



COLUMBIA UNIVERSITY

*College of Physicians  
and Surgeons*

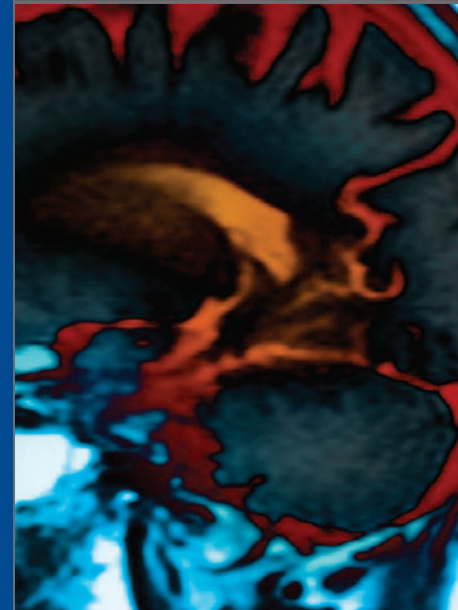
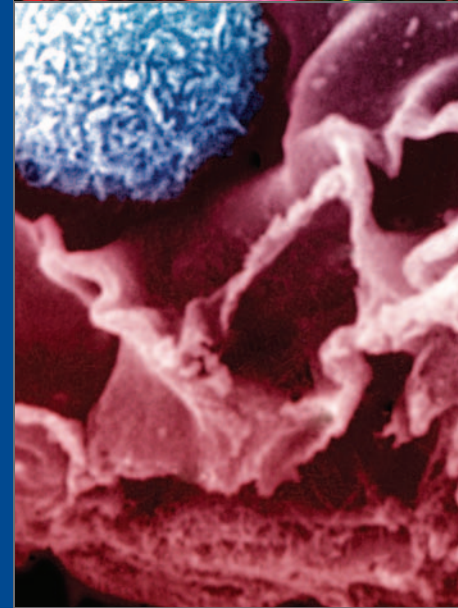
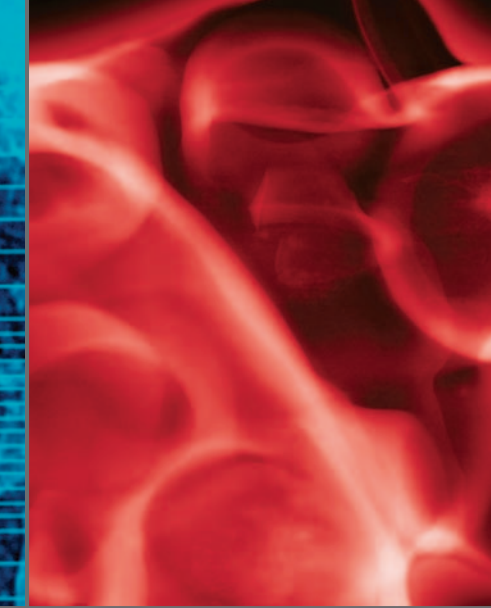
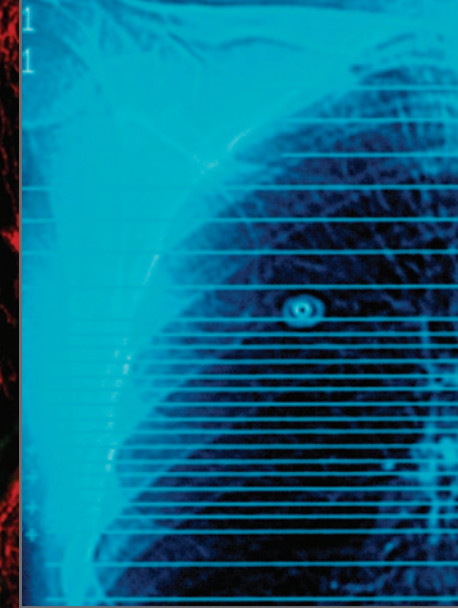
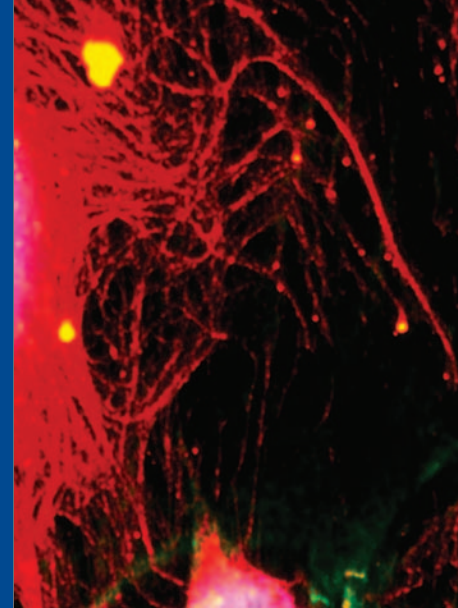
ANNUAL REPORT 2004-2005

# health

**HEAL AND HEALTH.** THOSE INTERDEPENDENT CONCEPTS, SO CLOSELY LINKED THAT THEY ARE NEARLY THE SAME WORD, LIE AT THE HEART OF THE MISSION OF COLUMBIA UNIVERSITY'S COLLEGE OF PHYSICIANS & SURGEONS.

ONE OF THE EARLIEST FACTS A YOUNG DOCTOR-TO-BE LEARNS DURING MEDICAL SCHOOL IS THAT THE BODY IS ORGANIZED INTO SYSTEMS—CARDIOVASCULAR, RESPIRATORY, NERVOUS, MUSCULO-SKELETAL, AND SO ON—THAT WORK IN AN INTEGRATED WAY TO KEEP THAT BODY HEALTHY AND FUNCTIONING. WHEN THE INTEGRATED SYSTEMS OF THE HUMAN BODY WORK PROPERLY TOGETHER, WE HAVE HEALTH. WHEN THESE SYSTEMS FALTER, WE MUST HEAL.

THIS YEAR'S ANNUAL REPORT FOCUSES ON COLUMBIA'S ACHIEVEMENTS DURING 2004 AND 2005 THROUGH THE PRISM OF THE BODY'S INTEGRATED SYSTEMS. AT THE SAME TIME, WE EXAMINE COLUMBIA'S ESSENTIAL ROLE TO PROMOTE HEALING AND ADVANCE HEALTH IN THE "SYSTEM" OF OUR LOCAL COMMUNITY AND THE WIDER WORLD.



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## From the Dean

The role of a great medical center is to promote health and healing in the broadest context: from the development of new scientific concepts, to the isolation of new candidate therapies, to the validation of new therapies via clinical research, to providing our patients with informed guidance in using those therapies. Our efforts cut across traditional departmental boundaries to involve the entire medical center and, in many cases, the entire university, linking disciplines like biology and genetics with engineering and physics.

Here at Columbia University College of Physicians & Surgeons, this cross-cutting continuum is dramatically illustrated in our attempts to understand, treat, and defeat cancer—which during the past year surpassed heart disease as the top killer of Americans under the age of 85. Columbia's Irving Comprehensive Cancer Center (ICCC) is one of only three National Cancer Institute-designated comprehensive cancer centers in New York state, and one of fewer than 40 such centers in the nation. This prestigious designation recognizes the depth and breadth of cancer research and treatment available at P&S. At Columbia we span the entire spectrum, from basic scientific understanding of mechanisms that make cells divide out of control, invade adjacent tissues, and metastasize widely throughout the body. We are committed to the development of new treatments and new

strategies to prevent cancer from ever occurring.

Few institutions have the financial and personnel resources to mount such a diverse attack. At Columbia, thanks not only to the recognition and support of the National Cancer Institute, but also to the generosity of Herbert and Florence Irving, we have that capability. In May, we opened the Irving Cancer Research Center, a 300,000-square-foot facility in the Audubon Biomedical Science and Technology Park, located between the Russ Berrie Medical Science Pavilion and the Mary Woodard Lasker Biomedical Research Building. Together, these facilities form nearly 700,000 square feet of dedicated research space.

But research space means little without scientists to use it. This brings me to another reason for my great optimism about cancer research and care at Columbia: the appointment of Riccardo Dalla-Favera as the new director of the ICCC. A world-renowned researcher, Riccardo is also a talented clinician and administrator. His area of expertise is in the molecular genetics of lymphoma and other bloodborne cancers.

Dr. Dalla-Favera's task will be to expand our research enterprise, taking advantage of this extraordinary time in which we have a deeper understanding of underlying causes of cancer. He will collaborate with our clinical leaders in building a superb clinical oncology program.



*Gerald D. Fischbach, M.D.  
Executive Vice President  
Columbia University  
Medical Center  
Dean, Faculty of Medicine*

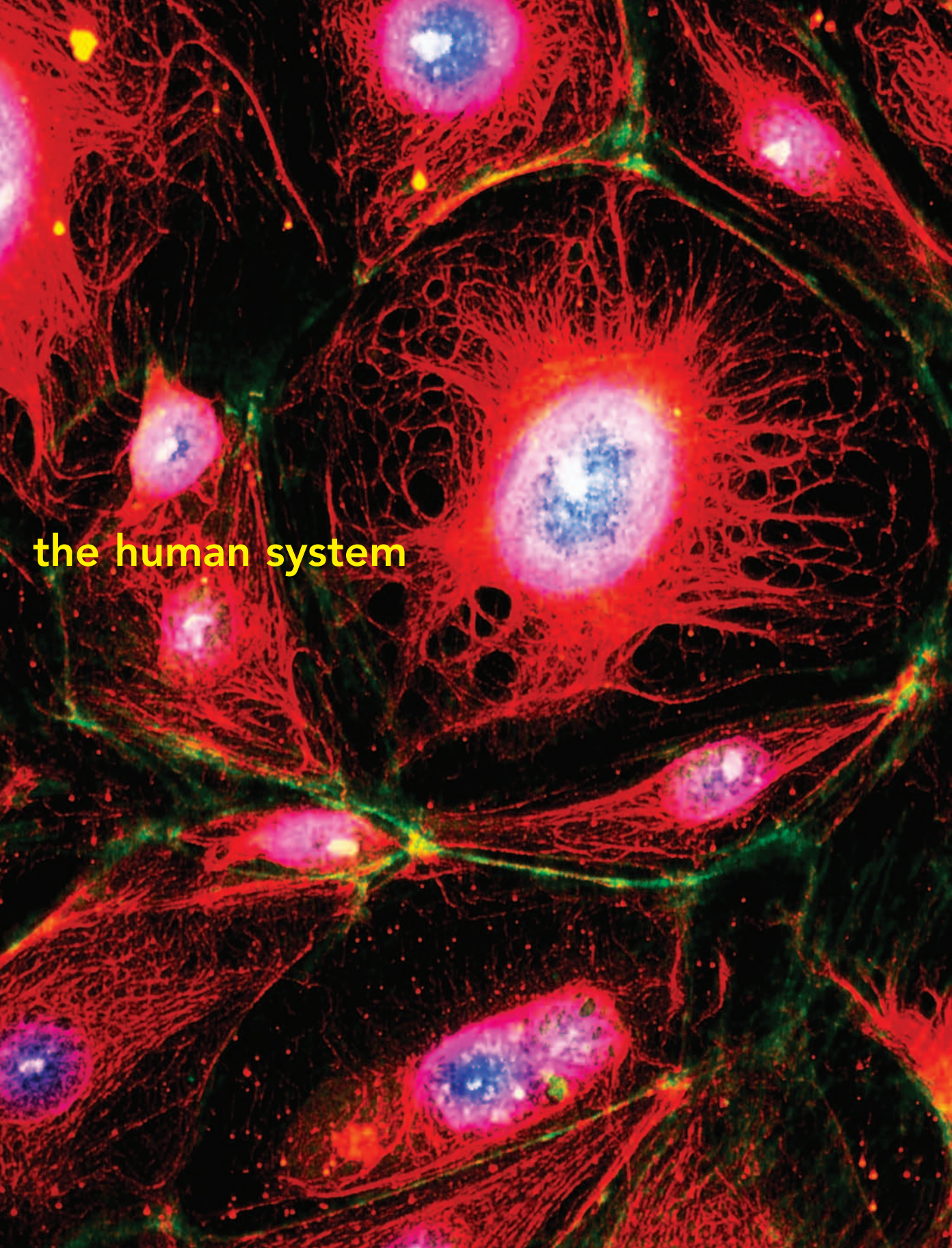
This “comprehensive” approach serves as the model for what we hope to establish in other fields beyond cancer, fields ranging from nervous system disorders to cardiovascular disease to immunology and metabolic disorders.

This model will form the basis for the new Center for Neuroscience Initiatives, which will be built around fundamental themes in the study of brain science: neurodegeneration, neural repair and plasticity, cognition and behavior, and mood

and motivation. This is my own area of expertise and I look forward to helping out.

With our strategic interdepartmental approach we can define the future of medical science and medical education. Our long-term goal must be to reduce suffering and enable all people to lead full lives. Our immediate goal is to provide an environment in which the best research can be conducted and in which the very best of the next generation can be trained.





the human system

## Healing the Whole

Though its origins may be isolated to one part of the body, cancer ultimately attacks the health of the entire human system if left untreated, metastasizing from the breast to the lung, the prostate to the bone, or the pancreas to the liver. This most feared of diseases is, perhaps, the ultimate example of how the health of one human system is inextricably tied to the health of the whole.

