



# URMC School of Medicine & Dentistry



Lynne E. Maquat, Ph.D.

Arthur J. Moss, M.D.

Donald R. Bordley, M.D.



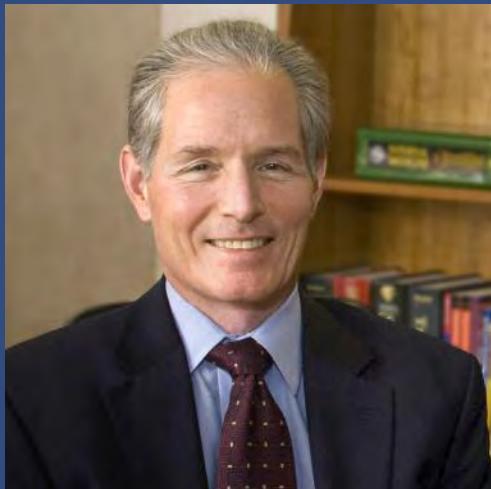
MEDICINE *of* THE HIGHEST ORDER

**Bradford C. Berk, M.D., Ph.D.**  
CEO, University of Rochester Medical Center  
Senior Vice President for Health Sciences

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**Mark B. Taubman, M.D.**  
Dean of the School of Medicine and Dentistry  
Vice President for Health Sciences

# Once again, the University of Rochester School of Medicine & Dentistry and the Medical Center played major roles on the national stage in a year of significant awards and accomplishments that promise more and better achievements.



Lynne E. Maquat, Ph.D., the J. Lowell Orbison Chair and professor of Biochemistry and Biophysics, was elected this year to the National Academy of Sciences. One of the top RNA scientists in the world, Dr. Maquat well deserves this honor. We are very proud she is a member of our faculty.

The National Institutes of Health renewed our Clinical and Translation Science Award, a \$21 million vote of confidence in our leadership in this growing and important field. We opened the \$60 million Saunders Research Building, where our Clinical and Translation Science Institute is housed. Saunders has become the home of some 600 researchers and staff, from whom we expect significant advances. Rochester entrepreneur and philanthropist B. Thomas Golisano, pledged \$20 million for our new \$134 million Golisano Children's Hospital that we plan to complete by 2015.

Four of our programs earned a spot in the Top 50 rankings issued in July by *U.S. News & World Report* for its list of the "2011–12 Best Hospitals in America." Those programs on the national list are: Gynecology, rated as the #32 best; Urology placed as #39; Nephrology scored at #42; and Neurology and Neurosurgery landed on the list at #48.

The strength of our faculty is one reason we have made many steps forward in the last year. As a demonstration of this strength, this publication highlights eight of our faculty



members who, like Lynne Maquat, are national leaders in their field.

In a spectacular 50-year career, **Art Moss** has made major discoveries in the treatment and prevention of cardiac arrhythmias and heart failure. **Diane Hartmann** and **Don Bordley** are thoughtful and well-respected leaders of those who train residents, a vital community for the future of health care. **Judith Baumhauer** is the president of the American Orthopaedic Foot and Ankle Society, the first woman elected to the position. **Charles Thornton**, who is making great advances on a treatment for myotonic dystrophy, received a \$4 million grant for his groundbreaking work. And **Craig Jordan** and **Lois Travis** are national leaders in two important aspects of curing cancer. Craig Jordan has produced encouraging results in his search for new powerful treatments for cancer while Lois Travis shapes enhanced and smarter care for those who survive cancer.

These are just some of the reasons for a productive and rewarding year and why we are confident in the years ahead for our School of Medicine and Dentistry and our Medical Center.



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# Lynne E. Maquat, Ph.D.

## Untangling the complexities of RNA, Maquat joins the prestigious National Academy of Sciences.

Lynne E. Maquat, Ph.D., a pioneering investigator of the complex world of RNA biology, has achieved a pinnacle of recognition of her work—election to the National Academy of Sciences.

Maquat, the J. Lowell Orbison Chair and professor of Biochemistry and Biophysics at the University of Rochester School of Medicine and Dentistry, is known throughout the world for her research on nonsense-mediated mRNA decay.

She also is an active supporter of academic research and women in science.

"Throughout my career I've looked up to members of the National Academy of Sciences, especially the relatively few women who are members, as scientific role models," Maquat says. "I am humbled by my election. At the same time, I am happy to have my lab's research accomplishments recognized in such a way. I am also looking forward to new challenges as I am asked to serve in even greater capacity than I do now as advisor to the nation's scientific processes."

Maquat is considered the uncontested pioneer in her field. In an article published in February in *Nature*, for example, she described one way genes are regulated that is unique to primates. The newly identified mechanism involves Alu elements,

whose function has been largely unknown. Maquat discovered that Alu elements team up with molecules called long noncoding RNAs to regulate protein production. They do this by ensuring messenger RNAs, which take genetic instructions from DNA and use it to create proteins, stay on track and create the right number of proteins.

Maquat is an active promoter of RNA research and supporter of the scientists who work in the field. A member of the RNA Society since its formation in 1993, she has held every elective office in the organization and served as its president from 2006 to 2007. During her presidency, she introduced post-doctoral and graduate student representatives as peer group leaders to help younger members become more engaged in the society. She started a Women in Science Dinner and organized multiple career mentoring workshops. In 2010, Maquat was honored with the society's Lifetime Achievement Award in Service.

Maquat also organizes conferences, including a Gordon Research Conference in 2010 in Newport, R.I., and the 2011 meeting of the RNA Society in Kyoto, Japan.

Relative to men, many fewer women who earn a Ph.D. degree end up having a career that utilizes that degree; those who do often

do not rise to the top of their profession. In Rochester, Maquat created and leads the University of Rochester Graduate Women in Science program, which provides mentoring, funding for travel to conferences and outside guest speakers who are successful scientists in academics, industry and related fields.

"When I was a graduate student, there were no female faculty in my department, and some male faculty did not believe women should be training for a career in research science," Maquat says. "For me, there was also a constant battle between excitement over the work and worry that I might not be on an experimental path that would lead to discovery. All of this translated to mixed feelings that included love for the challenge but self-doubt about my abilities. At the time, I would have welcomed a group like I've created in Graduate Women in Science to help me stay grounded. It would have been very helpful for me to have interacted with successful women scientists who are open to revealing how they managed their career and personal issues that came up along the way."

Maquat was elected to the American Academy of Arts and Sciences and the Association for the Advancement of Science in 2006.



AUG PTC  
Endonucleolytic decay by SMG6 and 3'-to-5' exonucleolytic decay of 5'-cleavage product

AUG PTC

UPF1 ATPase-dependent disassembly and 5'-to-3' exonucleolytic decay product

eRF3  
eRF1

Norm Ter

PAB AA(A)<sub>n</sub>

cleolytic by SMG6 at

UPF1 2MG UPF2 UPF3 or 3X

PABPN1 PABPC1

phorylation'



# Diane M. Hartmann, M.D.

A national leader in resident training, Diane Hartmann plans for the future while remembering the past.

Diane M. Hartmann, M.D., who oversees the training of more than 750 residents and fellows at the University of Rochester School of Medicine and Dentistry, focuses on the needs of the 21st Century physician while investigating ways to maintain the values of her 20th Century education.

"How do you stay true to the humanistic tradition when you walk around with an iPad and rely on it to communicate with patients electronically?" asks Hartmann, the Senior Associate Dean for Graduate Education at the School of Medicine and Dentistry.

A professor of Obstetrics and Gynecology, Hartmann is recognized nationally as a leader in resident education, giving several presentations annually across the country. She currently is a member of the Association of American Medical College's Advisory Panel on Medical Education. From 2008 to 2011, she chaired the Council on Residency Education in Obstetrics and Gynecology.

"I was trained under Rochester's biopsychosocial model. It has become a part of how I practice and how I take care of people," Hartmann says. "People often think the model is just focuses on effective communication, but it is much more than that. I look at a patient, not only considering

the molecular biology and disease process, but also focusing on how their health affects their family and affects the health of the community they have to go back to. I have to consider all those factors to take care of the whole person. I am responsible for training the physicians of the 21st Century, when many new skills are becoming much more important. I want to make sure those skills fit in with this model that Rochester has held dear for many years and still holds dear."

