benefit most from various forms of mammography.

Selected examples of Carolina's research strengths

Neurosciences

Carolina's new Neurosciences Research Center, directed by Bill Snyder, applies the powerful tools of genetics and interdisciplinary collaboration. The Center has recruited scientists from a wide variety of fields who are striving to learn how the brain works, how it develops, and how its complex biology sometimes goes awry in neurological disorders and disease.

Genetics and genome sciences

Carolina has made a ten-year, \$245 million commitment to develop strength in the fundamental sciences of life. Already, studies using mouse models and advanced computational and analytical techniques are revealing basic knowledge that will have direct relevance to our understanding of human biology and disease.

Disease prevention, diagnosis, and treatment

With broad strengths in medicine, pharmacy, and pharmacology, Carolina is a leading force for better health care. Here are just a few examples:

- **Cancer.** Carolina's Lineberger Comprehensive Cancer Center is one of 39 National Cancer Institute-designated Comprehensive Cancer Centers and one of only two programs of research excellence in breast cancer and in gastrointestinal cancers. Carolina ranks in the top 15 nationally in cancer-research funding.
- **Infectious disease.** Carolina researchers are working to understand and treat a wide range of deadly diseases. Recently, Carolina won a major role in the \$45 million Southeast Regional Centers of Excellence for Biodefense and Emerging Infectious Disease (SERCEB). With funding from the NIH and Homeland Security, the program will develop vaccines, drugs, and diagnostics against emerging infections and organisms that might be used in bioterrorist attacks.
- **Drug discovery.** Researchers in pharmacy and pharmacology are finding new compounds and new drug-delivery systems. For example, a drug now in clinical trials could revolutionize AIDS treatment. The drug is based on a discovery by Kuo-Hsiung Lee in the School of Pharmacy. Lee found that a compound in an herb grown in Taiwan and in the bark of birch trees had great potential in suppressing HIV AIDS.
- **Wellness and health care.** Carolina faculty are working across North Carolina to improve nutrition, injury prevention, and wellness for our citizens. For example, projects led by the Center for Health Promotion and Disease Prevention, directed by Alice Ammerman, are addressing the serious problems of obesity and poverty among low-income and minority women in rural counties. And the Sheps Center for Health Services Research, Directed by Timothy Carey, works to improve the design and delivery of health services.

Public health

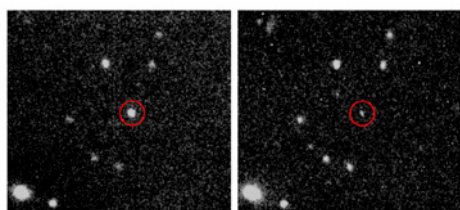
Carolina's highly ranked School of Public Health (first among publics, according to *U.S. News and World Report 2003*) is a major force working to ensure the safety and health of our citizens. Research strengths include biostatistics, environmental sciences and engineering, epidemiology, health behavior and health education, health policy, maternal and child health, and nutrition. Here is one recent example:

- **National children's study.** In September 2005, Carolina became one of six universities, and the only one in the South, to embark on a comprehensive study of the environment's effects on children. The research, funded by the National Institute of Child Health and Human Development, is led by faculty members from the School of Public Health and the Carolina Population Center.

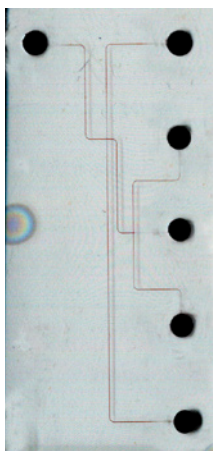
The school is also involved in finding ways to help the nation prepare for and recover from bioterrorist attacks and natural disasters such as hurricanes.



The Frank Porter Graham Child Development Institute is working to reinvent school entry for young children. First School, based on decades of research in early childhood development, will begin at age 3 and extend through second grade.