Over the past year, Columbia has been laying the foundations for one of its most ambitious initiatives yet: the evolution of the Irving Comprehensive Cancer Center, already a national leader in the field, into one of the world's premier cancer programs. In scope and depth, in clinical and basic science expertise, and in compassionate patient care, Columbia's cancer center will stand among the giants in the field.

Two major grants are helping to drive the expansion of the cancer center. With a \$15.5 million, five-year grant from the

National Cancer Institute, the Institute for Cancer Genetics will study the molecular pathways that lead to the development of breast cancer, with the ultimate goal of developing more targeted therapeutics like the drug Herceptin. Herceptin is currently the only "rationally designed" drug available for breast cancer, selectively killing cancer cells by attaching to Her2 receptors while leaving healthy cells untouched. Since Her2 receptors are present in only 20 percent of tumors, however, many more such drugs are needed, says Dr. Riccardo Dalla-Favera, director of the institute and the grant's principal investigator.

Dr. Dalla-Favera, newly named as head of the Irving Comprehensive Cancer Center, will also lead investigators in a five-year, \$5 million grant from the Leukemia and Lymphoma Society as they test an experimental lymphoma drug in clinical trials. In partnership with Memorial Sloan-Kettering Cancer Center, Columbia investigators will also study the mutations

**Robot scrubs in:** Michael Treat, associate professor of clinical surgery, has developed a unique one-armed robotic scrub technician known as Penelope. Most surgical robots currently available are run by surgeons, but Penelope is a "stand-alone co-worker," says Dr. Treat. Using machine vision—a digital camera that sees the surgical field, along with software that can identify instruments—Penelope "scrubbed in" on her first case in March 2005, part of a research study to validate that the robot is working as expected.





that lead to lymphomas, the most common cancer among people 30 to 40 years old.

One of the most exciting approaches to understanding cancer and many other disease mechanisms is known as chemical biology, or chemical genomics. This “big science” strategy takes a high-throughput, systematic approach to chemistry and biology so powerful that it can screen some 50,000 chemical compounds against a single biological disease target in just one day, testing each of them to see how they act against the disease. But it’s not just a drug development tool; it’s a process that may help physicians at Columbia and elsewhere better understand how human disease—and human healing—operates at the most basic cellular and molecular levels. With the addition of Lasker Award-winning scientist James Rothman to our faculty, Columbia has established itself as an academic leader in this field. Formerly with Memorial Sloan-Kettering Cancer Center, Dr. Rothman heads Columbia’s new Center for Chemical Biology, a program that will ultimately collaborate with many laboratories and many disciplines to apply cellular screening tools to the countless mysteries of health and healing throughout the human system. Dr. Rothman also now leads the Judith P. Sulzberger, M.D. Columbia Genome Center, an outstanding fit with his ongoing work on high-throughput technologies to screen genomes.

That’s another mystery of the human system: Now that we have sequenced the human genome, how do we use that information to better understand disease and develop new treatments? So far, no one has successfully linked the genome to the human clinical phenotype, mapping the

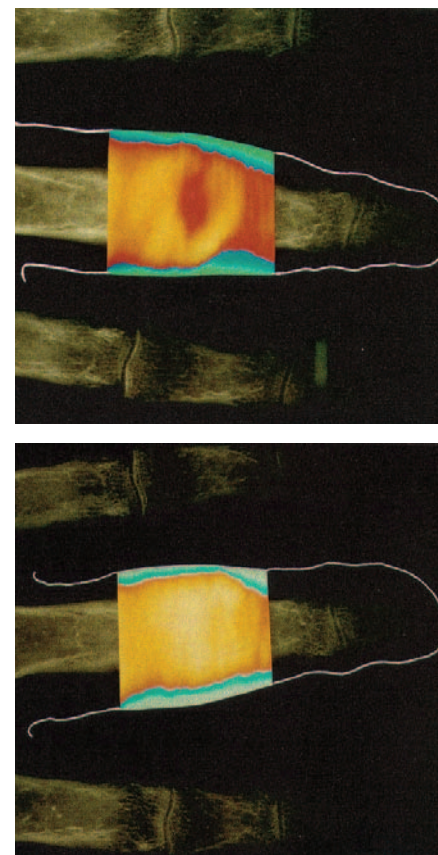
processes by which the genetic instructions encoded by the genome produce the tissues, organs, and behavior that make us human. It won’t be easy: The human genome, which has about 25,000 genes, produces possibly 200,000 different proteins—maybe as many as 1 million proteins. This makes for an almost infinite variety of protein interactions, or combinations of proteins that drive a cell’s activities. Helping medicine take advantage of this vast, uncharted frontier of information in order to improve human health is the goal of Columbia’s new Joint Center for Systems Biology. The center will use high-speed, advanced computational tools to analyze an enormous database of 2.5 million patients, conducting studies that will tie our knowledge of the genome to the genetic and molecular causes of disease.

Great leaps in basic science research mean nothing if they are not translated to treatments at the bedside. In Advances in Translational Research, a major international symposium held in October 2004, Columbia brought a galaxy of experts from medicine and industry together to discuss strengthening the continuum of research in cardiology and oncology, from the lab to the clinic and back again. “The ability to do team-based research is something that’s increasingly valued by the NIH,” says Eric A. Rose, M.D., chairman of the Department of Surgery, who directed the symposium. “Arguably, it’s the most likely mechanism by which you can turn discovery into clinical delivery.”

With that principle in mind, Columbia has entered into a partnership with Merck, establishing a small-scale pharmaceutical

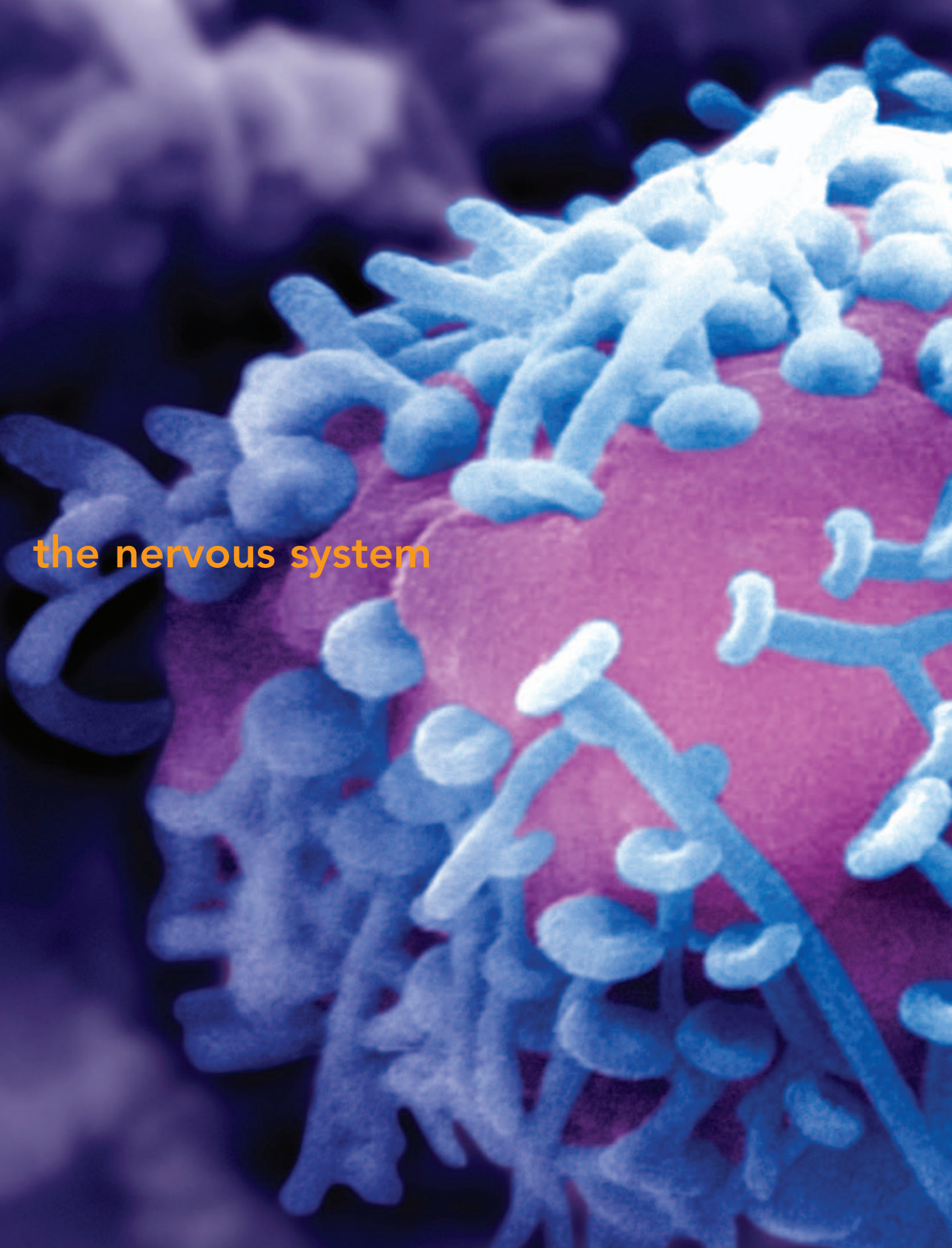
production center in the Black Building. The new Synthetic Organic Chemistry Collaborative Center provides researchers with experimental therapeutics and other molecules needed for their preclinical studies, molecules needed for the pilot studies that are essential to garnering grant support for larger studies.

Other new centers at Columbia will also tie research and treatment together in a comprehensive, multidisciplinary approach. One of these is the Reiner Center for Behavioral and Psychosomatic Medicine, the only center of its kind in New York City. It will explore how psychiatric, psychological, behavioral, and genetic factors affect human health and contribute to a wide array of diseases, from the role of hostility, depression and anxiety in heart disease to how expectant mothers’ mood states affect fetal and infant development and how treatment for cancer may increase the risk for cognitive dysfunction.

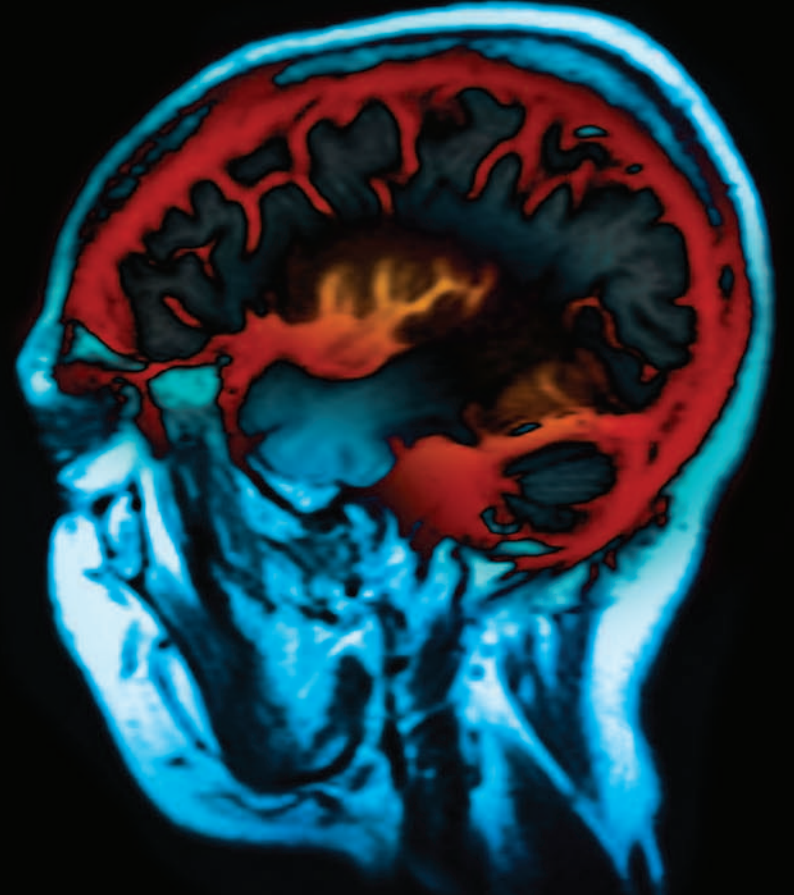
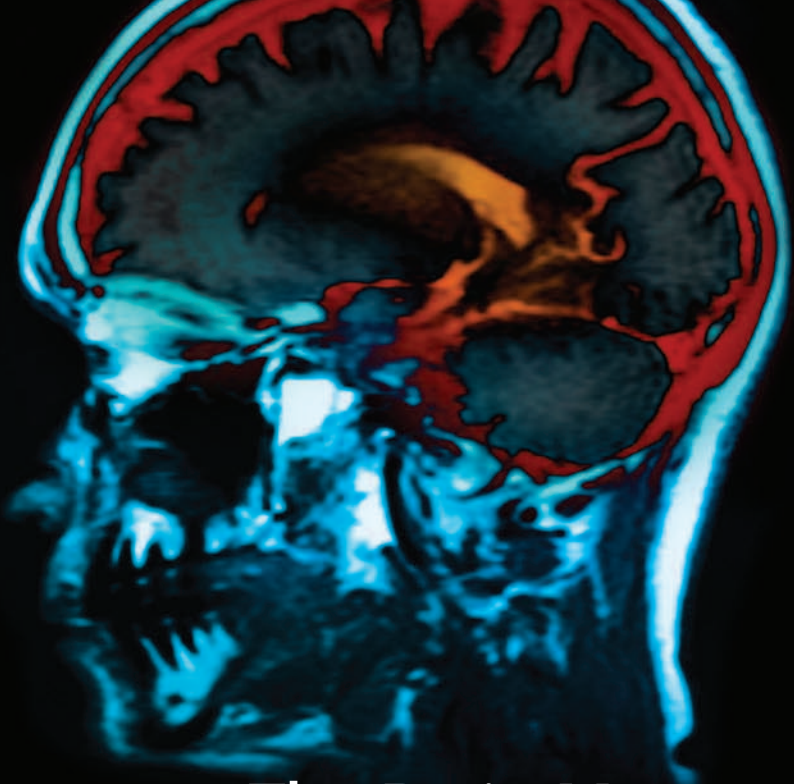
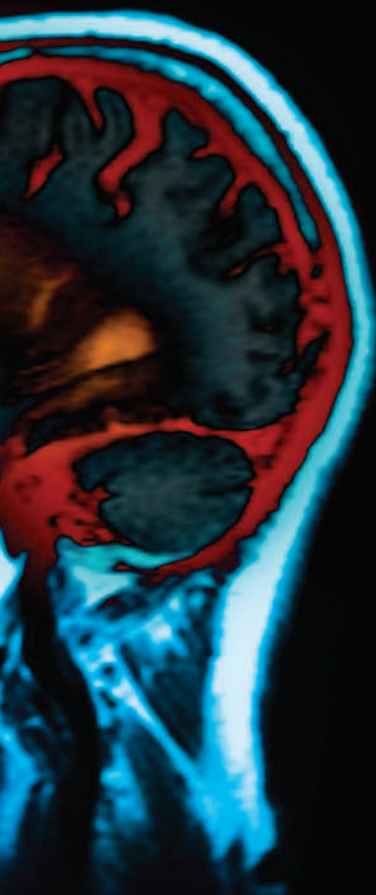