In 2009, the Accreditation Council for Graduate Medical Education (ACGME) named Hartmann a recipient of the organization's Parker J. Palmer Courage to Lead Award that honors officials who have facilitated residents' ethical, professional, and personal development, and ensured safe and appropriate care of patients. In 2005, under her leadership, the School of Medicine and Dentistry received an unprecedented six-year accreditation for its residency programs from the ACGME.

Hartmann and her Rochester colleagues now are working on ways to teach residents health information technology and methods for interpreting the volume of data that technology can produce. She emphasizes the future of team-based health care, investigating links with the University's

School of Nursing. She also is developing programs for residents in quality and safety and patient-and-family-centered care.

Hartmann also practices general ambulatory gynecology with a special clinical expertise in the areas of menopause and geriatric gynecology.

"I love what I do because I continue to take care of my own patients as well as supervise residents in our women's health practice," Hartmann says. "As a dean, I am challenged every day to think of a better way to do things here and to work with each of our programs to make sure they put their best educational program on the table. My eyes are always on the future. It is fun to do this here because this place is very supportive of medical education. It is viewed as a primary mission and it is backed up."

Hartmann's colleagues describe her as the essence of Rochester's motto and spirit – *Meliora*, which means "ever better."

# Donald R. Bordley, M.D.

Even after three decades of mentoring residents, Don Bordley still seeks the quintessential triangle.

The power of encounters at a patient's bedside and the guidance of Donald R. Bordley, M.D., have shaped the future of hundreds of physicians who trained at the University of Rochester School of Medicine and Dentistry.

"I am a firm believer that the quintessential educational experience happens when a teacher and the learner and a patient are together at the bedside or in the examining room," says Bordley, who has mentored residents in Rochester for 30 years and directed the School of Medicine and Dentistry's internal medicine residency program for almost 15 years.

Technology, simulations, lectures and research all have value. But Bordley looks to the "triangular encounter" for the lessons that ultimately create the best physicians. "Where you really find out how people can function as doctors is with real patients," he explains. "All of my most memorable experiences, both as a resident and as an educator, have been around interactions with patients."

Bordley has preached his belief in bedside education nationally. From 2007 to 2010, he served as president-elect, president and then past-president of the Association of Program Directors in Internal Medicine,

which has more than 2,000 members from 380 medical schools and teaching hospitals. He was on the board of directors of the Alliance for Academic Internal Medicine during the same period. He now chairs the Alliance's Governance Task Force.

Although Bordley cherishes his traditional approach, he supports innovation in the training of residents. The School of Medicine is redesigning the resident's outpatient practice as a patient-centered medical home. Bordley also is overseeing a pilot program that will give residents longer blocks of time in ambulatory primary care practices and selected subspecialty practices.

"This will allow a resident to see a patient multiple times and that means a more meaningful and a better learning experience," Bordley says. "A critical element of this institution is the commitment to the educational mission at the highest level of leadership. It is genuine and unwavering, in spite of the fact that it is not always the cheapest way to go. I have never had any trouble over my years of running this program in getting support from institutional leadership for any changes we need to make, even when they have been costly to the hospital. Because of my involvement in national organizations, I know how unique

it is to have such support and how fortunate I am to have accomplished what we have."

A graduate of Johns Hopkins University School of Medicine, Bordley came to Rochester in 1976 for his residency training during the tenure of William L. Morgan, M.D., as director of the program. Along with George Engel, M.D., Morgan wrote *The Clinical Approach to the Patient*, the influential textbook that had a humanizing effect on medical teaching.

"Of all the people I have worked with professionally, I respected him more than anybody because of his clinical excellence, his integrity, his advocacy for residents," Bordley says. "I wanted to be like him. The best way to be like him was to wait for an opportunity to have the job he did with such distinction."

Today, Bordley not only directs the residency program, he is the first William L. Morgan Professor in Medicine.





# Judith F. Baumhauer, M.D.

A woman of many firsts,  
Judith Baumhauer takes the lead  
in advancing foot and ankle care.

Call Judith F. Baumhauer, M.D., a physician, an orthopaedic surgeon and a researcher, but also call her a trailblazer.

In July, Baumhauer, a professor of Orthopaedics at the University of Rochester School of Medicine and Dentistry, was installed as president of the American Orthopaedic Foot and Ankle Society (AOFAS), the first woman to lead the professional organization in its 42-year history.

In 2008, she was elected the first woman president of the Eastern Orthopaedic Association, a regional professional organization. In 1995, Baumhauer was the first female appointed to the School of Medicine and Dentistry's Department of Orthopaedics and Rehabilitation faculty, and she is one of the nation's few female professors of foot and ankle surgery.

"Diversity is very important in providing care to patients," Baumhauer says "I would love to have more women interested in orthopaedics, as this has been traditionally a man-dominated field. My election suggests that as foot and ankle orthopaedists, we are gender-neutral and the most qualified man or woman can lead the society. I am thankful for the opportunity to lead."

Baumhauer treats patients, conducts research, and directs the Strong Foot and

Ankle Institute, a joint venture in clinical care and research between the University and the Ithaca College Physical Therapy Department. Physicians and scientists at the Institute study a variety of problems including plantar fasciitis, amputation, arthritis of the foot and ankle, painful flatfoot, and the most cost-effective ways to treat common ailments such as bunions and hammertoes.

Baumhauer has received the prestigious Roger Mann Award for excellence in clinical research and the J. Leonard Goldner Award for outstanding basic science research. In the summer of 2010, Baumhauer traveled to Vietnam as a surgical volunteer with the AOFAS Overseas Outreach Project, where she worked in primitive, minimally supplied facilities to correct severe limb deformities due to accidents, birth defects, or other health problems. In January 2011, she visited India to give lectures and conduct three live surgeries to teach the latest procedures.

As AOFAS president, Baumhauer promotes the organization's mission, advancing patient care through research, education, and humanitarian efforts. She and AOFAS are investigating the potential of providing research resources to members to study foot and ankle problems more efficiently and effectively.

"It could help us answer important questions. What is the most cost effective treatment for a foot problem? How well do surgical outcomes match with the patient's wishes?" Baumhauer says.

The project also would enable orthopaedic foot and ankle surgeons to work together throughout the world to participate in data entry on various topics, allowing researchers to reach conclusions in a much shorter period of time. It would match Baumhauer's focus, which has been to help people function as normally as possible, whether they have a life-altering degenerative disease, a serious injury, or a chronic condition.

"We tend to take our feet and our ability to move for granted. Approximately half of all Americans will face a foot or ankle problem at some point in their lifetime," Baumhauer says. "Women have foot problems two times more commonly than men. Although as doctors we don't have to have the disease to treat it, I have a unique perspective. I have walked in their shoes."

# Craig T. Jordan, Ph.D.

Searching for new ways to attack cancer, Craig Jordan turns to the plant world, chemistry and collaboration.

Craig T. Jordan, Ph.D., professor of Medicine and of Biomedical Genetics at the University of Rochester School of Medicine and Dentistry and director of Translational Research for Hematologic Malignancies at the James P. Wilmot Cancer Center, has a new title to add to his list.

In June, Jordan was named the Philip and Marilyn Wehrheim Professor, an endowed position created to support his work. Jordan is a nationally recognized leader in research on cancer stem cells and innovative therapies for leukemia and other malignancies of the blood, bone marrow and lymph nodes. The endowed position is a further endorsement by the University and the donors of his efforts to investigate a different route to attacking cancer.

"There are a lot of ideas about targeting leukemia stems cells but not much has reached the clinic," Jordan says. "In leukemia and other cancers, we desperately need some new directions. The ways we've been treating these diseases and a lot of the research paths do not incorporate knowledge gained in the past few years. Fresh thinking on how to approach these things is critical."

For more than a dozen years, Jordan, who joined the School of Medicine and

Dentistry faculty in 2003, has made human leukemia cancer stem cells the primary target of his research. Cancer stem cells seem to resist many traditional treatments and could be the source of a cancer's emergence from remission.