Using SOAR and PROMPT, Assistant Professor Daniel Reichart, three undergraduate students, and one Ph.D. student discovered the most distant stellar explosion. The star is so remote that the light departed the source when the universe was only six percent of its current age. Reichart has said that undergraduate student Josh Haislip will be first author on the research publication about the discovery.



Lab-on-a-chip technology pioneered by Michael Ramsey's lab could revolutionize the way liquid samples are analyzed.

Education

Research at Carolina strives to understand the factors that enable learning and overcome barriers to education. Here are just a few examples:

- **Rural education.** The School of Education received national recognition in 2004 with the award of \$10 million from the federal government to establish the nation's leading center on rural education research.
- **Family literacy.** Barbara H. Wasik, William R. Kenan Jr. professor in the School of Education and fellow at the Frank Porter Graham Child Development Institute (FPG), recently received a \$3.5 million grant to study the the Even Start Family Literacy Programs, which serve young children and their parents in every state. In the 3-year project, Wasik will develop a new curriculum and implement it nationally in a random sample of 60 Even Start programs.
- **Child development.** Scientists at the Frank Porter Graham Child Development Institute study issues facing young children and their families. FPG-developed measures of child-care environments have become the most widely used in the world. FPG also has become known for its research, led by Director Don Bailey, on Fragile X syndrome, the most common known cause of mental retardation.

Astrophysics and astronomy

With help from donors and the U.S. Congress, Carolina faculty and students probe the skies from several new vantage points. Carolina is a partner in SOAR, a four-meter telescope atop Cerro Pachon in northern Chile, and PROMPT, an array of robotic telescopes atop Cerro Tololo. PROMPT's six 16-inch telescopes are designed to follow up satellite discoveries within tens of seconds and alert SOAR to action. Carolina also has a three-percent share in the largest telescope in the southern hemisphere, SALT (Southern African Large Telescope), which is about 300 miles north of Cape Town. SOAR, SALT, and PROMPT are all capable of being operated with a remote observing center in Chapel Hill by faculty or students.

New materials and processes

At Carolina, chemists, physicists, and computer scientists develop materials and processes that will help drive innovation and economic growth. Examples include:

- **Fuel cells and tiny particles.** Joe DeSimone, William R. Kenan Jr. distinguished professor of chemistry and chemical engineering, creates new materials for use in the membranes of fuel cells. DeSimone's group also has created the world's tiniest manufactured particles for delivering drugs or genetic material.
- **Lab on a chip.** Michael Ramsey, Minnie N. Goldby distinguished professor of chemistry, conducts pioneering research in miniaturizing and automating lab processes. Ramsey helped create the concept of a "lab on a chip," which uses miniaturization to test various liquids faster and with tiny amounts of sample.
- **Nanotechnology.** Richard Superfine, Bowman and Gordon Gray professor, condensed matter physics, biophysics, and microscopy, in advancing the science of the very small in big ways. Nanotechnology has great potential to improve applications as diverse as x-ray machines, computer screens, and drug delivery.

Social sciences

Carolina is known for its strength in the social sciences. Here are two highlights:

- **Sociologists** play a leading role in the National Longitudinal Study of Adolescent Health (Add Health), which explores the causes of health-related behaviors of adolescents and their outcomes in young adulthood.
- **Population studies.** Carolina is a national leader in the studies of human populations around the world. Much of this work is coordinated by the Carolina Population Center, directed by Barbara Entwisle. The Center supports research on issues such as fertility, mortality, migration, marriage, and health, and how each is affected by social, economic, and cultural forces.

Carolina

a Research University



The Association of Research Libraries and the *Chronicle of Higher Education* rated Carolina's library system 16th in the U.S. and first in the South. **Above:** The Andre Savine Collection, an enormous cache of Russian émigré documents.



A section of a quilt made by Heather Andrea Williams, assistant professor of history, inspired by her research. Williams' book, *Self-Taught: African American Education in Slavery and Freedom*, was published by UNC Press.



Computer scientists at Carolina and the University of Virginia are creating a model of Thomas Jefferson's Monticello. Using a laser-range scanner, millions of data points can be gathered quickly and precisely and transformed into highly accurate three-dimensional models for study. The scanner used in this project is marketed through a startup venture from 3rdTech, which links university inventions with the marketplace.