**Optical imaging for disease detection:** A new imaging technology called optical tomographic imaging (OTI), which uses laser light combined with biomedical engineering expertise to measure light passing through tissues, holds promise for early detection of rheumatoid arthritis and potentially many other disorders. Andreas Hielscher, Ph.D., associate professor of biomedical engineering and radiology, who is conducting clinical trials of the technology, has plans to develop a system that combines OTI with magnetic resonance imaging (MRI).





the nervous system



The Brain Matters



# The Brain Matters

Not long ago, neurology and neuroscience were known as the “nihilistic specialties.” The complexities of the brain were medicine’s final frontier, and the prospects of healing damage to it were few. Doctors who could offer their patients the name of a disease but few if any treatments sometimes frustratedly referred to their practices as “diagnose and adios.”

Today, with advances in imaging, neurobiology, and neuropharmacology, physicians who specialize in the nervous system can offer patients a growing array of treatment options for diseases, disorders, and traumatic injuries ranging from multiple sclerosis to dementia to stroke. While we cannot yet say that we are “healing” these disorders—current treatments for neurodegenerative disorders, for example, may slow the progress of disease or alleviate symptoms, but cannot yet arrest or reverse the damage—the prospects for more robust treatments for many neurological diseases seem tantalizingly close at hand. Such progress can in part be credited to the commitment of institutions like Columbia, who have invested in basic and translational neuroscience research, making it an article of faith that these investments will indeed pay off for our patients.

Our long history of preeminence in the neurosciences added another distinguished chapter in 2004, when biochemist and molecular biologist Richard Axel, M.D., became Columbia’s newest Nobel

Laureate. The work for which he and his former postdoctoral fellow, Linda Buck, were honored with the 2004 Nobel Prize in Physiology or Medicine sounds purely aesthetic at first: understanding how our sense of smell works. But Dr. Axel’s insights into this mysterious sense—the one most strongly correlated with memory—have implications far beyond designing perfume. He and Dr. Buck discovered a large gene family, comprised of some 1,000 different genes (some 5 percent of the genome) that help us to distinguish more than 10,000 odors in the environment. Going further, they demonstrated that different odors activate different neuronal patterns in the brain—patterns that may also be involved in other senses like sound, hearing, and vision. Understanding how our brain makes sense of these perceptions is likely to prove important in deciphering diseases like schizophrenia and memory disorders.

With world-renowned scientists like Dr. Axel and 2000 Nobel Laureate Eric Kandel among its faculty, Columbia’s neuroscience program can already justifiably claim to be among the world’s best. But we aim to reach even higher, developing a new research institute—the Center for Neuroscience Initiatives—as the first phase of a comprehensive Mind, Brain and Behavior Initiative. This initiative is designed to link the discoveries of basic neuroscience research to new therapies for

neurological and psychological disorders. the Center for Neuroscience Initiatives will focus on one of the central challenges of contemporary neural science: the relationship among neural circuitry, human behavior, and brain disease.

This exciting new effort was announced at the Brain and Mind Symposium, a May 2004 conference that brought researchers from around the world to Columbia to discuss the latest discoveries in neuroscience. Led by professor of biochemistry and molecular biophysics Thomas Jessell, the program featured Drs. Axel and Kandel and explored topics ranging from the atomic and molecular level to the systems level.

One component of the neuroscience initiatives will be a Center of Excellence in Genomic Science, endowed by a three-year, \$11 million grant from the National Human Genome Research Institute (NHGRI) of the National Institutes of Health. In one of the first projects to be funded by the NHGRI after the completion of the human genome project, Columbia scientists will study neuronal diversity and plasticity, using genomics and bioinformatics to explore profound questions about brain function, such as what makes one nerve cell different from another, and how those nerve cells change during learning and memory.

And with a \$5 million gift from Johnson and Johnson, we are establishing the Paul Janssen Scholars Program in Translational Neuroscience—an exciting academia-industry partnership that aims to bridge the gap between bench and bedside, accelerating drug discovery and therapeutics for brain-related diseases.

Some of the most profound questions

in neuroscience center on how the complex neural circuitry of our brains controls and directs our behavior. With a new \$7.5 million award from the Kavli Foundation, the new Kavli Institute for Brain Science will seek the answers to those questions. Headed by Eric Kandel, the Institute will develop novel experimental strategies to decipher and map the human neural signaling process. “Our work will be directed toward developing more powerful tools to enable us to move from the study of individual nerve cells to that of complex neural systems which underlie the higher mental function,” says Dr. Kandel, whose co-directors are Thomas Jessell, Ph.D., P&S professor of biochemistry and molecular biophysics, and Rafael Yuste, Ph.D., Columbia University associate professor of biological sciences.

Among the conundrums of neurodegenerative disease is this question: For genetically linked disorders, like Huntington disease and some forms of Parkinson, ALS and Alzheimer’s, what sets the chain of events in motion that brings the disease on? For Huntington, it has long been thought that the disease gene alone influences the age at which degeneration begins, but thanks to more than two decades of intensive study of a unique community of families with HD in Venezuela, we now know that this dogma is wrong. In fact, both genetic and environmental factors have a powerful influence on when the disease begins, according to new research from a team led by Dr. Nancy Wexler, Higgins Professor of Neurology and president of the Hereditary Disease Foundation. Armed with this knowledge, we now understand that Huntington can



**“Baby Framingham” study:** Columbia University researchers, in collaboration with colleagues at the Norwegian Institute of Public Health, have received a five-year, \$13 million grant from the U.S. National Institutes of Health to fund one of the largest studies of neurodevelopmental disorders by tracking babies before they are born. The study, led by P&S and Mailman School of Public Health professor Ian Lipkin, will follow up to 100,000 pregnancies from the first trimester through childhood and perhaps adulthood via access to a birth registry in Norway.

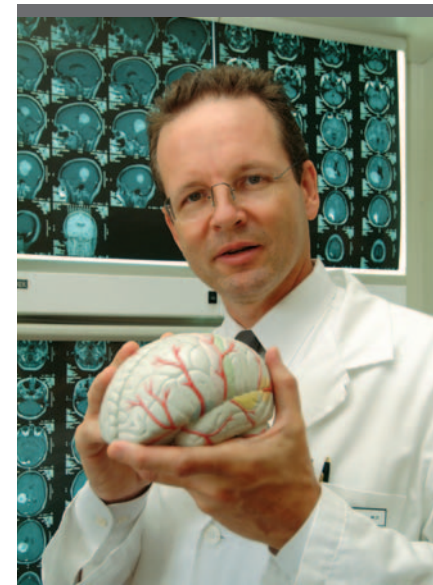
be attacked in more ways—for example, with drugs that might mimic protective environmental, as well as genetic, influences.

For some people, neurological deficits are the result of the long, slow slide from a disease like Alzheimer's or Parkinson's. For others, they can occur in a single instant, resulting from the devastating cascade of events that occurs in the wake of a stroke, a traumatic brain injury, or a spinal cord injury. Here, too, neuroscience at Columbia is making great strides.

Within the past several years, strategies for the treatment, rehabilitation, and prevention of stroke have taken giant leaps forward. From the use of clot-busting drugs called tissue plasminogen activators (tPA)—developed from research techniques created by Nobel Laureate Richard Axel—to carotid stenting to prevent stroke in high-risk patients, to a new “corkscrew” device that retrieves clots and almost instantly reverses stroke damage, the prospects for preventing or reversing the debilitating effects of this devastating “brain attack” have never been better. The

most recent example: a new multi-center, international study led by Columbia researchers that shows a compound called recombinant activated factor VII could significantly improve prospects for treating acute intracerebral hemorrhage, or “bleeding stroke.” This deadliest and most disabling type of stroke has few treatment options. If RFVIIa, which entered phase III trials in early 2005, is approved, it will become only the second emergency treatment for stroke in more than three decades.

In late 2004, Columbia received one of the largest stroke grants in its history, a highly competitive Specialized Programs of Translational Research in Acute Stroke (SPOTRIAS) award from the National Institute on Neurological Disorders and Stroke. It is the only new SPOTRIAS grant issued in 2004; only four other institutions have such grants. Worth about \$12 million over five years, the grant will support three large, multidisciplinary, collaborative translational research programs that bring together researchers and clinicians from neurology, emergency medicine,



**Chemotherapy to hit brain tumors:**

Scientists have been able to bypass the blood-brain barrier and deliver a proven chemotherapy agent directly to brain tumors, using a new technique called convection enhanced delivery. Using catheters inserted into the brain, a slow, steady flow of chemotherapy is pushed into the tumor cells. Brain tumors that develop from brain tissue affect 15,000 to 20,000 people in the United States each year, and are extremely aggressive, usually returning after radiation and surgery. Patients typically survive between one and three years. Jeffrey Bruce, professor of neurological surgery, lead investigator in the Columbia trials, believes that the new chemotherapy delivery method—which appears safe thus far in Phase I trials—can slow the growth of tumors, improve quality of life, and lengthen survival.

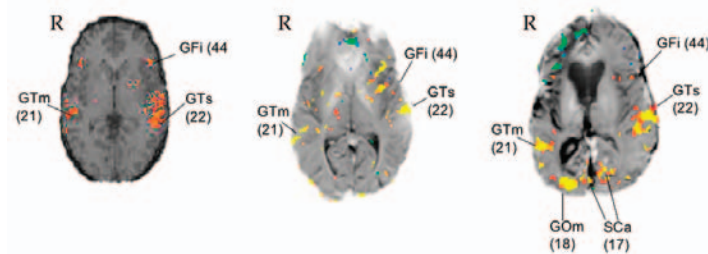
pathology, radiology, and cardiology in P&S and biostatistics, epidemiology, and sociomedical science in the Mailman School of Public Health and New York-Presbyterian Hospital.

Called the New York Columbia Collaborative SPOTRIAS, the project will focus on rapid diagnosis and effective interventions, including the first-ever study of the use of high-dose statins for treating stroke. “Columbia is uniquely qualified to do this work because of the wealth of research talent we have,” says principal investigator Ralph Sacco, M.D., associate chairman and professor of neurology (P&S) and professor of epidemiology (Mailman School).

Among the most common aftereffects of a stroke are speech and language impairments and limitations in mobility. But also common—and not nearly as well understood or managed—is the vision loss that can occur after a stroke or brain trauma. Some 1.5 million people in the

United States have major vision loss as the result of stroke or traumatic brain injury, with 90,000 more losing a substantial part of their sight every year. This year, Columbia became the first institution in the Northeast to offer patients a new computerized therapy that can help them see the world with new eyes. Vision Restoration Therapy, developed by NovaVision Inc., takes advantage of new research into neuroplasticity, identifying and stimulating regions in the visual field that are only partly damaged by stroke or trauma. The new treatment addresses “a virtually unmet need,” says associate professor of clinical neurology Dr. Randolph Marshall.