First identified in 1994 in relation to acute myeloid leukemia, cancer stem cells also have been identified in several solid tumors in mice as well. Scientists who study cancer stem cells believe they have distinct properties from other cancer cells, and may be the first cells to undergo mutations.

In the laboratory, Jordan and a team of collaborators have developed a compound based on parthenolide, a component of the feverfew plant, and demonstrated that it can cause leukemia cancer stem cells to self-destruct. The drug is now being tested in people with leukemia in a Phase 1 trial.

"This compound has the wonderful property, in the laboratory at least, of very nicely killing cancer stem cells that cause leukemia but also not harming or being much less toxic to normal stem cells that create blood," Jordan says. "We'll soon have a better feel for its utility in people."

Jordan sees collaboration across disciplines as an effective way to hurdle cancer's obstacles. He is working with

Rudi Fasan, Ph.D., a University of Rochester assistant professor of Chemistry, who has developed a novel way to make a new form of parthenolide he hopes will be shown to be superior in leukemia patients.

Jordan also collaborates with Alison J. Frontier, Ph.D., a University associate professor of Chemistry, who has developed a synthetic molecule based on a different plant-derived compound called rocaglamide.

"This is an encouraging compound that we believe may be an effective drug for killing leukemia stem cells," Jordan says. "Agents of this type represent a rather different approach that has never been used for leukemia patients. Ultimately, will they be better? I don't know, but our laboratory results thus far appear promising. We are doing some fresh thinking and we hope it pays off. This is academic science at its best. Put a bunch of good people together. Focus them on a difficult problem and see whether they can come up with new solutions."





# Lois B. Travis, M.D., D. Sc.

In groundbreaking research, Lois Travis works to make a better and healthier future for cancer survivors.

Lois B. Travis, M.D., D. Sc., is on a mission to improve the lives of cancer survivors.

A professor of Radiation Oncology at the University of Rochester School of Medicine and Dentistry and director of the Rubin Center for Cancer Survivorship, Travis is accomplishing her mission with multiple groundbreaking studies of the late effects of chemotherapy and radiotherapy and the initiation of research on biomarkers that could identify patients at greater risk for the late effects of cancer treatments.

"It is not enough just to cure a cancer patient. We have to think downstream. What is the potential cost of the cure to the patient in the future?" Travis says. "Did we inadvertently introduce some long-term toxicity from cancer treatment? For young cancer survivors, how might the normal aging process interact with any long-term toxicities they develop? This is a potential problem of the success of treatment, and we must carefully consider these issues when we initiate cancer therapy. Clinicians work hard to give patients their lives back, but we now need to optimize the quality of that life. That is where my work comes in."

Trained at the Mayo Clinic and the Harvard School of Public Health, Travis joined the Rochester faculty in 2009 after

two decades of research as a principal investigator at the National Cancer Institute, where she helped launch the investigation of the long-term physiologic and psychosocial consequences of cancer treatments and directed a large number of international, multi-center studies.

In one study, for example, published in the *Journal of the American Medical Association*, Travis and her team showed that young women treated with radiotherapy for Hodgkin's lymphoma had a significantly increased risk of breast cancer, with the risk increasing with increasing radiation dose. This prompted large-scale efforts to screen the women. In a study, published in the *New England Journal of Medicine*, Travis and her colleagues concluded that women treated for ovarian cancer with platinum-based chemotherapy have a two- to eight-times greater chance of developing leukemia.

Another study of patients treated with chemotherapy and radiation for Hodgkin's lymphoma found an increased risk of lung cancer and that those patients who smoked increased their risk 50-fold.

"This is valuable information," Travis says. "The time of cancer diagnosis is a teachable moment. The patient is interested in health, and we can intervene in regard to habits,

such as smoking, diet and exercise, and ensure that health promotion becomes a part of survivorship plans."

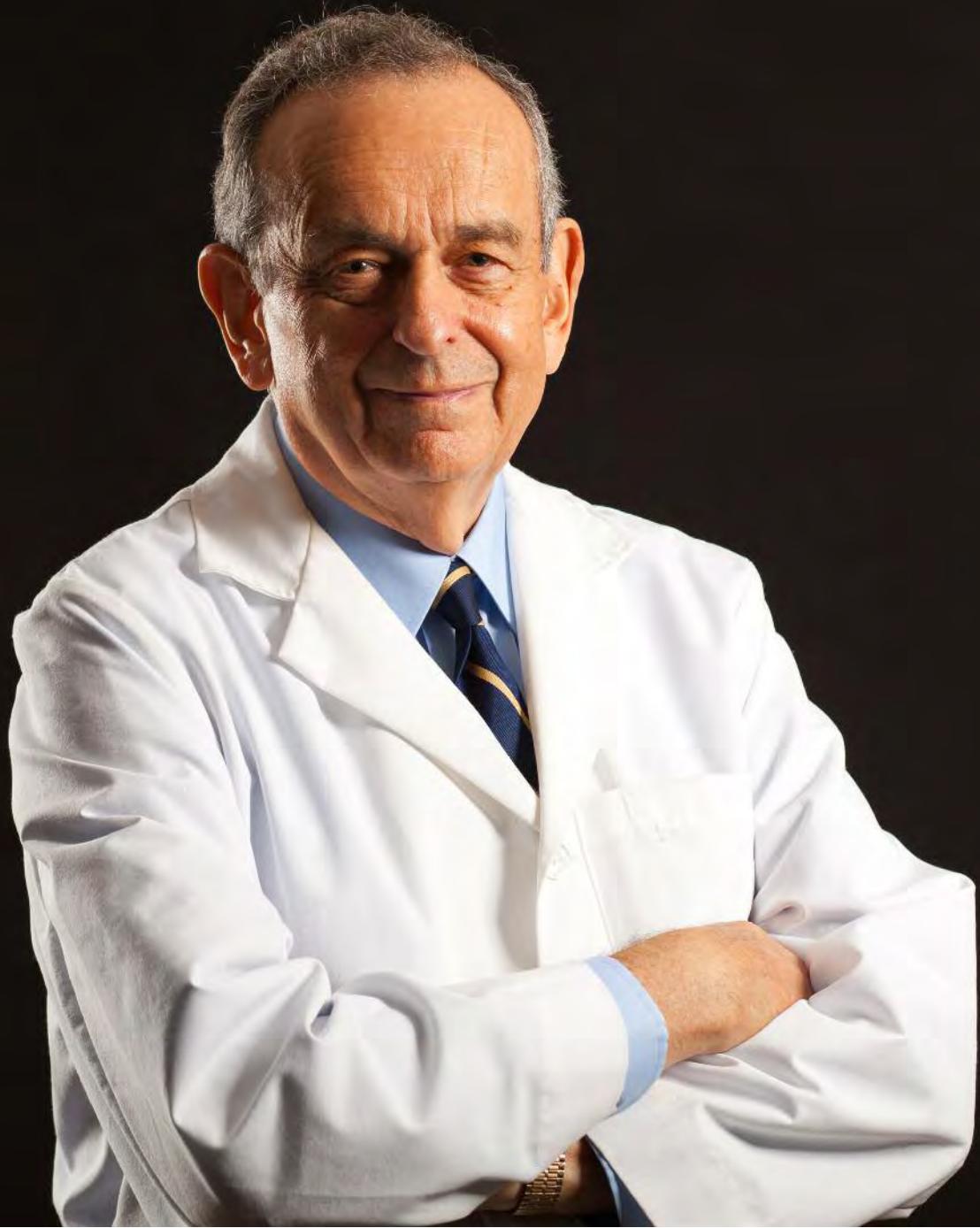
Travis also plans to investigate genetic susceptibilities to the toxicities of platinum-based chemotherapy.

"Platinating agents are the most commonly used group of drugs worldwide to treat cancer, yet little has been done to evaluate the genetic susceptibility to late effects of treatment," she says. "Is it possible to identify, for example, who has debilitating sensory neuropathies because of a genetic sensitivity? If we could identify these and the underlying biologic mechanisms, we could intervene and perhaps prevent or ameliorate the toxicities."

Travis and her colleagues also are putting together a North American study to track a large group of cancer survivors for decades to learn the changes in their lives and that of their children as a consequence of treatment.