Southern studies, African American studies

Carolina has become the national leader in the study of the literature of the American South by both white and black writers. Bolstered by the Southern Historical Collection, one of the largest collections of manuscripts relating to the South anywhere, Carolina has attracted a core faculty in Southern and African American literary studies unrivaled by any single university. Here are two examples:

- "Documenting the American South," a web site created in conjunction with the UNC-Chapel Hill libraries, features over 150,000 pages of books, journalism, illustrations, and photographs.
- When W. W. Norton commissioned four scholars in 1995 to edit the definitive textbook, *The Literature of the American South: A Norton Anthology*, only one was a member of the Carolina faculty. Today, all four of them hold distinguished professorships here.

Entrepreneurism

Carolina ranks as the nation's top university for fostering entrepreneurship across campus, according to *The Princeton Review* and *Forbes.com*. The Carolina Entrepreneurial Initiative (CEI), supported in part by the Ewing Marion Kauffman Foundation, weaves entrepreneurship into the fabric of the university. Students, faculty, and staff transform ideas into enterprises with social, economic, environmental, or artistic value. CEI complements the Kenan-Flagler Business School's Center for Entrepreneurial Studies. In addition, Carolina fosters entrepreneurship through the Office of Technology Development, the Office of Economic and Business Development, and a variety of other units.

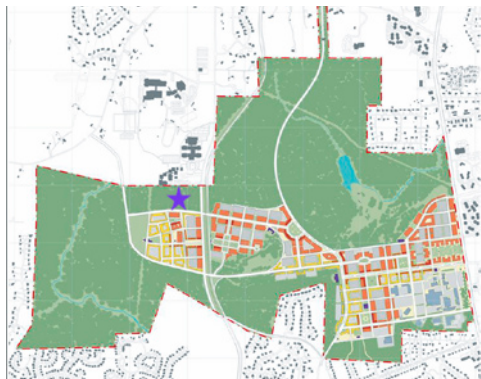
Collaboration

Carolina is known for its ability to foster collaboration among disciplines and institutions. One measure of this is sharing on research grants. In 2005, Carolina's Office of Sponsored Research reported that the university received 381 sub-awards from other schools totaling \$3,922,101 and granted 1,000 sub-awards totaling \$63,157,446. Within the UNC system, Carolina is a net provider of research funds to other campuses (see the table below). Another measure of collaboration is the level of funding in interdisciplinary research centers. In 2005, Carolina had approximately \$100 million in funding in some two dozen centers and institutes.

Sub-awards with UNC schools: Carolina sends a net of \$3 million to other schools for collaborative research.

UNC School	Received	Granted
Appalachian State	21,245	57,609
East Carolina	134,174	705,156
NC A&T	67,097	545,486
NC Central	37,462	231,547
NC State	1,143,918	1,953,782
UNC-Charlotte	554	86,761
UNC-Greensboro	29,535	646,1751
UNC-Wilmington	38,746	101,0141
Western Carolina	0	36,572
UNC-Pembroke	0	97,699
Winston Salem State	0	2,430
Fayetteville State	0	44,447
UNC-Asheville	0	-74,859*
Total	\$1,472,731	\$4,433,824

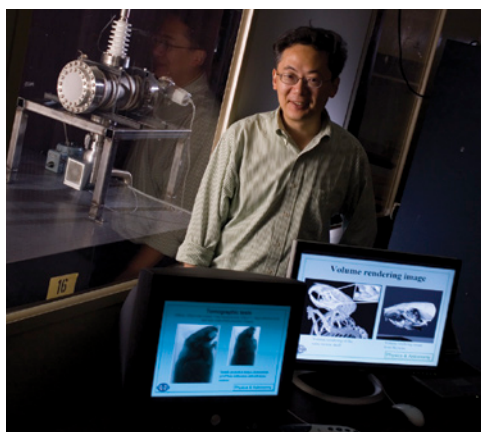
* funds returned from a lapsed agreement



A draft concept plan for Carolina North as it might be, fully built several decades from now. University buildings, corporate facilities, housing, and service retail would mix in compact neighborhoods surrounded by green space. The blue star indicates the First School site.