The death of actor and activist Christopher Reeve in 2004 underscored the race against time that characterizes the quest to heal spinal cord injuries. A new surgical technique developed at Columbia, still in its early stages of animal research, may hold promise for restoring severed



**Brain activity in minimally conscious patients:** Using sophisticated brain imaging techniques, scientists at Columbia and colleague institutions have discovered that some seemingly unconscious patients with severe brain damage are, in fact, capable of responding to speech. A team led by Joy Hirsch, professor of neuroradiology and psychology, used functional magnetic resonance imaging (fMRI) to look at the brain activity of two minimally conscious patients. While listening to narratives recorded by loved ones, both patients had patterns of brain activity that were indistinguishable from normal subjects



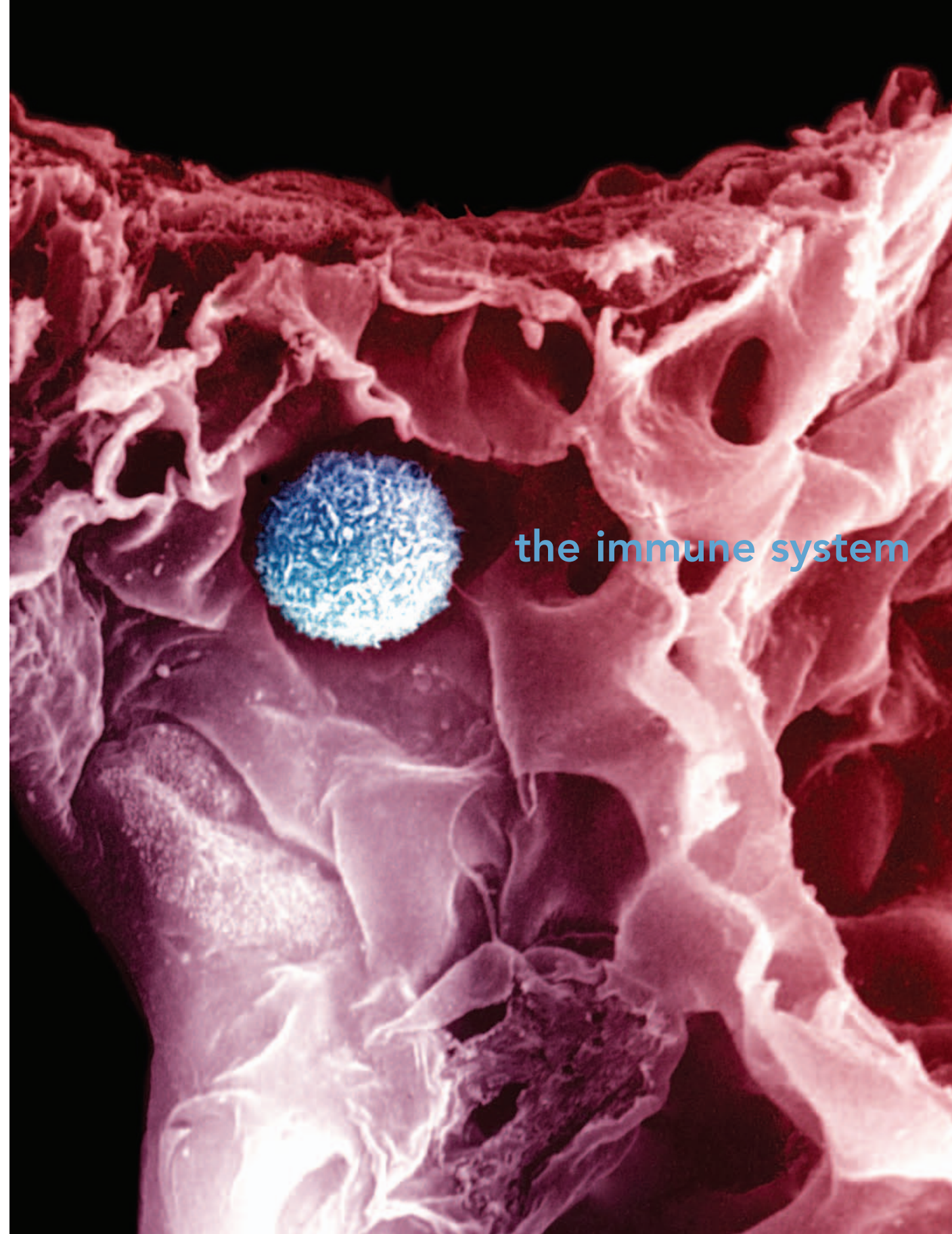
spinal connections by bypassing the site of the injury. When surgeons detached a thoracic nerve from its muscle in the abdomen, and then inserted the cut end of the nerve into the spinal cord below the lesion, they found that not only did the peripheral nerve's axons readily regenerate—well beyond their expectations—but they also targeted neurons in the parts of the spinal cord that control muscle. Designed by David Chiu, M.D., adjunct professor in anatomy and cell biology, the surgery must now be tested more thoroughly in animal models, but P&S scientists are optimistic. “We are very excited about our technique,” says Jack Martin, M.D., of Columbia’s Center for Neurobiology and Behavior, “especially its applicability to people who have lived with spinal cord injuries for years.” If all goes well, the researchers hope that clinical trials can begin within the next few years.

Our improving understanding of the brain’s complex neural pathways has also contributed to enormous advances in psychiatry, with more and better treatments available for mental illness, addictions, and mood disorders. As one of the nation’s leading psychiatric institutions, the New York State Psychiatric Institute at Columbia stands at the forefront of these advances. Now, the Institute has new leadership: Jeffrey Lieberman, M.D., chairman of psychiatry at P&S, director of the Psychiatric Institute, and director of the joint Columbia and NYSPI Lieber Center for Schizophrenia Research.

Dr. Lieberman, who previously directed the Mental Health and Neuroscience Clinical Research Center at the University of North Carolina, has de-

veloped an outstanding body of research in the neurobiology, pharmacology, and treatment of schizophrenia and related psychotic disorders. “In terms of its size and the quality of many of its programs, this position has enormous opportunities, which Jeff sees clearly,” said P&S Dean Gerald D. Fischbach, M.D. “He comes to Columbia from an academic career spent thinking about mental illness and schizophrenia with a wonderful clinical research perspective. I believe this experience, along with his close involvement with NIH-funded translational neuroscience research and clinical trials, will bring the Lieber Center to new heights and benefit every single program in the department.”

Our growing understanding of the interaction between the brain and behavior has also yielded new treatments for addiction. One of the newest, buprenorphine, was recently approved by the Food and Drug Administration to help treat addiction to opiates like heroin, Oxycontin, and Percocet. Last year, the Department of Psychiatry became one of the first places in New York to offer the new treatment option and, more importantly, to train doctors to give treatment in their offices.



the immune system

**Cellular defect in autism:**  
*New research from Columbia has identified, for the first time, how a cellular defect may be involved in autism. The research points to a defect in neuroligin (a component of synapses) as a possible contributor to the disorder. The researchers found that the loss of neuroligins perturbs the formation of neuronal connections and results in an imbalance of neuronal function. This imbalance provides a potential explanation for the neurodevelopmental defects in autistic children.*



# Your Best Defense

When human health comes under attack from the outside—whether it's a flu virus, a bite from a tick carrying Lyme disease, or a respiratory infection—the first line of defense is our immune system. Most of the time, it's remarkably effective, but sometimes viruses and infectious can overwhelm this defensive arsenal, while at other times, the immune system itself goes haywire and turns its defensive weapons inward, becoming a threat of its own.

In our global world, in which a disease unknown in New York City can be brought here by a single international traveler and pose a threat to thousands whose immune systems have not been taught to recognize it, an aggressive strategy for strengthening our immune system's defenses is essential.

Time is often of the essence in an infectious disease outbreak: An incorrect diagnosis could result in a treatment that does more harm than good, while the infectious agent rages on unchecked. Columbia Genome Center researchers, in collaboration with scientists from the Mailman School of Public Health, recently announced the development of a sensitive new diagnostic technology platform, called "Mass Tag PCR," that can simultaneously screen for multiple infectious agents, precisely identifying and differentiating multiple viruses, bacteria, and other pathogens in as little as two hours.

One infectious disease that poses particular diagnostic challenges is Lyme

disease, a tick-borne infection that has affected individuals in numbers that have nearly doubled between 1991 and 2002, according to the Centers for Disease Control and Prevention. A quick look at geographic distribution maps for Lyme disease explains why Columbia has taken an intense interest in this particular infectious disease: While most other states appear in the calm blues and greens of low incidence, New York, New Jersey and Connecticut appear in neon red, with 1,000 to 4,500 cases reported per 100,000 population. Since Lyme disease can have persistent, long-term consequences that include arthritis and disabling neurological conditions, it's important to treat it effectively and early.

One problem: No definitive test can identify an active Lyme disease infection and rule out other disorders that may cause similar symptoms. Addressing this diagnostic challenge, as well as the multi-systemic symptoms that can linger after diagnosis and treatment, is the mission of Columbia's new Lyme and Tick-Borne Disease Evaluation Service. The center aims to provide a comprehensive Lyme disease evaluation that can pinpoint a Lyme diagnosis among a constellation of other possibilities and relieve ongoing psychiatric complaints that can follow many tick-borne diseases. As with so many of Columbia's programs, the new center

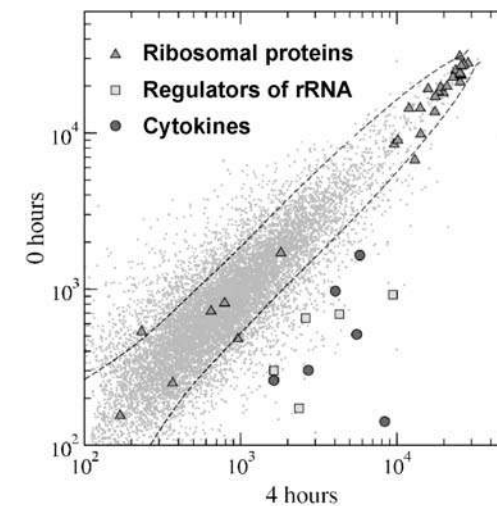
takes the multidisciplinary approach championed by Dean Gerald Fischbach: Headed by psychiatrist and Lyme expert Brian Fallon, M.D., it includes a neurologist and rheumatologist in its evaluation program.

Dr. Fallon's ultimate aim: to make Columbia "the first place to focus on Lyme disease." The Lyme Disease Association and its Connecticut affiliate, Time for Lyme, are raising \$3 million to fund a Lyme disease research center at Columbia.

Despite progress in dramatically lengthening the lifespans of individuals with AIDS, researchers continue to refine treatment for HIV and AIDS. Dr. Scott Hammer, the Harold C. Neu Professor of Infectious Diseases and chief of the division of infectious diseases at P&S, co-chaired a panel of the International AIDS Society-USA that published updated recommendations in 2004 for the treatment

of adult HIV infection. The recommendations incorporate scientific knowledge about the virus that researchers have gained since the last publication of HIV recommendations in 2002 and help refine choices for initial treatment of HIV infection.

The recommendations include new drugs to fight the disease and knowledge regarding different drug combination regimens. The recommendations also address progress in identifying drug toxicities, particularly lipid problems that can lead to higher risk of cardiovascular disease, to allow patients and clinicians to make more informed treatment choices. "The evolution of antiretroviral therapy over the course of the HIV pandemic has been remarkable but many challenges still lie before us," says Dr. Hammer. "Guidelines for therapy, whether for the developed or the developing world, are an iterative process and will require future updating to



**How T cells fight flu:** Columbia researchers have uncovered the mechanism behind the immune system's swift response to the flu vaccine. The vaccine works, in part, by creating memory T cells that have experienced the flu's antigen. Primed by the vaccine, the T cells respond almost instantly when the same antigen appears in an actual flu virus, increasing the production of cytokines to turn on the immune response and prevent infection. Now, scientists led by Jeremy Luban, associate professor of microbiology, have used microchip technology to reveal that the T cells get a jump start on producing cytokines before even encountering the virus. The T cells appear to make the protein's mRNAs earlier, in preparation for cytokine production. After the cells encounter antigen, the cells start translating the mRNAs into protein. The research was published in the October 2004 issue of *Immunity*.



**Legionnaire's genome sequenced:** Researchers at Columbia University Medical Center and School of Engineering have completed the sequencing and analysis of the genome of *Legionella pneumophila*, the bacteria responsible for Legionnaires' disease. The discoveries, published in the Sept. 24, 2004, issue of *Science*, may lead to the development of new therapies and vaccines for the treatment of Legionnaires' disease.

keep in step with the scientific advances in the field and to assist clinicians and patients in the management of antiretroviral therapy.”

Sometimes, it's not a virus or infection attacking from without, but an abnormal immune reaction attacking from within. Although many autoimmune diseases are rare, combined they affect millions of people. And although the reaction may start with the immune system, autoimmune disorders can damage our health by attacking virtually every system of the body—for example, the nervous system, in multiple sclerosis; the gastrointestinal system, in Crohn's disease; and the musculoskeletal system and multiple other organs, in lupus and rheumatoid arthritis.