Travis came to Rochester to create a national outreach to survivors and to expand transdisciplinary study of the late effects of cancer treatment.

"Cancer does not occur in a vacuum. You have human beings with many concerns, and we should find ways to ensure their health and well-being long term," Travis says.



# Arthur J. Moss, M.D.

With 50 years of experience and significant findings, Art Moss works to unravel more mysteries of the heart.

For five decades, Arthur J. Moss, M.D., has pursued the rhythms and disturbances of the heart.

During that time, Moss, a professor of Cardiology at the University of Rochester School of Medicine and Dentistry, has become an internationally recognized expert who has made significant discoveries in the treatment and prevention of cardiac arrhythmias, sudden cardiac death, and heart failure in a spectrum of disorders.

And he is not finished with his pursuit.

In May, Moss received the Heart Rhythm Society's Distinguished Scientist Award, given annually to an individual who has made major contributions to the understanding and treatment of heart rhythm disorders.

"Very few individuals have made such enormous advances in the field of electrophysiology as Dr. Moss. He has truly transformed the care of hundreds of thousands of individuals and added importantly to the scientific body of knowledge," said Paul J. Wang, M.D., head of Cardiac Electrophysiology at Stanford University who presented the award at the Society's annual meeting.

In 2009, Moss won the Golden Lionel Award, given every two years at the International Workshop on Cardiac

Arrhythmias to recognize "eminent authority in the field of arrhythmology."

Moss' more than 550 publications include studies from the Multicenter Automatic Defibrillator Implantation Trial or MADIT, a series of trials in which has been and is the principal investigator. In 2002, he demonstrated that preventive therapy with an implantable cardioverter defibrillator significantly reduces the risk of death in heart attack survivors. The finding, published in the *New England Journal of Medicine*, changed medical guidelines nationwide and led to the use of ICDs in millions of patients each year.

In 2009, Moss completed the MADIT-CRT trial, finding that cardiac resynchronization therapy improves the mechanical pumping action of the heart and prevents the progression of heart failure in patients living with mild forms of heart disease. This study led the FDA to extend approval of the device to patients with mild heart failure to prevent progression to advanced disease.

Moss also is known for his key findings influencing the care of patients with Long QT syndrome (LQTS), an inherited disorder with life-threatening arrhythmias. In 1979, he launched the International LQTS Registry, a database of families with the LQTS trait and one of the first registries for any genetic

disease in the world. His creation of the registry and pioneering studies helped Moss become one of the first physicians to investigate in depth how genetics influence one form of heart disease. Moss, together with other experts, provided many of the most important insights into the diagnosis, prognosis, and treatment of this syndrome.

Although he has five decades of research behind him, Moss continues to unravel the mysteries of the heart.

"One goal is to gain new and added insight into the genetic mechanisms responsible for life-threatening heart rhythm disorders in the hereditary Long QT Syndrome. With this information we can more effectively improve survival with tailored, patient-specific therapy in affected patients with this disease entity," Moss says. "Another goal is to develop more effective device therapy to improve outcome and reduce heart failure in adult patients with common forms of heart disease. We continue to make progress."

# Charles A. Thornton, M.D.

Aiming to reverse a genetic disease, Charles Thornton uses determination and antisense to achieve his goal.

When Charles A. Thornton, M.D., began treating patients with genetic diseases and investigating potential cures two decades ago, the prospects for an effective remedy were, as he says, "very dim."

Today, Thornton, a professor of Neurology at the University of Rochester School of Medicine and Dentistry, and his colleagues are moving steadily ahead on a therapy that reverses the symptoms of myotonic dystrophy. He has demonstrated the reversal in mice and, in April, the National Institutes of Health awarded Thornton a \$4 million grant to support his work to the point of human trials, perhaps within five years.

"If by cure you mean you give it once and people would be free of needing additional treatment, then this is not a cure, but I do believe this could bring sustained and major improvement in symptoms of the conditions," says Thornton, who is codirector of the University's Neuromuscular Disease Center.

Thornton's work reflects the integrated approach taken by many physicians and scientists at the School of Medicine and Dentistry and the University's Medical Center. Thornton routinely splits his day between seeing patients and working in the laboratory. He has followed many patients for years and

they have contributed muscle cells and tissue samples for research. The Medical Center is home to a national registry of dystrophy patients from throughout the United States, many of whom participate in trials conducted at the University's Clinical Research Center.

"We have a relatively unique circumstance in which, under one roof in one medical center, there are people attacking the problem from many aspects," Thornton says. "We have people analyzing genes, making mouse models, doing basic research, doing clinical research. We have hundreds of patients who come for study visits repeatedly over the years so we can compare developments in animal models and people. We have people involved in optimizing the drugs to identify the ones that may have the strongest therapeutic effects and smallest risk of side effects. We have people totally engaged in developing the methods that will track a therapeutic effect once they advance to stage of clinical trials. There is a big efficiency and I envision others working on other genetic diseases the same way."

In 1992, scientists discovered the source of myotonic dystrophy, a mutation of the DPMK gene on chromosome 19. In 2000, Thornton's team developed the first

transgenic mouse model of myotonic dystrophy that enhanced research significantly. The team demonstrated that the culprit in myotonic dystrophy is a toxic messenger RNA. No essential component of muscle is missing, but some important proteins are in the wrong place, stuck on the toxic RNA.

His team has developed a synthetic molecule, called an antisense morpholino oligonucleotide, which mimics a segment of the genetic code. The molecule specifically was designed to bind to the toxic RNA and neutralize its harmful effects by releasing the stuck proteins. The team also has developed other synthetic molecules that send the toxic RNA into a rapid degradation pathway.

Thornton believes any problems delivering these molecules in people can be overcome and the treatments have reasonable prospects of bringing about a reversal. He also believes that using this approach to target RNA has a promising future in other diseases.

"We are in a line of research that suggests you can actually get reversal of genetic symptoms even after they are fully developed," Thornton says. "You can get reversal by finding very specific ways to manipulate gene expression in the body that can compensate for genetic diseases. That is an important line to follow."

A portrait photograph of a middle-aged man with short brown hair, wearing a white lab coat over a light blue button-down shirt. He is standing against a soft, out-of-focus background. The lab coat has handwritten text on the left chest: "Charles Anton, MD" and "Dept. of Urology".

Charles Anton, MD  
Dept. of Urology

# As an initial CTSA recipient, Rochester's leadership affirmed by National Institutes of Health renewal.

In a challenging economy and with strong competition for funding, the University of Rochester Medical Center earned a National Institutes of Health Clinical and Translational Science Award (CTSA), a \$21 million grant that supports the Medical Center's biomedical research.

In 2006, the Medical Center was one of the first 12 institutions in the nation to receive a CTSA from the NIH, a \$40 million grant that helped launch an expansion of clinical and translational research.

The new award, which was effective July 1, renews the NIH endorsement of the Medical Center's programs.

"This new grant represents an affirmation of our community's commitment to invest in biomedical research and recognizes that in order to make significant advances in medicine institutions need to bring together people with the expertise necessary to help move research from one stage to the next," said Bradford C. Berk, M.D., Ph.D., the Medical Center's chief executive officer.

The \$21 million grant supports the Medical Center's Clinical and Translational Science Institute (CTSI) that provides researchers a comprehensive and integrated set of services, expertise and resources. The Institute funds pilot research, oversees

new graduate programs in translational medicine, and serves as the nucleus for a coalition of 16 biomedical research centers in upstate New York.

In addition, the new award supports the work of several translational medicine initiatives, including:

- **Early-stage translational research**

The Center for Human Experimental Therapeutics helps researchers conceive, plan, and carry out the initial steps of translation, taking novel interventions from preclinical evaluation to the first human clinical trials. The Center builds upon decades of combined experience in conducting experimental therapeutics and running some of the more complex clinical studies in the world.

- **Comparative effectiveness research**

The Center for Research Implementation and Translation, a partnership between the University's School of Nursing, and the Departments of Community and Preventive Medicine and Psychiatry, conducts research in real-world settings comparing the benefits and harms of different interventions and strategies to prevent, diagnose, treat and monitor health conditions. The Center's goal is to identify new approaches that

improve care and lower cost.