These are just a few of the companies created from Carolina inventions.



Otto Zhou, Lyle Jones professor of physics and materials sciences in the College of Arts and Sciences, is developing a new method of medical x-ray imaging based on pulsed nanofibers. The system can capture images of the body or a specific organ while they are moving. The result is more precise and sensitive x-rays. Zhou's invention led to a start-up company, Xintek.

Economic development

Expenditures resulting from research funding at Carolina cycle through the state and local economies, transforming federal funds into revenue for North Carolina residents and businesses. Using U.S. government multipliers, Carolina's \$579.6 million in research funding generated approximately **\$985.3 million in economic impact and 20,000 jobs.**

Carolina North. Carolina is making strides to expand its capacity for innovation. The best example is Carolina North, our new campus for living and learning, where we will engage with the private sector to drive economic development through research that yields new technologies, companies, and jobs. A recent economic impact study estimates that Carolina North will generate **7,500 local jobs** and about \$48 million in annual tax revenues by the year 2020. Carolina North has the potential to position UNC as a leading national center for public-private partnerships. In addition, Carolina North will

- allow UNC-Chapel Hill to remain a leading public research university in an increasingly competitive environment,
- be a catalyst that helps North Carolina be a force in the new economy, and
- have long-term benefits for local communities, the region and the state.

Already, several activities are ready and waiting for a new home at Carolina North:

- **An innovation facility**, whose site has already been approved by our Board of Trustees, will enable companies based on Carolina inventions to get a running start toward commercialization.
- **First School**, the Frank Porter Graham Child Development Institute's model for reinventing school entry for young children, would occupy a Carolina North site also approved by our Board.
- **The Renaissance Computing Institute**, with its commitment to research, outreach, and public-private collaboration, is ideal for Carolina North.
- **The Schools of Public Health and Pharmacy** will use new buildings at Carolina North to cultivate basic science and intellectual property, enhance recruitment and retention of outstanding scientists, and foster public-private partnerships.

Technology development

The Office of Technology Development works with faculty inventors to develop and license promising intellectual property and to form companies with strong potential in the marketplace. Highlights include:

- **25 companies** from Carolina technologies
- Approximately **281 jobs** from new companies
- **113 invention disclosures** filed in 2005
- **119 patent applications** filed in 2005
- **25 new U.S. patents** issued to the University in the past year, bringing the number of U.S. and foreign patents issued to Carolina to 655
- **31 inventions licensed**
- **\$1,987,551 in license income** in 2005

Here is one example of a recent, promising invention from Carolina research:

- An experimental **anti-HIV drug** being developed by Panacos Pharmaceuticals has successfully completed Phase II clinical trials. The drug was developed by Carolina researcher Kuo-Hsiung Lee, a professor of natural products in the School of Pharmacy. Its central compound was discovered in an herb grown in Taiwan but is also found in the bark of birch trees across North America.



In one year, work by Carolina students made the covers of two of the most prestigious journals in the world. Jennifer Taylor, a biology graduate student, and Bill Kier professor of biology, coauthored "Switching Skeletons: Hydrostatic Support in Molting Crabs," featured in *Science*, July 11, 2003. Julie Canman, who recently received her Ph.D. in biology, and others in Professor Ted Salmon's lab contributed to "Determining the position of the cell division plane," featured in *Nature*, August 28, 2003.



Student researchers in archeology excavate a 19th Century cabin site.



Joe Carter, professor of biology, examines a fossil reptile with undergraduate students Segun Olagunju and Elizabeth Kerr. Students helped Carter discover and assemble this ancient predator, which is older than the dinosaurs.

Research and students

At Carolina, research is first and foremost a way of **learning**. Training graduate students is a primary reason for university research, and undergraduates learn by experiencing first-hand the process of discovering new knowledge.