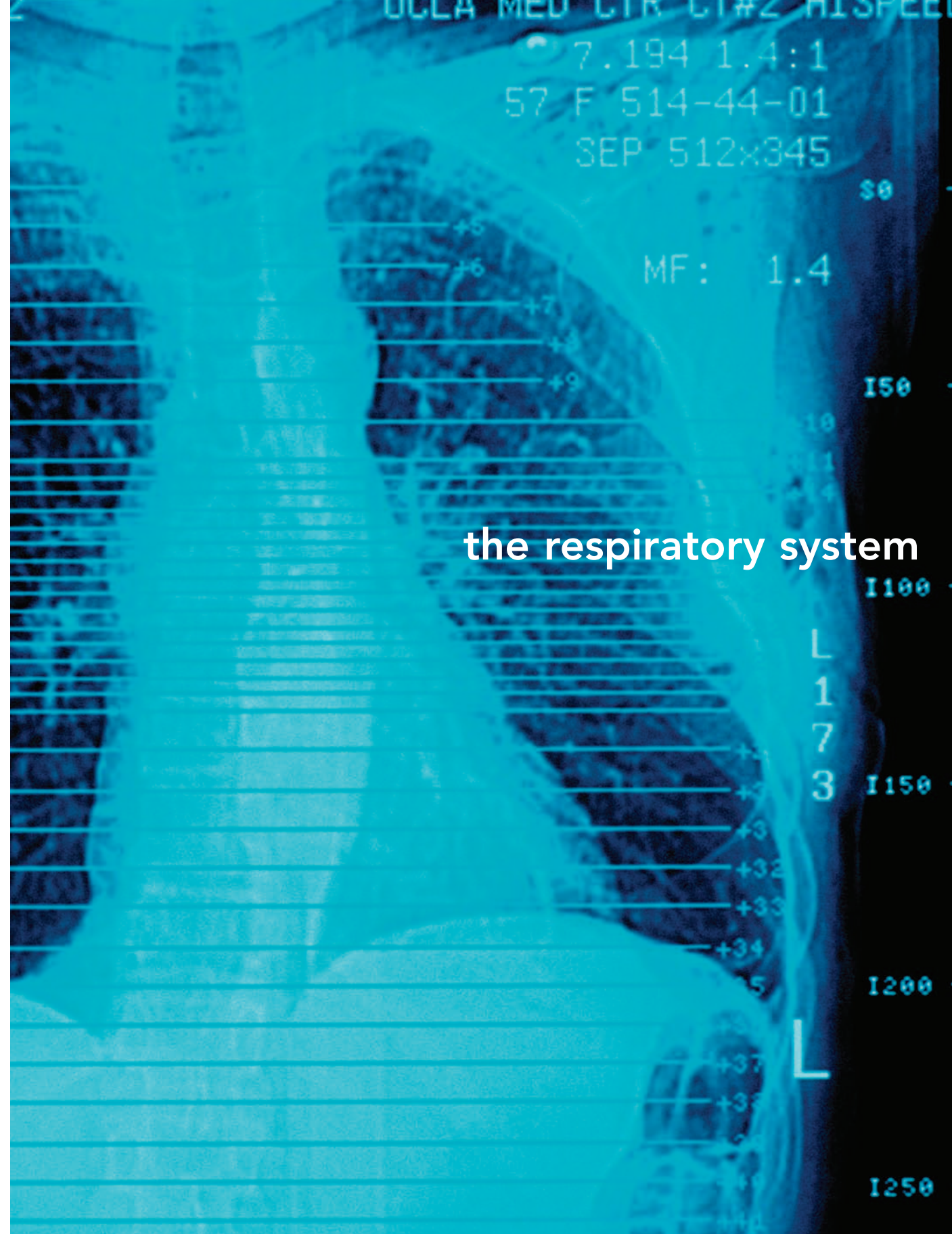
Since 1999, Columbia's Autoimmunity Center of Excellence has studied both the normal biology of the healthy immune system and the development of new therapies that may heal autoimmune disease. This year, a new \$3.78 million, five-year grant from the NIH will support novel research and clinical trials focused on the pathogenesis and treatment of Type 1 diabetes, lupus, multiple sclerosis, rheumatoid

arthritis, and scleroderma. “The goal of the Autoimmunity Center of Excellence at Columbia is to help translate what's been a scientific revolution in immunology into direct clinical applications in the treatment of autoimmune diseases,” says Dr. Leonard Chess, professor of medicine and director of the center.

Two potential therapeutic drugs initially discovered at Columbia are now being investigated in preclinical studies, and a third, potentially revolutionary treatment for Type 1 diabetes is already being tested in early clinical trials led by Kevan C. Herold, M.D., associate professor of clinical medicine. Using a monoclonal antibody to alter the signal that otherwise causes the immune system to attack the cells that secrete insulin, the therapy “teaches” the immune system to recognize the insulin-producing cells as part of the body, not a foreign invader.



**Gene that prevents HIV infection:** CUMC researchers have identified a gene in owl monkeys that prevents infection by HIV-1, the virus that causes most cases of AIDS. The gene—TRIMCyp—is unique to owl monkeys, but it is a fusion of two genes, TRIM5 and cyclophilin A (CypA), each of which is found separately in all primates, including humans. These molecules constitute an innate defense system that stops viruses from replicating and infecting primates. The research, led by Jeremy Luban, M.D., appeared in the July 29, 2004, issue of *Nature*. Experiments to determine how the two genes work together are now under way.



the respiratory system

# Health in the Air

Breathing easy is a daily challenge for millions of people with conditions ranging from lung cancer to asthma to tuberculosis to cystic fibrosis. Since New York City got an “F” on the American Lung Association’s 2004 State of the Air report, ranking among the cities with the worst air quality in the nation, it’s clearly urgent that leading medical centers like Columbia take an aggressive role in protecting respiratory health and reducing lung disease.

Already the premier center of its kind in the New York area, Columbia’s Center for Lung Disease and Transplantation is on the cusp of becoming a national leader in the field. Last year, it achieved an important milestone: 90 percent of its patients survive at least one year after transplantation. That’s one of the highest survival rates in the country, according to the center’s program directors, Joshua Sonett, M.D., and Selim Arcasoy, M.D. Most other such centers boast rates of 75 percent to 80 percent. Because Columbia’s program specializes in high-risk patients, these excellent outcomes are even more significant.

What’s behind these impressive advances? New surgical, medical, and lung preservation techniques, improved protocols for identifying and treating organ rejection early on, and a strong, cohesive multidisciplinary team of experts that treat the “whole patient.” Not only do patients referred to the center receive consul-

tation from surgeons and pulmonologists, but they also have access to psychiatrists, physical therapists, social workers, and even financial counselors. Continuous involvement of all specialists throughout the treatment process makes the experience seamless and reassuring for the patient, enhancing quality of care and quality of life.

Research is also a key focus of the center, including studies that seek to identify blood markers that can predict which patients will suffer from graft injury; determine the most effective post-transplant strategies for preventing rejection and infections; and identify critical pre-transplant prognostic markers that can help predict optimal timing of transplantation and surgical outcomes.

One of the most common respiratory ailments in both adults and children is asthma. Millions of children have asthma attacks every year. Of course, we have long known that asthma is particularly prevalent in New York City and in the northern Manhattan area that is home to P&S. But a new screening and outreach program has identified the truly astounding scope of the problem—and shown strong initial effectiveness in helping to address it.

Initially established in 2001, the Harlem Children’s Zone Asthma Initiative, whose leaders include Stephen W. Nicholas, M.D., associate professor of clinical pediatrics, aims to reduce asthma-related morbidity through improved surveillance and health

care access for children in the Harlem Children’s Zone neighborhood. In data published in late 2004, the Initiative reported that some 31 percent of Harlem’s children had asthma or asthma-like signs—compared to just 5 percent to 10 percent in the general pediatric population. But the news is also encouraging: Children participating in the program have seen their asthma-related school absences decline from 23 percent to 8 percent, and emergency department and unscheduled physician office visits for treatment of asthma plummeted from 35 percent to 8 percent.

Another well-established asthma program sponsored by Columbia, “Open Airways for Schools,” has been shown to be so successful that the American Lung Association is now leading a drive to bring it to all 67,000 elementary schools in the country. Aimed at third through fifth graders, “Open Airways” teaches children how to manage their asthma and has already reached more than 200,000 children in 20,000 schools nationwide. A recent evaluation found that children in the program were absent from school about two fewer days per year and that efforts to educate parents about asthma management using their children’s homework have been successful.

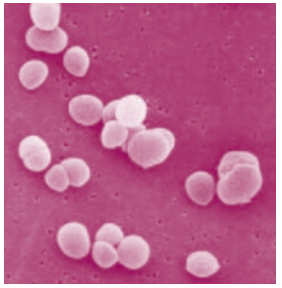
Less common, but more deadly, is cystic fibrosis, a genetic disease that affects approximately 30,000 children and adults in the United States. Both the first clinical description of the disease and the famous “sweat test” for its diagnosis were developed at Columbia. Nearly 70 years later, our Sue and John L. Weinberg Cystic Fibrosis Center boasts such impressive

outcomes that the Cystic Fibrosis Foundation is analyzing data from Columbia and several other successful centers to pinpoint the best practices for cystic fibrosis treatment.

Tremendous advances have been made in treating CF over the past decade; people with the disease were once thought to have little hope of surviving past their teen years, but now the median age of survival for someone with cystic fibrosis is in the mid-30s. That figure may improve even more, thanks to a revolutionary discovery about a common oral antibiotic.

The drug azithromycin, often used to treat ear infections in children, can also dramatically improve lung function in people with cystic fibrosis, according to a study published by clinical pediatrics professor Lisa Saiman, M.D., in the *Journal of the American Medical Association*.

Study subjects found their lung function improved by 6.2 percent during a 24-week course of azithromycin, taken three times a week in conjunction with other daily treatments. It also cut in half the number of days patients spent in the hospital, improved their weights, and reduced the total amount of antibiotics they needed to take. And unlike the other two new therapies made available for CF over the past 10 years (for which Columbia also conducted key clinical trials), azithromycin is relatively cheap, easy to use, and readily available.



**Halting staph-induced pneumonia:** Drugs that target the TNF alpha pathway may be useful in treating staphylococcus-induced pneumonia. During a lung infection, the *Staphylococcus aureus* bacteria draws an army of leukocytes that try to eradicate it. This can be too much of a good thing: excess leukocytes lead to inflammation and potentially fatal pneumonia. Now Columbia scientists have found that Protein A, a common component of the outside walls of staphylococci, is the chief culprit in the bug’s deadly effects. Binding Protein A and preventing it from activating the TNF alpha receptor—a primary instigator of inflammation—has been shown to protect infected mice from the adverse effects of the bacteria.





the cardiovascular system



Healthy at Heart

# Healthy at Heart

It was once thought that the heart was the seat of the human soul. Scientifically speaking, today we understand that diseases of the heart and the cardiovascular system are among the greatest threats to human health: Cardiovascular disease accounts for one of every 2.6 deaths in the United States and since 1900 has been the leading cause of death in this country in every year except 1918, when the flu epidemic claimed more lives.

Columbia has long ranked among the nation's top medical centers for cardiology and cardiac surgery. The international reputation of our comprehensive, cutting edge program was underscored in 2004 as former President Bill Clinton chose a Columbia team led by Calvin F. Barber Professor of Surgery Craig Smith, M.D., to perform his successful quadruple bypass operation. Columbia's Chief of Cardiology, Allan Schwartz, served as Mr. Clinton's cardiologist throughout his hospitalization. Mr. Clinton's surgery was such a success that his fellow former President, George H.W. Bush, called him the "Energizer Bunny" after their trip through tsunami-ravaged Asia. He returned in 2005 for successful follow-up surgery.

The program that was entrusted with the life of a former president continues to take great leaps forward with a new Center for Interventional Vascular Therapy, led by a world-renowned interventional cardiology team that joined Columbia from New

York's Lenox Hill Hospital. Led by Jeffrey Moses, M.D., who was the chief investigator on the groundbreaking 2002 clinical trials that led to the FDA's approval of the Cypher drug-eluting stent, the team also includes Drs. Martin Leon, Gregg Stone, and Victor Yick.

Together and separately, these medical innovators have made pioneering discoveries in most of today's minimally invasive cardiac procedures, including angioplasty, atherectomy, and stenting. Their advances have allowed patients with serious heart disease worldwide to be treated without surgery or lengthy hospital stays. Over the past 10 years, they have completed more than 20,000 angioplasties and other cardiac interventions. Since the team arrived at Columbia, the number of these procedures has more than tripled.

In connection with its expanded CIVT program, Columbia also established an educational partnership with the Cardiovascular Research Foundation, founded by Dr. Leon and now led by Dr. Yick. Its annual Transcatheter Cardiovascular Therapeutics program teaches the latest techniques to interventional cardiologists from all over the world and will now be co-sponsored by Columbia University.