- **Public-private partnerships**

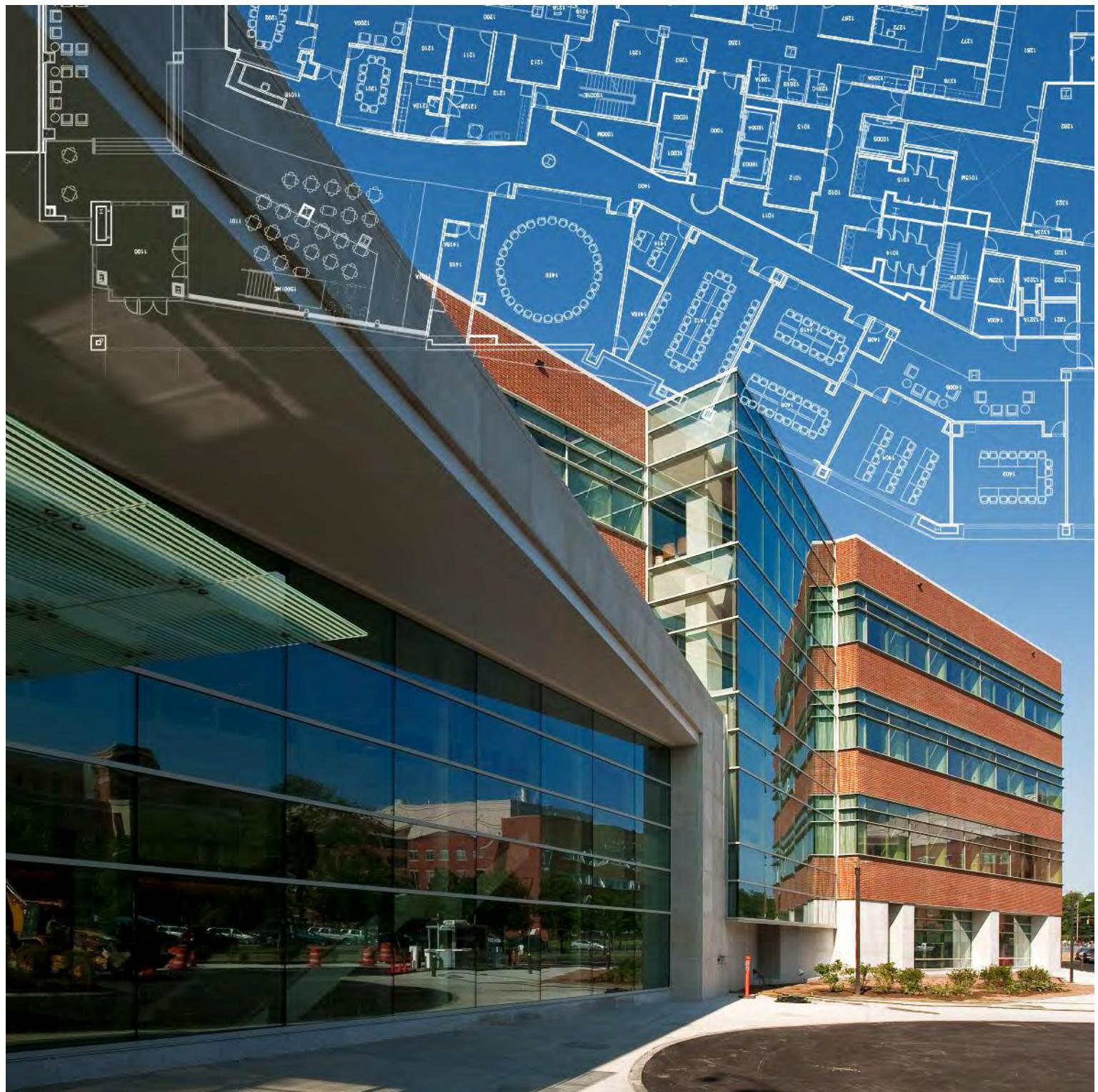
In coordination with the Office of Research Alliances, the CTSI assists scientists in creating research and educational collaborations with the private sector, foundations, government agencies and other institutions through joint research projects and the development and commercialization of Medical Center technologies.

The grant also funds new initiatives to promote the creation of large teams of researchers focused on complex health problems, new education and training programs, ongoing community outreach projects carried out in collaboration with the Center for Community Health and a program called Research Navigator that helps scientists find backing for their work, specialized research space and skilled staff.

**In 2006, the Medical Center was one of the first 12 institutions in the nation to receive a Clinical and Translational Science Award from the National Institutes of Health.**



**A new \$20 million award, effective July 1, renews the National Institutes of Health endorsement of the Medical Center's biomedical research programs.**



# Saunders Research Building

provides a unique home for  
Clinical & Translational Science Institute.

Clinical and translational science has a new home at the University of Rochester Medical Center—the \$60 million Saunders Research Building, a habitat for collaboration, an incubator for cross-disciplinary projects, an academic home for a growing field of research.

The building's design maximizes opportunities for interaction among researchers. Windows wrap around the upper floors. Individual offices are arranged in blocks that run perpendicular to the exterior windows, creating an open floor plan which brings more natural light into the interior of the building. The individual offices also have glass walls to allow in ambient light. The high ceilings enhance the suggestion of space.

"Rochester has an overwhelming tradition of collaboration and collegiality," said Thomas Pearson, M.D., Ph.D., M.P.H., director of the Institute. "That is what this building is about and the building was designed with this in mind. The Saunders building is the physical manifestation of our commitment to team science, working with students, mentoring, cross-disciplinary work and unique partnerships."

A dozen research programs and departments have settled in the Saunders

building, which opened in April and immediately became the hub of clinical and translational medicine for the Medical Center and a network of scientists and physicians across New York. It also is home to the Clinical and Translational Science Institute (CTSI), created to provide researchers a comprehensive set of services, expertise and resources necessary to carry out all phases of research aimed at accelerating the pace of moving scientific discoveries to real solutions for patients.

"This facility was created with the understanding that the future of medicine will be driven by institutions that assemble the teams and create the environment necessary to follow through on discoveries and make them relevant in terms of improving health," Bradford C. Berk, M.D., Ph.D., the Medical Center's chief executive officer, said at the building's dedication.

In the last 15 years, the Medical Center has made a \$1-billion investment in fundamental research and, as a result, was the sixth fastest growing academic medical center in the nation between 2005 and 2010 in research funding. Still, about 60 percent of investigators, 60 percent of projects and more than 50 percent of total research funding at the Medical Center

are clinical research projects that involve patients.

The Saunders building houses a number of support services, experts in bioinformatics, human subject protection, regulatory affairs, technology transfer and trial recruitment. Research programs in cardiovascular disease, neurological disorders, cancer, pediatrics and emergency medicine, along with the Department of Community and Preventive Medicine and Department of Biostatistics and Computational Biology, work out of Saunders as well.

"We're happy with our balance of basic and clinical research," Pearson said. "We think this balance is advantageous and our new building gives us another advantage."