Thirty percent of Carolina's graduating seniors report they were involved in a research project. In the past year, applications for undergraduate summer research fellowships doubled. Many students publish their findings in top-rated journals, and faculty report that pilot projects by students often lead to external research grants. Here are a few recent examples of undergraduate research projects:

- Characterization of Prostate Cancer Using Mouse Models (biology)
- Bioartificial Muscles and the Myotendinous Junction (biomedical engineering)
- Globalization and the Mexican Handicraft Industry (romance languages)
- Probing the Early Universe: The Search for Optical Transients (physics and astronomy)
- Interaction of Mitochondrial Ribosomes with the Inner Membrane (chemistry)
- Study of Holistic Care of HIV Patients (international studies)
- BATS: The Blind Audio Tactile Mapping System (computer science)
- Investing in Ethanol Production: A Comparative Analysis of Ethanol's Current and Future Role (public policy)
- Meeting of the Waters Creek: A Study of the Effect of UNC on its Environment (biology)
- Educational Attainment and the Lone Mother: A Historical Perspective 1940-1950 (economics)

Graduate education and research

The Graduate School at UNC-Chapel Hill encompasses **85 graduate programs** offering 64 doctoral and 91 master's degrees. For Fall 2004, Carolina had 8,008 registered graduate students and 2,345 registered professional students. Together, they make up about 39 percent of Carolina's total number of enrolled students. More than 12 percent of these students come from underrepresented groups.

At any research university, graduate students are a critical part of the workforce for research. At Carolina, more than 1,000 graduate students are employed as research assistants, working in labs, conducting field work, and collecting data. **We compete with our peers** for talented graduate students. To maintain our excellence in research, we must offer competitive compensation for our research and teaching assistants, including tuition remissions. The N.C. General Assembly has funded a graduate tuition-remission program that allows us to remit the difference between in-state and out-of-state tuition. Since the number of awards was increased by the General Assembly in 1999, more than 100 new graduate programs have been added, and the graduate population has increased by 25 percent.

Postdoctoral fellows

Postdoctoral fellows have a vital role in the research enterprise. Often, skilled postdocs extend the value of senior scientists, greatly expanding the scope of a faculty member's research program. At Carolina, postdocs make a strong contribution to the intellectual life of the university, making discoveries, inventing new technologies, and sharing their ideas. In fact, Carolina ranks first among U.S. academic institutions recognized as "best places to work for postdocs," according to *The Scientist* magazine, in part because our Office of Postdoctoral Services strives to improve working conditions and opportunities.



Carolina strives to attract, develop, and retain a diverse faculty. For example, the Carolina Postdoctoral Program for Faculty Diversity develops scholars from underrepresented groups for possible tenure-track appointments at research universities. At present, 23 graduates of this program hold faculty positions at UNC-Chapel Hill, and 78 additional graduates hold faculty positions elsewhere.



Brian Kuhlman, assistant professor of biochemistry and biophysics in the School of Medicine, was named to the prestigious W.M. Keck Foundation Distinguished Young Scholars in Medical Research Program in 2005.

Faculty in national academies and learned societies

Carolina's faculty are distinguished by their academic accomplishments. According to the latest available data, UNC-Chapel Hill ranks 12th among public research institutions in terms of number of members in the National Academies, including the National Academy of Sciences (11), the National Academy of Engineering (6), and the Institute of Medicine (22). In addition, Chapel Hill counts 29 of its faculty among the members of the American Academy of Arts and Sciences.