Dr. Moses, who calls the new Center for Interventional Vascular Therapy "the opportunity of a lifetime," predicts that the collaborative opportunities offered by Columbia will lead to major breakthroughs

in research. As the CIVT team's discoveries have helped to demonstrate, the health of the cardiovascular system affects almost every other medical specialty, including endocrinology, hematology, and diabetes, and the interdisciplinary partnerships encouraged by Columbia provide the perfect environment for broader discoveries at the intersection of these fields. The future of cardiovascular medicine, suggests Dr. Moses, lies in developing an "early warning system" of cardiac disease at the genetic or cellular level, allowing intervention well before life-threatening symptoms develop.

Working at the cellular and subcellular level to attack heart disease is already the charge of Columbia's Center for Molecular Cardiology. This year, the center's physician-scientists announced an astounding new development: a pill that offers promise in preventing the life-threatening arrhythmias associated with heart failure.

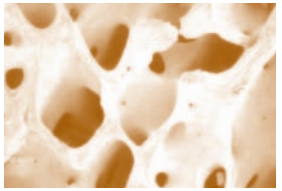
The drug, which completely prevents sudden death from arrhythmia in mice that have the same heart defects as people with heart failure, is one of the first molecular-based therapies for heart failure and arrhythmias. It works by patching leaks in the heart's calcium channel, which can trigger fatal arrhythmias by leaking calcium ions into heart cells.

If it works in humans, the drug could help more than 5 million Americans who suffer from heart failure, decreasing the hundreds of thousands of deaths caused by heart failure-induced arrhythmias every year. Most other medical treatment options for these arrhythmias are so toxic that they've been removed from the market, while other treatments are expensive and highly invasive.

"This represents the beginning of an era when drugs will directly fix the molecular defects in heart failure," says Andrew Marks, M.D., chairman of physiology and cellular biophysics and director of the Clyde & Helen Wu Center for Molecular Cardiology, who developed the new drug based on 15 years of research.

One of the greatest challenges associated with healing the heart is the difficulty of using mechanical tools, like pacemakers, to replicate the function of a failing human heart. Pacemakers, for example, require risky surgery and don't respond to the body's signals—during exercise or a state of emotional excitement, for example—the way normal heart cells would. What if a genetically engineered version of such a tool, more compatible with the healthy function of the human body, could replace the inflexible mechanical version? That's the hope of Columbia scientists who are now partnering with Guidant Corporation and Stony Brook University in a new study of gene and cell therapy that may lead to the development of a "biological pacemaker" which could vary the heart's beats to suit the body's needs.

In the healthy heart, a tiny region of the right atrium called the sinoatrial node acts as a sort of metronome, sending out "pacemaker" signals as electrical impulses, regulating every beat. But for some 250,000 people every year in the United States alone, this signaling function goes awry. Collaborative research conducted at Columbia and at Stony Brook has demonstrated that adult human mesenchymal stem cells can be programmed to express a specific gene that's responsible for this normal pacemaker function. When placed in the sinoatrial node, these cells form



**Saving bones after heart transplants:** As many as one-third of heart transplant recipients break bones in their spines during the first year after transplantation because of the bone loss caused by drugs used to prevent rejection. Now, CUMC researchers have found that two different drugs can prevent much of the bone loss that contributes to fractures in these patients. The study, which appeared in the *New England Journal of Medicine*, compared two drugs, alendronate and calcitriol, in heart transplant patients. Both drugs prevented bone loss, researchers found: After one year, the alendronate and calcitriol groups lost between 0.7 percent and 2.1 percent of bone mineral density, while the reference group lost between 3.2 percent and 6.2 percent.



linkages permitting direct communication with the heart muscle cells.

Early results in cell cultures and experimental animal models are promising. Now, the partnership—which includes the labs of Michael R. Rosen, M.D., the Gustavus A. Pfeiffer Professor of Pharmacology and professor of pediatrics, and Richard B. Robinson, Ph.D., professor of pharmacology—will investigate such important questions as how long the “pacemaker gene” can function, if there are any side effects associated with the therapy, and how it compares with electronic pacemakers.

The ideal solution to heal a failing heart may indeed eventually be genetic or molecular therapy. For today’s patients, however, heart transplantation sometimes represents their last, best hope of a longer and healthier life. Last year, Columbia’s expert transplant teams performed the first combined heart-liver transplant in the New York region. Only a few such transplants have been performed anywhere in the world, because their complexity requires the kind of combined ex-

pertise that can only be found at major centers like Columbia, with its renowned Heart and Liver Transplant Program. Since the patient’s liver and heart were both failing, neither transplant could be done alone. Using a single donor—which offers immunological advantages and decreased risk of rejection—a 16-member transplant team used an innovative medical approach to remove antibodies from the highly sensitized patient, who had developed resistance against most donors, before the transplant surgery. This single achievement represents the most dramatic of a number of collaborative ventures in which advanced heart and liver disease have been treated jointly by these two respected transplant services.

Another innovative cardiac surgical technique received one of its first trials at Columbia last year. As a pioneer in minimally invasive cardiac surgery, Columbia was an ideal center to conduct Phase I clinical trials of the Evalve Cardiovascular Repair System for the treatment of mitral valve regurgitation, a condition in which the valve mitral does not seal completely

and blood leaks back into the left atrium of the heart. Some 250,000 Americans every year are diagnosed with this condition; left untreated, it can lead to arrhythmias or congestive heart failure. For the 40,000 such patients each year who undergo mitral valve surgery, the Evalve system may offer a new “surgery without the surgery” option.

Traditional mitral valve repair involves extremely complex, invasive open-heart and bypass surgery. With the Evalve system, a catheter is guided through the vascular system to the mitral valve, then a clip is put in place to prevent the valve from leaking. Columbia is the only center in the New York region and one of only seven leading cardiac centers worldwide participating in the Evalve clinical trials (known as EVEREST I, or the Endovascular Valve Edge-to-Edge Repair Study).

Not all efforts to prevent and control heart disease are surgical or medical. When it comes to heart health, public understanding, awareness, and behavior are equally important. A recent national survey by Columbia’s Lori Mosca, M.D., associate professor of medicine, found that more than half of American women remain unaware that cardiovascular disease is their No. 1 health threat. The survey, published in *Circulation*, found that despite an intensive public education campaign, the percentage of women who know that cardiovascular disease is their leading cause of death grew from 30 percent in 1997 to 46 percent in 2003. That’s progress, Dr. Mosca said, but the information gap remains vast.

After decades of heart research and guidelines that assumed that women’s

hearts function—and malfunction—just as men’s do, medical science has finally come to understand that heart disease is not necessarily the same in men as in women. An expert panel chaired by Dr. Mosca published the first evidence-based guidelines for cardiovascular disease prevention in women, based on an extensive search and review of 7,000 studies. The panel emphasized the importance of assessing the absolute heart disease risk and categorizing women as high, intermediate, or lower risk to help determine the intensity of preventive therapy.

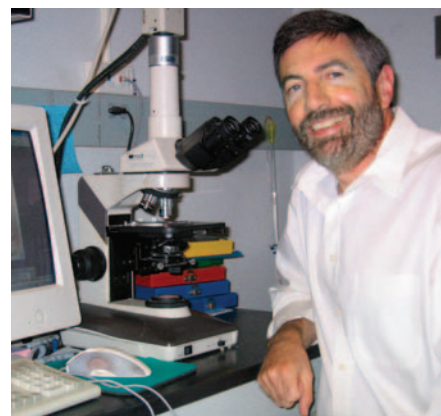
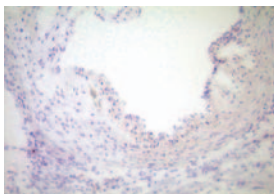
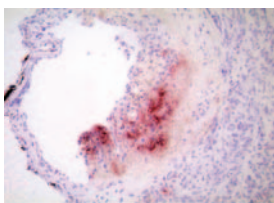
Research from Columbia is also leading to a better understanding of heart disease treatment and prevention in another important population: the elderly. Many heart transplant centers rule out cardiac transplants for people older than 65, assuming that they will not respond as well to surgery and will face more dangerous complications than younger transplant patients. But as more people live longer, the need for heart transplants in the elderly grows. A Columbia study found that heart recipients 65 or older do as well as younger recipients when it comes to survival, organ rejection, infection and length of hospital stay.

“Our results show age alone should not preclude an older person from getting a transplant,” said Dr. Mehmet Oz, professor of surgery and an author of the study, which appeared in the *Annals of Thoracic Surgery*. The next step, according to Dr. Oz: determining the safe upper age limit for heart transplants and analyzing quality of life improvements after heart transplant for both younger and older patients.

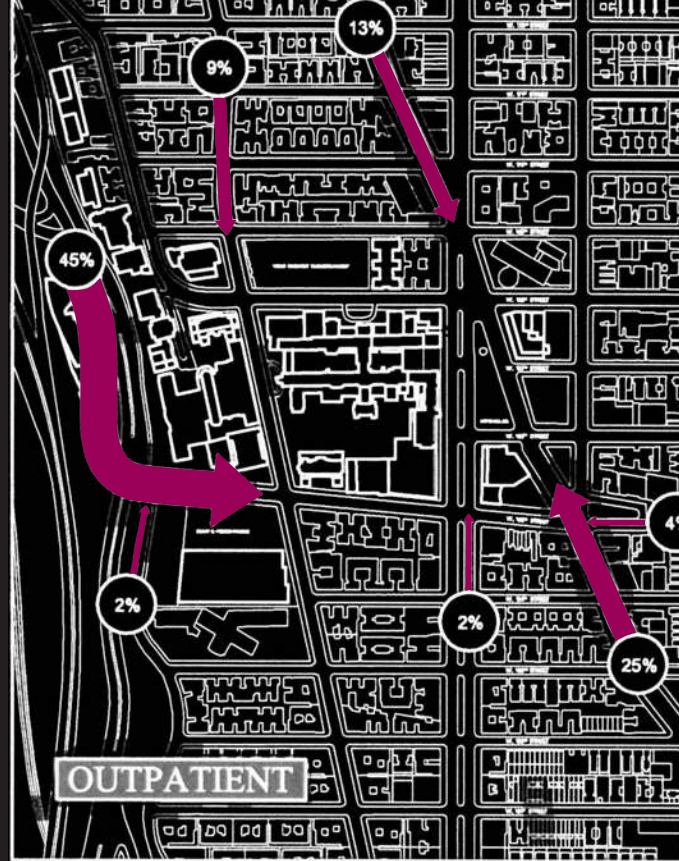
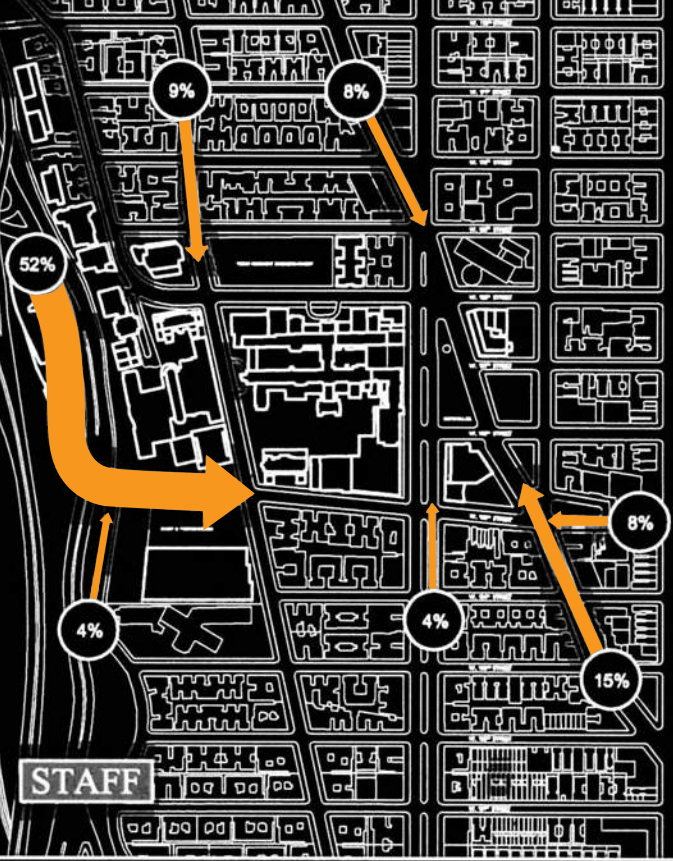
**First pediatric cardiac mission to Cambodia:** In February 2005, a group of American heart surgeons traveled to Phnom Penh, Cambodia, to perform pediatric cardiac surgery. This mission, the first of its kind from the United States, was led by Columbia’s Jonathan Chen, assistant professor of surgery. The group took on 23 cases in five days, with Dr. Chen operating on nine children in all. The procedures were performed in the Children’s Pavilion, the 2-year-old pediatric unit of Phnom Penh Heart Center, which serves more than 240 Cambodian children a year at no cost to their families.

**Alternative atherosclerosis treatment:** New findings from Columbia may point the way to an alternative approach to treating atherosclerosis. Benign deposits of fat and cholesterol inside arteries may turn into exploding lesions that can block blood flow, causing heart attacks and strokes. Researchers believe one factor contributing to the rupture of these lesions is the death of macrophages inside them. Ira Tabas, professor of medicine and anatomy & cell biology, has found that macrophages die as the cholesterol they ingest moves into the endoplasmic reticulum’s (ER) membrane, which normally contains little cho-

lesterol. When researchers blocked delivery of cholesterol to the organelle with a drug, mouse macrophages cultured *in vitro* survived despite engulfing large amounts of the fat.