# 2011-12 Best Hospitals in America

*U.S. News & World Report*

University  
of Rochester  
Medical Center  
rankings

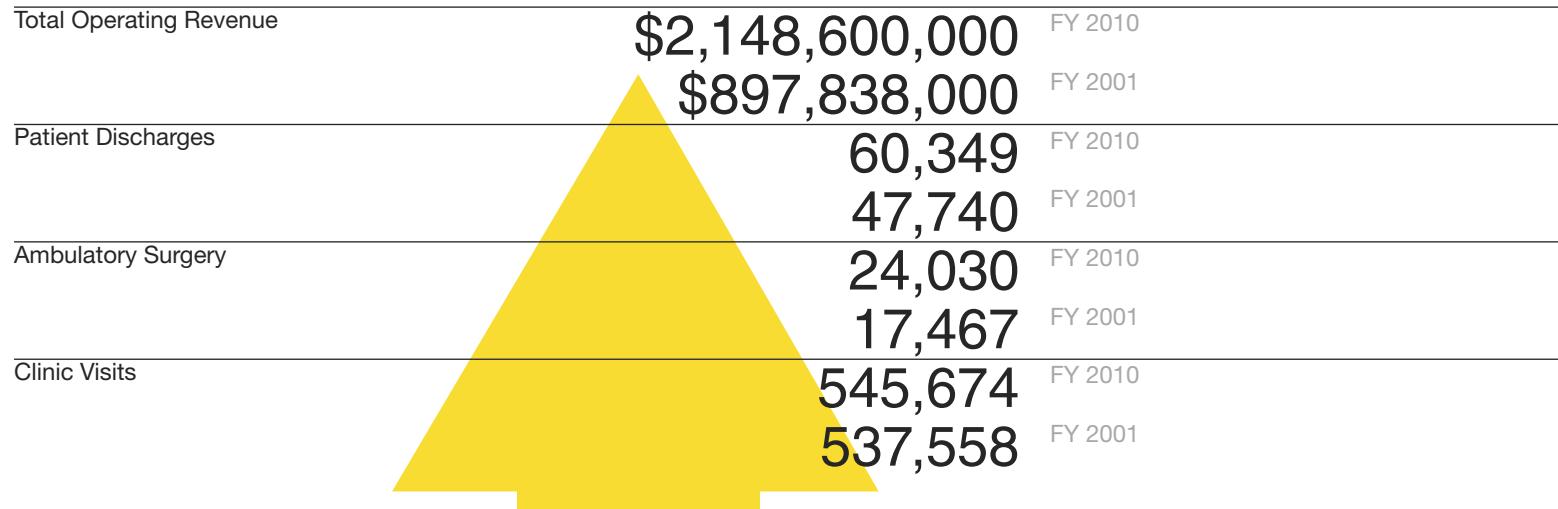
#**32** Gynecology

#**39** Urology

#**42** Nephrology

#**48** Neurology and  
Neurosurgery

# Quality of care of the “highest order,” as the Medical Center grows.



The hallmark of the University of Rochester Medical Center is “Medicine of the Highest Order.” In 2007, the Medical Center launched a comprehensive Strategic Plan that made high-quality, safe patient care the Medical Center’s leading clinical goal. Since then, the Medical Center has instituted hospital-wide efforts to reduce infection rates, improve communication among members of care teams, and involve family members more closely in patient care decisions.

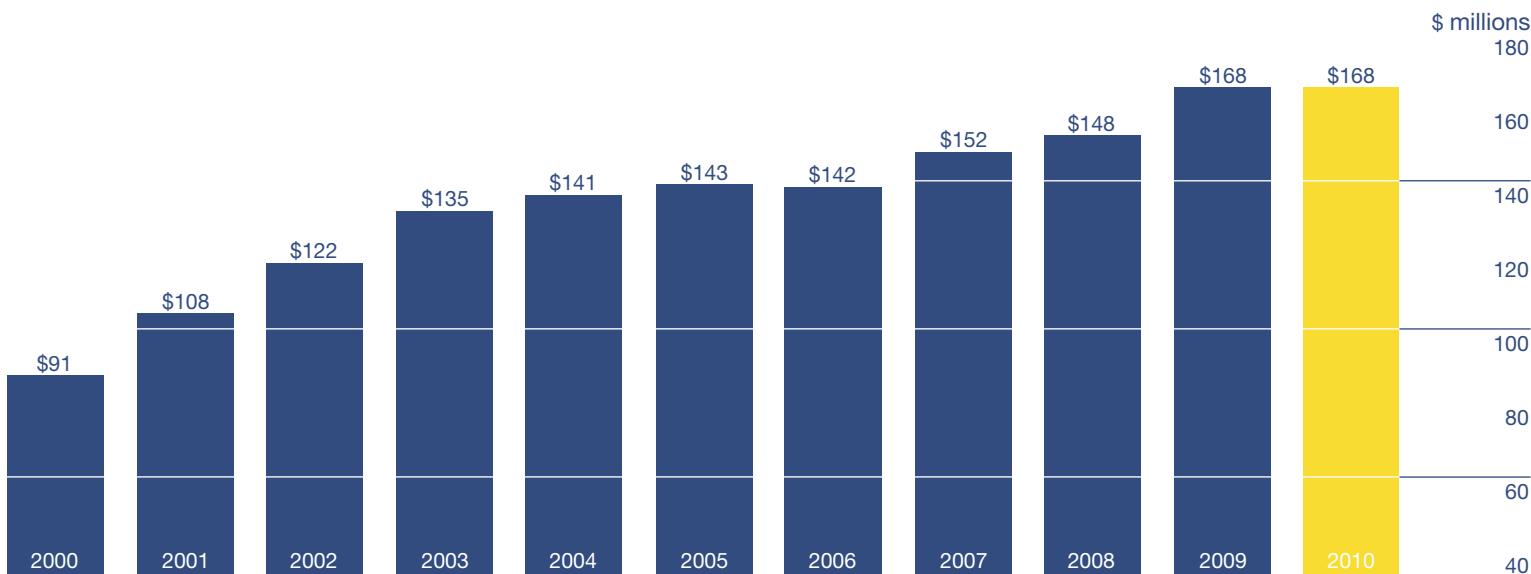
Steady improvements in quality

contributed significantly to four Medical Center programs earning places in the Top 50 rankings issued this year by *U.S. News & World Report* for its list of the “2011–12 Best Hospitals in America.” The programs on the national list are: Gynecology, which is rated as the #32 best; Urology placed as the #39 best; Nephrology scored at #42; and Neurology and Neurosurgery made the list at #48.

Eight Medical Center specialties also were listed by *U.S. News & World Report*

as “top performing” programs, meaning their scores were nearly at the level of nationally ranked Top 50 programs. These programs include cancer, cardiology and heart surgery, diabetes and endocrinology, ear, nose, and throat, gastroenterology, geriatrics, orthopaedics, and pulmonology. The magazine also named three Medical Center pediatric subspecialties — orthopaedics, neurology and neurosurgery, and neonatology within the Golisano Children’s Hospital—in its “Best Children’s Hospitals” issue.

# Rochester's research investment paying off with increased funding.



National Institutes  
of Health funding

\$168,000,000

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FY10 Funding from  
all sources = \$280.2M

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FY09 Funding from  
all sources = \$242M

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\$100 million growth  
from 1998–2009

As many institutions saw a drop in research funding in the past few years, the University of Rochester School of Medicine and Dentistry's continued to climb. The amount of money awarded by the National Institutes of Health to the medical school in 2010, the most recent year available, was 55.5 percent higher than funding in 2001.

When contracts are included, NIH funding has doubled since 2001 and is up 42 percent, just since 2008. In the last 15 years, the Medical Center has made a \$1-billion investment in fundamental research and, as a result, was the sixth fastest growing academic medical center in the nation between 2005 and 2010 in research funding.

# 403%

NIH funding growth rate 2005–2010

---

#**6**

The University of Rochester Medical Center  
is #6 in compound annual growth rate among  
Medical Schools despite a flat NIH budget.

---

**4%**

The Medical Center's six-year compound  
annual growth rate is 4.0%

# Awards, honors & accomplishments



**John M. Bennett, M.D.**, professor emeritus of Oncology in Medicine, Laboratory Medicine and Pathology and an internationally known expert on leukemia, is the 2011 recipient of the B.J. Kennedy Award and Lecture for Scientific Excellence in Geriatric Oncology. The award, given by the American Society of Clinical Oncologists, honors individuals who have demonstrated outstanding leadership or contributed outstanding scientific work of major importance to the field of geriatric oncology.



**Nancy M. Bennett, M.D.**, director of the Center for Community Health and professor of Medicine and Community and Preventive Medicine, has been named to the federal Advisory Committee on Immunization Practices (ACIP), part of the Centers for Disease Control and Prevention. Bennett will serve a four-year term, through June 2015.



**Thomas L. Campbell, M.D.**, the William Rocktaschel Professor and chair of the Department of Family Medicine, is president-elect of the Association of Departments of Family Medicine. Campbell is nationally recognized for his work on the role of the family in medical practice and the influence of the family on health. His term extends through 2014.