Winners of prestigious external awards

UNC-Chapel Hill ranks 11th nationally among public research institutions in terms of the number of prestigious awards that their faculty members have received in the arts, humanities, science, and health. Here are several recent examples:

- Brian Kuhlman, assistant professor of biochemistry and biophysics in the School of Medicine, recently was named to the prestigious W.M. Keck Foundation Distinguished Young Scholars in Medical Research Program, the first Carolina scientist to earn the distinction. The award includes a five-year, \$1 million grant to fund his research.
- Yi Zhang, associate professor of biochemistry and biophysics at the University of North Carolina's School of Medicine, has been selected as a 2005 new investigator by the Howard Hughes Medical Institute.
- Edward T. Samulski, Cary C. Boshamer professor of chemistry, was in May 2005 named as a new Jefferson Science Fellow, chosen to offer science counsel to the U.S. Department of State.
- Wei Wang, assistant professor in the Department of Computer Science and a member of the Carolina Center for Genomic Sciences, garnered a Microsoft New Faculty Fellowship for 2005.

Carolina's Office of Research Development coordinates the process for nominating candidates for many of these awards.

Advisors to federal agencies

Many Carolina faculty members serve on federal advisory committees that play an important role in shaping programs and policies of the federal government. These committee members provide the expertise and professional skills that parallel the program responsibilities of their sponsoring agencies. They also are the public's voice in the federal government's decision-making process.

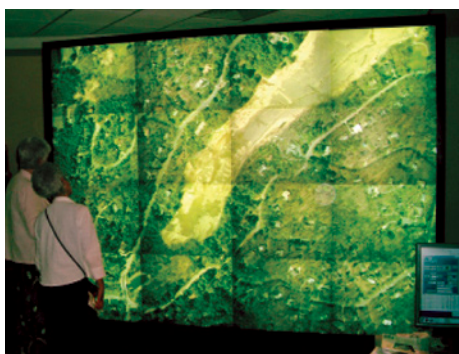
Competing for talent

In fiscal year 2005, Carolina faced increasing competition from private universities for talented faculty members. From 32 external offers, we retained 21 faculty members and lost 11 to other institutions. In 2004, we retained 43 faculty and lost 26. Our goal is to reward faculty based on merit and achievement, rather than responding to raids. In 2004, Carolina raised money for 25 new endowed faculty chairs through the Carolina First Campaign. The General Assembly appropriated \$8 million in recurring funds across the UNC System to match these gifts and doubled the amount to be matched by the state. Our share of these new state funds totaled \$4.3 million, clearing the way for 18 of the 25 new chairs to be fully funded.

In scientific research, start-up packages are a major investment in faculty excellence. In chemistry, for example, a start-up package may average \$770,000. Is this a good investment? Yes. The average grant carried a faculty member in chemistry is \$444,000, and he or she will land many grants during a career. Excellent faculty members not only provide a return on investment; they conduct research that powers economic growth and improves the health and welfare of our citizens.



The Citizen-Soldier Support Program facilitates practical and emotional support for N.C. National Guard and Reserve soldiers and their families before, during, and after deployments. The program provides resources to the families, augments existing Defense Department programs, and brings together employers, schools, child-care providers, health professionals, and the faith community to form a broad network of family support. The program is coordinated by the Odum Institute for Research in Social Science. Retired U.S. Army Major General Douglas Robertson, Director of the Highway Safety Research Center, spearheaded the program, assisted by Allison Rosenberg, associate vice chancellor for research, federal affairs.



The Renaissance Computing Institute collaborated with Carolina's Health Sciences Library to develop and create a high-performance visualization wall and collaboration facility. Similar facilities could help the nation plan for and react to disasters.

New research initiatives

Roadmap

With coordination from Carolina's new Roadmap Initiative in the Office of the Vice Chancellor for Research and Economic Development, the university has made great strides with a special series of proposals to the NIH's Roadmap program, which is designed to address health problems with highly focused interdisciplinary research. In 2004, Carolina researchers won three of 21 grants awarded nationally. In 2005 we won eight, which was **more than any other university**.

Nanomedicine

Nanomedicine has emerged from two streams of new knowledge. First, we have learned that cells function as assemblies of multi-protein nanomachines, and that when those machines break down the result can be cancer or other diseases. Second, we have learned that even though properties of matter on nanoscale are very different from those on the macroscale, we can create and manipulate nanoscale devices, even within cells. This offers exciting implications for therapy and diagnosis of human disease. Recently, Carolina was awarded a multi-million dollar grant from the National Cancer Institute to establish the **Carolina Center of Cancer Nanotechnology Excellence**. This Center will bring our physical scientists together with our cancer biologists to implement nanotechnology approaches in cancer research, diagnosis, and treatment, creating new jobs for North Carolina. Rudy Juliano, professor of pharmacology in UNC's School of Medicine and UNC Lineberger Comprehensive Cancer Center member, is principal investigator of the grant.