## A Healthier Future, A Healthier World

The essential mission of Columbia University College of Physicians & Surgeons is simple: to promote health and bring healing to our community and the wider world. As a medical school, one of the ways we do that is by “seeding the ground” with skilled, compassionate medical students, who will become committed, experienced interns then residents, who will become devoted physicians. Our systems of education and care are the environment in which these fledgling physicians acquire the clinical knowledge and research skills they need.

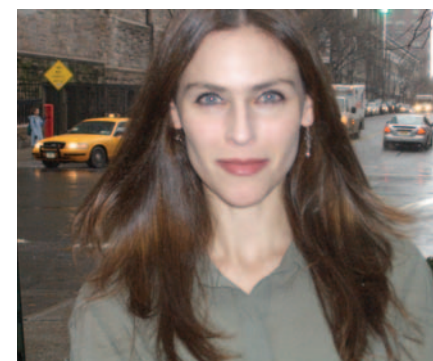
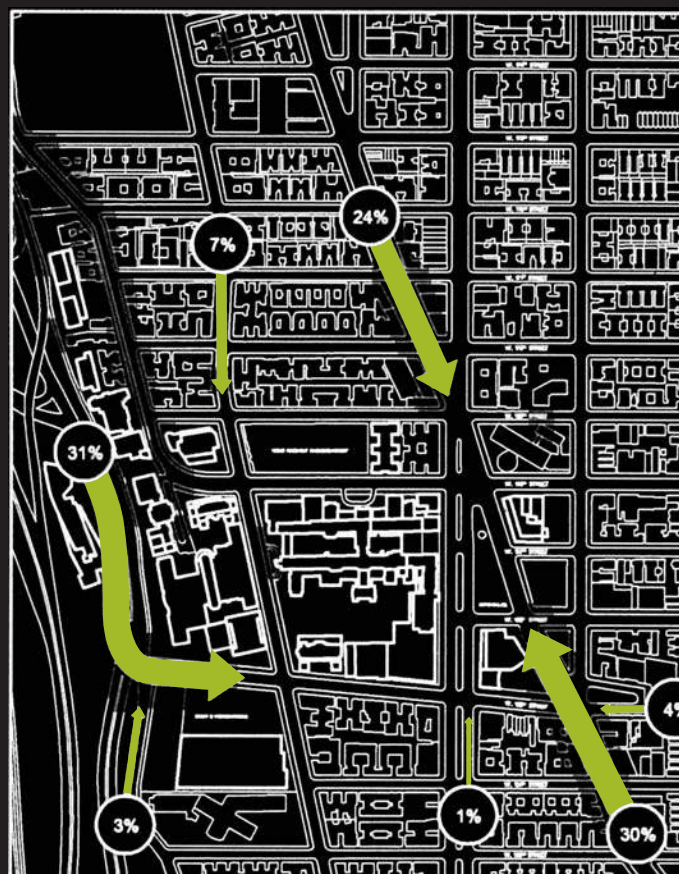
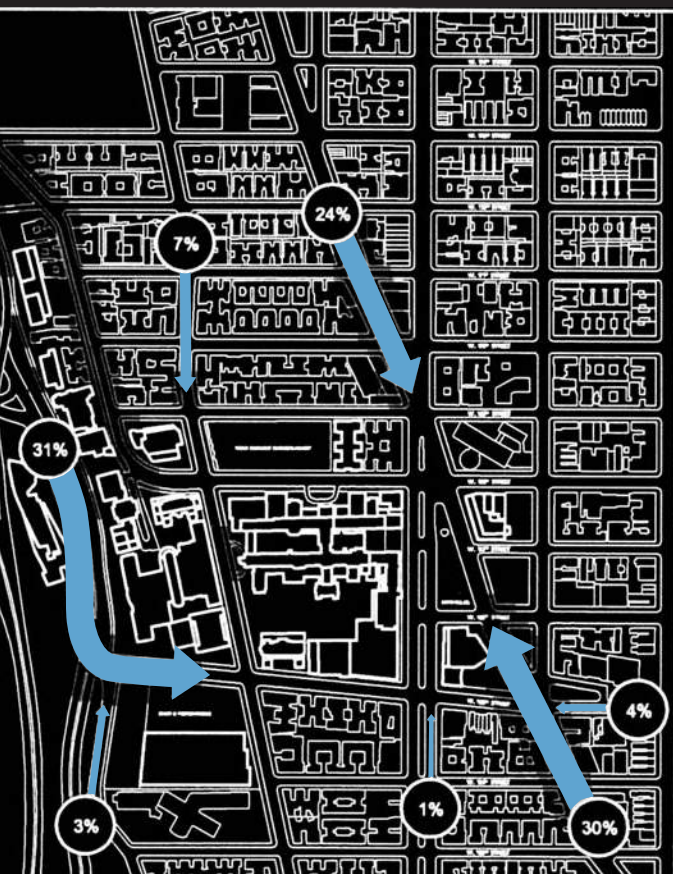
All too often, however, our educational mission takes second or third place to the missions of research and patient care. These two missions bring in their own revenue, whereas teaching does not. But what is the worth of a good teacher, especially in a complex field such as medicine? The answer is immeasurable, as the losses in 2004 of two of our greatest teachers, Glenda Garvey, M.D., and Steven Miller,

M.D., (see page 32) have brought home.

The decline of the academic mission in medical education was addressed by Andrew Marks, Clyde & Helen Wu Professor of Medicine, in a strongly worded editorial in the *Journal of Clinical Investigation* in November of 2004. “Our leaders must rise above the masses, look the financial officers and trustees straight in the eye, and declare the primacy of the academic mission in U.S. medical schools,” he wrote.

That is precisely what Columbia hopes to do with its largest curriculum review in years. The teaching faculty is now engaged in a comprehensive examination of learning objectives and their impact on education. A mission statement for the P&S education program, along with overall, guiding learning objectives, have been adopted, and each of the course directors is now working with the school’s leadership to review and reformulate each course to embed these learning objectives. The

## systems of education and care



**Conference on international humanitarian emergencies:** The first International Medical Emergencies: Protecting Health and Human Rights conference, organized by Rachel Moresky, M.D., assistant clinical professor of medicine at P&S, was held in October 2004 at the Children’s Hospital of New York-Presbyterian Hospital. The conference featured prominent experts in the fields of emergency medicine, public health, and global health, and focused on the medical community’s response to complex humanitarian emergencies.



ultimate goal: a curriculum “map” based on learning objectives and competencies.

As P&S continues to grow, so does the need for new and improved educational space. Last year, we engaged a consulting firm to review all of the school’s options for improved educational facilities and resources. Department chairs and P&S leadership then met in a retreat to discuss the consultants’ recommendations and assess the school’s need for both changes in physical facilities and for a reorganization of the overall structure of support for education at P&S. Several options—from new buildings to renovations of existing facilities—are being considered.

In the meantime, several high-tech tools have been added that will enhance the educational experience for our students and residents. Eight of our most-used classrooms now feature video projectors installed in the ceiling, with computers linked to them that allow instructors to easily project any kind of media. And students in all clerkships now have access to a new web-based and PDA-based solution called the Mobile Patient Encounter, which allows students to track their patient encounter experiences in any clinical setting, focusing on procedures and diagnosis. The MPE is customized for individual clerkships—an ob-gyn system, for example, would be very different from a neurology system. Students then upload the data they’ve entered to a central repository that the clerkship director can review to assess the students’ experiences and their progress against clerkship goals. If elements are missing—if, for example, a student on an ob-gyn rotation has yet to see a live birth—the director has the infor-

mation needed to intervene and make sure the educational experience is complete.

Learning a passion for science and medicine doesn’t begin on the first day of medical school. Columbia’s Summer Research Program for Secondary School Science Teachers aims to inspire more young people to pursue biomedical research careers by helping their teachers bring science to life in the classroom. Four days a week for two consecutive summers, the program brings New York and New Jersey secondary school science teachers to Columbia labs to learn about biological and physical science research. Now 15 years old, the program has just received a new, four-year \$400,000 grant from its founding supporter, the Howard Hughes Medical Institute. Preliminary data demonstrate the program’s success: Students taught by teachers who take part in the program participate in more science competitions and after-school science programs and achieve greater success on the New York State Regents exams in science.

As a leading academic health center, Columbia also has taken an important role in the national movement to improve our systems of health care, through quality improvement programs and the growing movement for customer service excellence in medical care.

Columbia has also taken a national leadership position in research and advocacy on health care quality in academic health centers. With the National Quality Forum, we hosted two national conferences aimed at developing specific quality performances measures unique to academic health centers. And Columbia’s International Center for Health Outcomes



**Upgrading student health:** Student Health has expanded and improved the services it offers to P&S students. The program has increased the number of board-certified primary care physicians on staff, added a new answering service to respond promptly to emergency health needs, reorganized its schedule to make more appointments available, updated and streamlined access to a state-of-the-art occupational exposure evaluation system, and added many new services including eating disorder evaluations, smoking cessation counseling, and mindfulness meditation-based stress reduction.

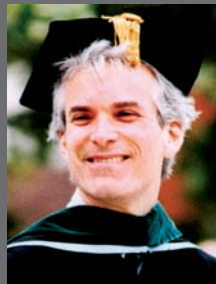
and Innovation Research (InCHOIR) recently received a large patient safety demonstration project grant from the Agency for Health Research and Quality. The project will develop a Web-based, hospital-wide event reporting system that captures data on near miss and patient harm events. Physicians are also maximizing technology and saving time for their patients through an initiative that allows secure online communications between physicians and patients through a program with RelayHealth Corporation, the nation’s premier provider of reimbursed online doctor-patient communication services. Patients save time by using e-mail and web services instead of scheduling nonurgent office visits.

As always, our efforts to enhance our systems of education, patient care, and research don’t stop at national borders. This year, Columbia added a unique international medical affiliation to its roster of major global collaborations. With New York-Presbyterian Hospital and Weill Cornell Medical College, P&S has entered into an affiliation agreement with Hallym University Medical Center in Seoul, South Korea—the first agreement of its kind in Korea. Physicians and scientists from Hallym will train in New York, and vice-versa, and joint research projects will be pursued to help improve patient care in local communities and throughout the world.

## Dedication



Glenda Garvey,  
1943-2004



Steven Miller,  
1958 - 2004

They were giants at P&S through the legacies they built in patient care, education, and devotion to their medical school alma mater, and their losses in 2004 were sad chapters in what was otherwise a glorious year for the school.

Glenda Garvey '69 devoted her entire career to P&S. As director of the Medical ICU, a unit she created, she cared for more than 10,000 patients and trained more than 1,000 young doctors. As director of the third-year clerkship in medicine for P&S students, she taught more than 3,000 students. A eulogy by Don Landry '83 said it best: "The underlying theme to the long list of her personal and professional virtues—compassion, caring, intelligence, diligence, and so on—was the capacity to make an almost unimaginably complete gift of herself to others. To her patients and their families. To the young physicians who cared for those patients. To the medical students who by precept and practice followed in her footsteps."

Her death from cancer, while unwelcome, was not unexpected.

In contrast, the death of Steven Miller '84 in a Missouri airplane crash caused collective shock and heartbreak among his students and his colleagues. His devotion to the pediatric emergency room and its patients was legendary. As one colleague recounted at his memorial service, an encounter on his last day in the pediatric ER exemplified his charm, his expertise, and his indelible impact on students: The parents of a young child who was seriously ill wanted to transport the child to another hospital, but the emergency room staff advised against it. Dr. Miller, with a student alongside, took the parents into a conference room and persuaded them to keep the child at Columbia. After the discussion, the student turned to the emergency room personnel and, referring to Dr. Miller, said, "I want to be a doctor just like him."

If P&S—a school Dr. Garvey never left and Dr. Miller returned to—can sustain the standards the two set, the enthusiasm they brought to their work, and the compassion they showered on patients, students, and colleagues, their gifts to us will be forever memorialized.

## College of Physicians & Surgeons 2005–2006

### Enrollment, Fall 2005

M.D. program	604
M.D./Ph.D. program	73
[Note: The M.D./Ph.D. enrollment number for Fall 2004 should have been 77.]	
Other M.D. programs	78
Graduate programs	704

Full-time faculty	1,778
Living alumni	7,000
Budget (FY05)	\$1 billion
Endowment	\$1.125 billion (Dec. 31, 2005)
Endowed chairs	148
Research support (FY05)	\$494 million

Degrees granted	2004	'05
M.D.	151	147
M.D./M.P.H.	5	3
M.D./Ph.D.	4	1
M.D./M.B.A.	7	4
Ph.D.	53	86
M.S. in occupational therapy	40	35
M.S. in physical therapy	28	2
Doctor of physical therapy	23	49
M.S. in nutrition	34	20
Master's in biomedical informatics	9	14
Certificate in psychoanalysis	7	5





# Development

Thanks to our supporters, the P&S fundraising efforts met with unprecedented success in fiscal 2004 and fiscal 2005, bringing in \$214 million. This exceptionally fruitful two-year span was marked by the launch of our capital campaign, Defining the Future. Still in its initial phase, the campaign has already recorded significant milestones. All of the major programmatic initiatives rolled out under the campaign's banner enjoyed the enthusiastic patronage of friends in 2004 and 2005.