**Gary L. Chadwick, Pharm.D., M.P.H.**, associate provost and director of the University's Office for Human Subject Protection, has been named to the Department of Health and Human Services Secretary's Advisory Committee on Human Subject Protection.

**Leway Chen, M.D., M.P.H.**, was elected to the board of governors for the American College of Cardiology. During his three-year term, Chen, associate professor of Medicine and director of the Program in Heart Failure and Transplantation, will serve as president of the New York Cardiological Society and then president of the ACC's New York Chapter.



**Louis "Sandy" Constine, M.D.**, vice chair of Radiation Oncology, received a National Institutes of Health Merit Award for his work with the PDQ Pediatric Treatment Editorial Board of the National Cancer Institute (NCI). A specialist in the treatment of lymphomas, Constine, also a professor of Pediatrics, was honored for his dedicated and exceptional service to the NCI.



**Yeates Conwell, M.D.**, professor of Psychiatry, received the 2011 American Foundation for Suicide Prevention Research Award for his work with suicide in the elderly. Conwell, vice-chair in the Department of Psychiatry and co-director of the Center for the Study and Prevention of Suicide, directs a multi-disciplinary program of research in suicidal prevention, with a special emphasis on adults in later life.



**Vikram Dogra, M.B.B.S.**, professor of Imaging Sciences, Biomedical Engineering and Urology, has been appointed editor-in-chief of the *Journal of Clinical Imaging Science*. The journal enables radiologists to clearly comprehend concepts and practices, and encouraging further research and technical innovation. Dogra also serves as consulting editor of the journal *Ultrasound Clinics*.





**John D. Markman, M.D.**, associate professor of Neurosurgery, represents the American Academy of Neurology (AAN) as a co-chair of the executive committee of a special partnership known as Analgesic Clinical Trial Innovations, Opportunities, and Networks (ACTION). Through ACTION, researchers hope to identify problems or gaps in current trial design and implementation techniques, and then find ways to bridge these gaps to speed the development of new safe and effective pain relief medicines. Markman is chair-elect of the AAN Section on Pain.



**Susan McDaniel, Ph.D.**, the Dr. Laurie Sands Distinguished Professor of Families and Health, is a fellow in the 2011–2012 Class of the Hedwig van Ameringen Executive Leadership in Academic Medicine (ELAM) Program for Women. McDaniel, who is the director of the Institute for the Family in the Department of Psychiatry, also received the Society of Teachers of Family Medicine Recognition Award in 2011.



**Regis O'Keefe, M.D., Ph.D.**, was named to the National Institutes of Health Council of Councils. The council was established by the NIH Reform Act of 2006 to advise the NIH Director on cutting edge, trans-NIH priorities and matters related to policies and activities of the Division of Program Coordination, Planning, and Strategic Initiatives. The council is made up of 27 members selected from the NIH Institute and Center advisory councils and the Council of Public Representatives, an advisory committee to the NIH Office of the Director. O'Keefe, chair of the Department of Orthopaedics and Rehabilitation and director of the Center for Musculoskeletal Research, also was named to the National Arthritis and Musculoskeletal and Skin Diseases Advisory Council.

**Dale Phelps, M.D.**, professor of Pediatrics, received the Landmark Award from the American Academy of Pediatrics. She was honored for her pioneering work collaborating with ophthalmology investigators in treating retinopathy of prematurity (ROP), a common eyesight problem in babies born early. Phelps is a leader in the research of how to identify and treat this sight-robbing disease among premature babies, having helped design the first clinical trial of cryotherapy for ROP. Based on the trial, ablation therapy became standard of care for ROP in 1988, and cryo-therapy or laser therapy has since preserved vision for thousands of preterm infants.



**Sandra Schneider, M.D.**, professor of Emergency Medicine, is president of the American College of Emergency Physicians (ACEP), a national medical specialty society representing emergency medicine that has 53 chapters representing each state, as well as Puerto Rico and the District of Columbia. Schneider is a respected leader on the issue of reducing overcrowding in the nation's emergency departments.



**Javeed Sukhera, M.D.**, is serving a two-year term as the resident physician representative on the Association of American Medical Colleges' (AAMC) board of directors. Sukhera completed his residency and is now a fellow in child and adolescent psychiatry.

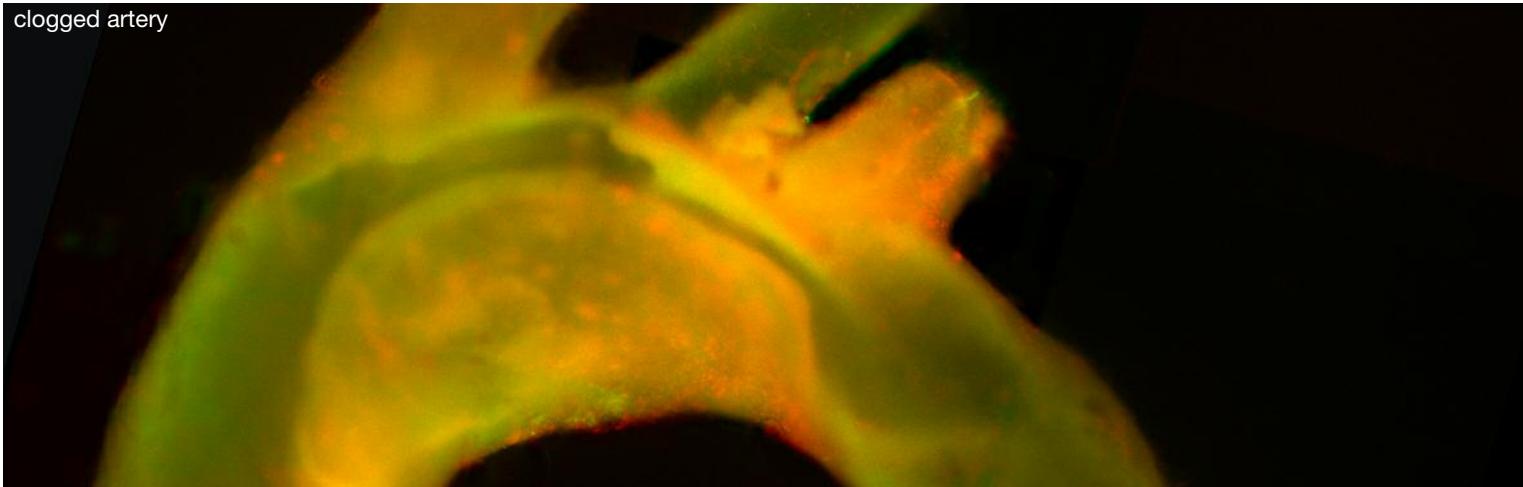


**Denham Ward, M.D., Ph.D.**, professor of Anesthesiology and chair emeritus of the Department of Anesthesiology, is the president of the Foundation for Anesthesia Education and Research (FAER), an organization founded by the American Society of Anesthesiologists to support individuals entering the field through research grants, mentoring and career development programs. As president of FAER, Ward aims to create new educational and support programs to best prepare those physicians and researchers joining the specialty.