Renaissance Computing Institute

RENCI, directed by Dan Reed, is a major new collaboration that combines the strengths of UNC-Chapel Hill, Duke University, and North Carolina State University with the social, business, and research opportunities of the UNC System and the State of North Carolina. The term Renaissance Computing invokes the breadth of intellectual activities RENCi encompasses, creating intellectual communities that span the sciences and engineering, the arts, the humanities, and commerce. RENCi builds on and leverages leading-edge computing, networking, and data resources and expertise to create a world-class infrastructure for collaboration on a broad array of research, development, and economic initiatives, ranging from disaster planning and response to biotechnology and financial analysis. RENCi has received recurring State funding to develop a statewide plan for research and economic development and will be establishing an anchor site and five satellite locations across the state.

Emerging issues of public interest

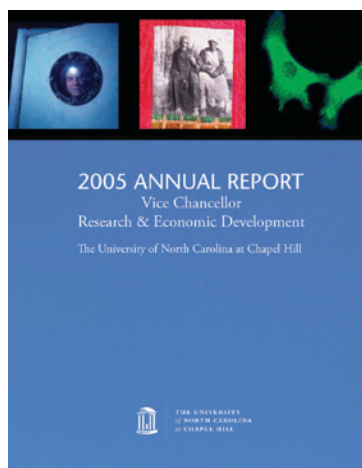
In addition to our traditional strengths, we are developing core expertise and strategic thinking about many emerging issues of interest to the public. These include:

- **Access to health care.** Our researchers are striving to find solutions in an era of rising costs, unaffordable health insurance, and shortages of primary care.
- **Energy and environment.** We are forging an interdisciplinary team of researchers to address the nation's need for alternate sources of energy.
- **Human embryonic stem cells.** We are developing ethical policies and scientific expertise to explore the potential of this promising area of research.
- **Racial disparities in health, education, economy, environment.** With our partners at historically black institutions in the UNC system, we are investigating disparities that disadvantage members of minority groups.
- **Homeland security, disaster preparedness, and recovery.** In public health, planning, marine science, and many other fields, Carolina is mustering expertise to help the nation prepare.



Endeavors, Carolina's magazine of research and creative activity, is published three times a year by the Office of the Vice Chancellor for Research and Economic Development. To subscribe or read the magazine online, please go to

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The Office of the Vice Chancellor for Research and Economic Development supports research at Carolina. For more information, please contact:

Tony Waldrop

Vice Chancellor for Research and Economic Development
twaldrop@email.unc.edu
919-962-1319

Neil Caudle, Associate Vice Chancellor for Research, oversees communications, external relations, information technology, and various projects for the Vice Chancellor. He is also Director of the Office of Information and Communications.

neil_caudle@unc.edu
919-962-6136

Mark Crowell, Associate Vice Chancellor for Economic Development and Technology Transfer, provides leadership for Carolina North and oversees technology transfer and business and economic development.

mark_crowell@unc.edu
919-843-2025

Robert Lowman, Associate Vice Chancellor for Research, oversees the areas of research policy and planning, training, infrastructure, regulatory compliance and intramural small grants.

lowman@unc.edu
919-962-7757

James Peterson is Associate Vice Chancellor for Research and Director of the Office of Sponsored Research.

jim_peterson@unc.edu
919-962-4661

Allison Rosenberg is Associate Vice Chancellor for Research, Federal Affairs. Her responsibilities include expanding the University's relationships with federal funding agencies, strengthening the University's contribution to national advisory panels and policy boards, and supporting our federal initiatives.

allisonrosenberg@unc.edu
919-843-0050

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