P. Roy Vagelos, M.D., retired Chairman and Chief Executive Officer of pharmaceutical industry leader Merck & Co., volunteered to serve as chair of the campaign. Dr. Vagelos graduated from P&S in 1954 and has brought extensive business experience and an intimate knowledge of medicine to our philanthropic enterprise.

We are fortunate in having supporters whose interests span the range of medical specialties. Their generosity has enabled each of our academic programs and clinical practices to thrive. These farsighted individuals are more than dedicated stewards of an illustrious tradition of research, care, and education. They are helping realize a vision of medicine in the 21st century.

Mr. and Mrs. Rand Araskog have generously endowed the A. Gerard DeVoe-B. Doblí Srinivasan Directorship of Ambulatory Eye Care in the Department of Ophthalmology. Dr. Srinivasan holds the

inaugural directorship, which oversees work in the ITT Eye Clinic of the Harkness Eye Institute, where 20,000 patients visit each year.

The Russell Berrie Foundation, founded by the late Russell Berrie and led by his wife, Angelica Berrie, has been a tireless champion of advanced research and care for diabetes. The Berrie Foundation's support of Columbia University has expanded the horizons of our understanding of, and ability to treat, diabetes.

Ann Saunders Brown made a gift in support of the Charles Brown Fellows in Aging and Dementia at the Taub Institute for Research on Alzheimer's Disease and the Aging Brain.

Robert L. Burch III made a gift to establish the Robert L. Burch III Professorship of Ophthalmology. The primary field of study of the incumbent will be in the area of retinal research.

Frank Cardile made a generous pledge to establish a professorship that will support research, education, and clinical care in the area of liver disease, with a focus on liver transplantation.

The Cystic Fibrosis Foundation provided grants to the Department of Pediatrics, as well as to the Departments of Medicine and Biological Sciences.

The Dyson Foundation contributed grants to General Pediatrics.

Loren Eng and Dinakar Singh, members of the Board of Visitors at Columbia

University Medical Center, contributed generously through their foundation, the Spinal Muscular Atrophy Foundation, to support various projects in SMA research in the Department of Neurology at Columbia University.

Thanks to the efforts of Lawrence Glaubinger, the Glaubinger Foundation provided funds for the Glaubinger Scholar Program. This initiative in Ophthalmology will support the research of Dr. Gaetano Barile and his team, as well as the professional development of future generations of ophthalmologists and clinical scientists.

The Estate of Phyllis Studner Grant contributed funds toward the Myron M. Studner Professorship in Cancer Research in the Department of Medicine, as well as the Myron M. Studner Scholarship Fund. These bequests were facilitated courtesy of Frederick Lubcher Esq., a member of the Medical Center's Professional Advisors' Circle.

Stanley and Joy Ho were instrumental in helping fund the Glenda Garvey Teaching Academy, an innovative program that will recognize and reward excellence in education at the Medical Center. The Academy is named in honor of the late Glenda Garvey, M.D., a beloved member of the faculty and a 1969 P&S graduate.

Herbert and Florence Irving continue to be mainstays of philanthropy at Columbia University Medical Center. With their contributions in support of the new Irving Cancer Research Center, they have ensured that Columbia will continue to play a preeminent role in the research and treatment of cancer and related conditions.

Johnson & Johnson established the Paul Janssen Scholars Program in

Translational Neuroscience. The program supports a fellowship and professorship with the objective of accelerating drug discovery and therapeutics for brain-related diseases. The program has been named to honor the life and work of the late Paul Janssen, a pioneer in the discovery of drug treatments for mental illness.

The Kavli Foundation committed substantial support to establish the Kavli Institute for Brain Science under the leadership of Nobel Laureate Eric Kandel. The Institute will focus on the development of novel experimental and computational strategies for analyzing and deciphering how signaling in neural circuits controls behavior.

Generous gifts from Stephen and Constance Lieber and the Essel Foundation continue to support the Lieber Center for Schizophrenia Research, now led by Jeffrey Lieberman, M.D., chairman of the Department of Psychiatry.

The Estate of Elizabeth Page Faulkner Lynch contributed funds to establish the James and Elizabeth Lynch Research Fund in Neurological Surgery; the Edgar M. Housepian Professorship of Neurological Research in Neurological Surgery; and the James and Elizabeth Lynch Fund for Medical Research in Medicine.

The SVM foundation created the Seymour Milstein Professorship of Cardiology in the Department of Medicine and the Vivian Milstein Associate Professorship of Clinical Surgical Oncology in the Department of Surgery and the Irving Comprehensive Cancer Center. The Milsteins have been longstanding supporters of the Medical Center.

The Medical Illness Counseling Center



*J. John Mann, chief of neuroscience in psychiatry, is the Paul Janssen Professor, supported by a gift from Johnson & Johnson. From left are P&S Dean Gerald D. Fischbach, Psychiatry Chairman Jeffrey Lieberman, Dr. Mann, and David Y. Norton of Johnson & Johnson.*



*Herbert and Florence Irving*



*Marriott Mitochondrial Disorder Clinic Research Fund: Standing from left are Michio Hirano, Steve Hersh, Eric Schon, and Salvatore DiMauro with Steve Marriott, seated*



*Russ and Angelica Berrie, center, with Berrie Center Co-Directors Robin Goland and Rudolph Leibel*



*Joy and Stanley Ho*



Henry and Marilyn Taub

established the Marriott Mitochondrial Disorders Clinic Research Fund in the Department of Neurology. This will advance pioneering research on this group of metabolic disorders.

The Moody's Foundation, a charitable foundation established by Moody's Corporation, is supporting a promising two-year research initiative in the Department of Psychiatry to investigate the early detection and prevention of childhood bipolar disorder.

G. Lynn Moore gave generously to the David A. Gardner PET Brain Imaging Center, named in honor of her late husband. It will be instrumental in helping understand the effects that various diseases and mood disorders have on the brain and will play a vital role in monitoring treatment response.

We are grateful to Suzanne C. Murphy for her stalwart commitments supporting novel research projects and key personnel in the Division of Child Psychiatry.

The Physicians Relief Fund made a significant contribution to endow need-based scholarships for medical students who are children of physicians practicing in New York City and the New York state area.

Ilona and Donald O. Quest, M.D., P&S 1970, pledged support toward the Quest Professorship in Neurological Surgery.

The Blanchette Hooker Rockefeller Fund gave generously to the Taub Institute for Research on Alzheimer's Disease and the Aging Brain.

La Fondation Sackler/the Sackler Foundation continues to provide essential support to the Sackler Institute for Developmental Psychobiology in the Department of Psychiatry.

The Simons Foundation is helping to

support three clinical professionals at Columbia's newly formed Developmental Neuropsychiatry Program for Autism and Related Disorders. The program provides state-of-the-art clinical services in coordination with the University's multidisciplinary research teams. The Simons Foundation also funded an autism symposium that brought together senior neuroscientists from around the world to share recent findings and academic trends relating to the underlying biology of the condition.

Jerry and Emily Spiegel have been instrumental in providing support to create the Jerry and Emily Spiegel Laboratory for Cell Replacement Therapies. It is primarily devoted to Parkinson's disease research.

Bernard Spitzer continues to offer critical support to Columbia University Medical Center's investigations of the potential of stem cells in treating neurological disorders.

Judith Sulzberger, M.D., P&S 1949, established the Isidore Edelman Professorship to honor one of Columbia's esteemed faculty members. Dr. Sulzberger has played a central role in supporting a host of major initiatives at the medical center, most notably the Judith P. Sulzberger Genome Center.

Henry and Marilyn Taub continue to provide essential support to the Taub Institute for Research on Alzheimer's Disease and the Aging Brain.

Columbia University Trustee Clyde Wu, M.D., P&S 1956, made a generous gift to name the Clyde and Helen Wu Center for Molecular Cardiology. Research at the center has uncovered the fundamental mechanisms underlying heart failure, promising a host of new therapies to treat it.

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Emily and Jerry Spiegel, center, with grandson, David Wilks, and Fiona Doetsch



Judith Sulzberger



From left: Gerald Fischbach; Herbert Pardes, Mortimer Sackler and Kathe Sackler, B. Timothy Walsh, Ilene Sackler Lefcourt and Myron Hofer at the 2001 dedication of the Sackler Institute for Developmental Psychobiology



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We mourn the recent loss of these friends and  
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# Financial Highlights 2004–2005

As predicted in last year's report, financial pressures have continued to force difficult choices for the leadership of P&S and the medical center. Losses carried over from previous years, particularly from our affiliation agreements, put the FY 2004 budget for CUMC at an operating deficit of \$19.5 million coming into the year. Swift and judicious priority-setting by the administration virtually erased this deficit for FY 2006. That budget will permit continued robust recruiting of researchers and clinicians and support of special projects, at an increase of nearly \$7 million over FY 2004 levels. We refuse to compromise on excellence.

During FY 2004, P&S revenues totaled \$1 billion. The largest single source of revenue, government grants, accounted for 34 percent of that budget, which marks a 7 percent increase in direct government research revenue. Several Columbia departments continue to rank among the top 10 in NIH awards. These include Neurology (#1), Nutrition (#2), Pathology (#4), Physiology (#6), Dermatology (#7), Genetics (#8), Obstetrics & Gynecology (#8), and Urology (#10).

Faculty practice revenues, the second largest source of income at 31 percent, also increased by approximately 7 percent. In previous years, faculty practice income was our biggest revenue generator. We have taken steps to help this source of dollars grow. We formed a Faculty Practice Task Force to create a new model for faculty

practice that will allow clinical faculty to assume leadership of their own faculty practice affairs. The new model will better serve the goals of our clinicians—improve the work environment, the patient's experience, and the clinician's financial security—and better support our academic mission. The task force has developed a roadmap to implement the faculty practice's vision for the model. Renewed marketing of our faculty expertise is ongoing. The faculty practice started a physician access line, a joint venture with New York-Presbyterian Hospital. This MD-to-MD referral service, which should increase patient referrals, office visits, and hospital admissions, is modeled after successful ventures at other academic medical centers.

Our capital campaign, *Defining the Future*, is performing strongly. We have garnered pledges of \$370 million in its first two years. We fully expect to be halfway toward our goal of \$1 billion by June of 2006. Our endowment is edging close to \$1 billion, with funds of \$920 million. Fund-raising will continue to be a priority, and its success will be even more important as federal funding for research remains constant. Endowed professorships grew from 112 to 133 during the past two years.

Our prospect for revenues from government research support will continue to be more challenged than in prior years, as the projected 2006 budget for the National Institutes of Health lags inflation for the first

time in more than two decades. We have significantly increased the resources available for recruitment over the past few years and that should better fortify us to compete for the shrinking pool of federal dollars.

Recruitments during the past few years have given us a good start on growing our research programs. James Rothman, recruited to Columbia in 2004, has assumed leadership of the Judith P. Sulzberger, M.D. Columbia Genome Center. His work as a cell biologist has been recognized with both the Mary Lasker Award and Columbia's Louisa Gross Horwitz Prize. Other notable recruits include Jeffrey Lieberman, a schizophrenia expert, as chairman of the Department of Psychiatry and director of the New York State Psychiatric Institute; Betty Diamond, rheumatologist; Thomas Herzog, gynecological oncologist; Thomas Pickering, hypertension expert; Fiona Doetsch, stem cell researcher; Jeffrey Moses and Martin Leon, interventional cardiology; and Tim Wang, gastroenterologist. All lead active and prolific research programs.

We also strengthened our Irving Comprehensive Cancer Center with the appointment of Riccardo Dalla-Favera as director. Dr. Dalla-Favera is a distinguished investigator in the molecular genetics of cancer. An international leader in the field of lymphoid neoplasia for the past 20 years, his ongoing work on human B cell lymphoma remains at the forefront of this challenging and clinically important disease. He will recruit experts to lead programs in medical oncology, surgical oncology, and cancer biology, areas that will strengthen our research funding competitiveness.

Strengthening our research infrastructure also will help us compete for federal

research dollars. We appointed Jane Tsambis as associate vice president for research administration; her expertise and experience in academic research administration at New York University and Mount Sinai School of Medicine will help us be as competitive as possible.

Recruitment of Alan Dzija to the position of Chief Financial Officer for the medical center and Vice President for Budget and Finance in February 2005 enabled us to renew our vigilance over financial matters. Mr. Dzija, a specialist in managing clinical finances in academic medicine, particularly in clinical practice, has brought more than 25 years of experience as a consultant in academic medicine to this position.

The Office of Budget and Finance that Mr. Dzija leads plans to carefully reinforce the informal reporting between the overall medical center finance operations and individual departmental finance functions. Strategic budget reviews assessing the relative roles of research, teaching, and clinical services in revenue generation will continue. These, together with monthly results reporting, will provide a clearer, more timely picture of financial developments as they happen, enabling us to better maintain strict financial controls.



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