# Research highlights

A brief list of significant research published in 2010–2011 by University of Rochester School of Medicine & Dentistry faculty

clogged artery



## Microbiologists discover how

### cavity-causing microbes invade heart

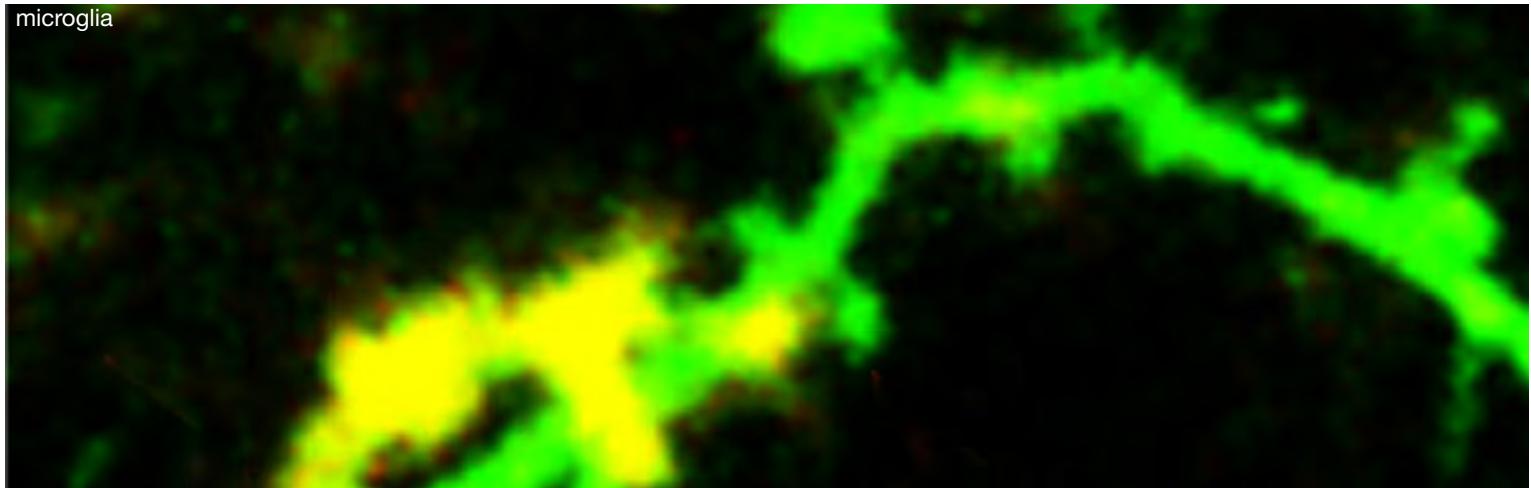
Jacqueline Abranches, Ph.D., and her team at the University's Center for Oral Biology discovered that a collagen-binding protein known as CNM gives *Streptococcus mutans* its ability to invade heart tissue. In laboratory experiments, the scientists found that strains with CNM are able to invade heart cells, and strains without CNM are not. When the team knocked out the gene for CNM in strains where it's normally present, the bacteria were unable to invade heart tissue. Without CNM, the bacteria simply couldn't gain a foothold; their ability to adhere was about one-tenth of what it was with CNM. *Streptococcus mutans* is a leading cause of endocarditis. The findings were reported in June in *Infection and Immunity*.

## Scientists override errant form of genetic signaling for first time

In a study published in the journal *Nature* in June, scientists reported an entirely new way to change the genetic code. The findings, though early, are significant because they may ultimately help researchers alter the course of devastating genetic disorders. Researchers, led by Yi-Tao Yu, Ph.D., associate professor of Biochemistry and Biophysics, were able to alter mRNA in a way that turned a stop signal into a "go" signal. As a result, the cell could read the genetic instructions all the way through and create a normal, full-length protein. The team produced these results both in vitro and in live yeast cells.

## Therapy to prevent heart failure more effective in women than men

Never before has a therapy proven more beneficial for women than men in preventing heart disease – until now. A study, published in February in the *Journal of the American College of Cardiology*, found that women receive a significantly greater benefit – a 70 percent reduction in heart failure and a 72 percent reduction in death – from cardiac resynchronization therapy with defibrillator (CRT-D) than men. In prior cardiac studies, men and women generally received similar benefit from preventive medical therapy, said cardiologist Arthur J. Moss, M.D., professor of Medicine at the University of Rochester Medical Center and lead author of the study. "Our finding was unexpected, but extremely important because this is the only heart treatment that is clearly better in women than men."



## How some brain cells hook up surprises researchers

Immune cells known as microglia, long thought to be activated in the brain only when fighting infection or injury, are constantly active and likely play a central role in one of the most basic, central phenomena in the brain – the creation and elimination of synapses. The finding, reported in November, 2010, in *PLoS Biology*, catapults the humble microglia cell from its well-recognized duty of protecting the brain to direct involvement in creating the cellular networks at the core of brain behavior. Its apparent role as an architect of synapses comes as a surprise to researchers long accustomed to thinking of microglia as cells focused exclusively on keeping the brain safe from threats.

Ania Majewska, Ph.D., assistant professor of Neurobiology and Anatomy, led the research.

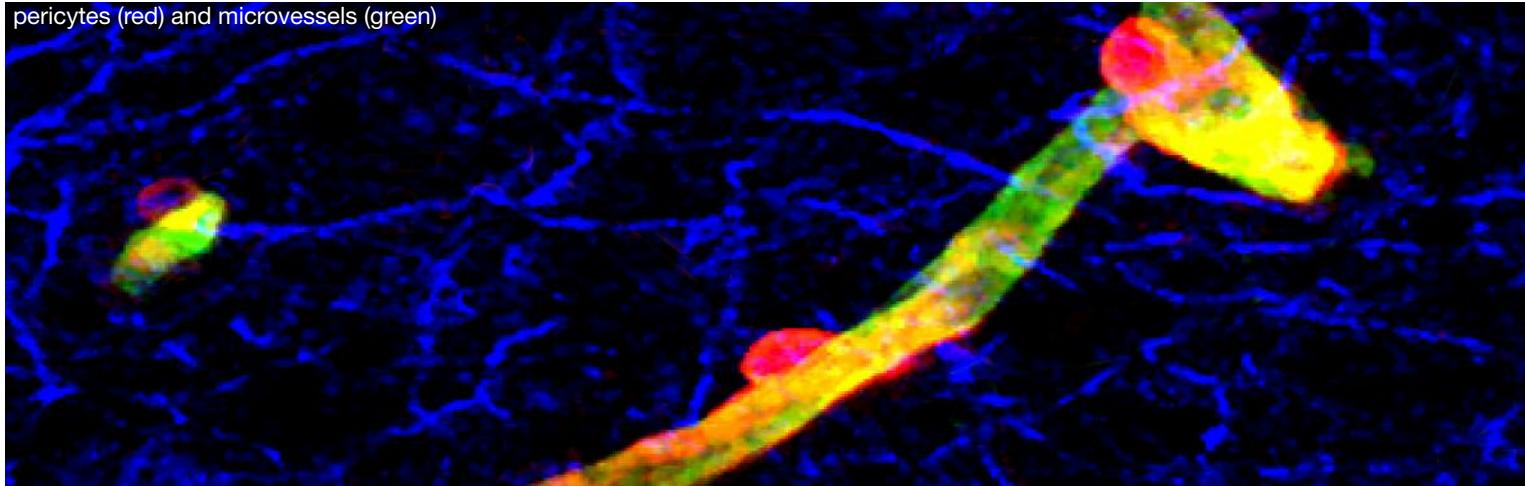
## Scientists find a key to maintaining DNA

In an important, albeit early step forward, scientists have discovered how DNA maintenance is regulated, opening the door to interventions that may enhance the body's natural preservation of genetic information. The new findings could help researchers delay the onset of aging and aging-related diseases by curbing the loss or damage of our genetic makeup, according to [Robert Bambara, Ph.D.](#), chair of the Department of Biochemistry and Biophysics and leader of the research. The study authors reported in March in the *Journal of Biological Chemistry* that acetylation, like a policeman directing traffic at a busy intersection, directs which proteins take which route, favoring the protection of DNA that creates proteins by shuttling them down an elite, more accurate course. Bambara's team is investigating the newly identified acetylation regulatory process further to figure out how they might be able to intervene to augment the body's natural safeguarding of important genetic information.

## Pre-conception and early pregnancy iron deficiency harms brain

A mother's iron deficiency early in pregnancy may have a profound and long-lasting effect on the brain development of the child, even if the lack of iron is not enough to cause severe anemia, according to a URMC study published in March in *PLoS One*. Obstetricians might not notice or treat mild or moderate iron deficiency and therefore the researchers, led by [Margot Mayer-Proschel, Ph.D.](#), associate professor of Biomedical Genetics, believe their findings underscore the need for monitoring a pregnant woman's iron status beyond anemia. They found that the critical period begins in the weeks prior to conception and extends through the first trimester to the onset of the second trimester. Iron deficiency that starts in the third trimester did not seem to harm the developing brain.

pericytes (red) and microvessels (green)



### The pericyte becomes a player in Alzheimer's, other diseases

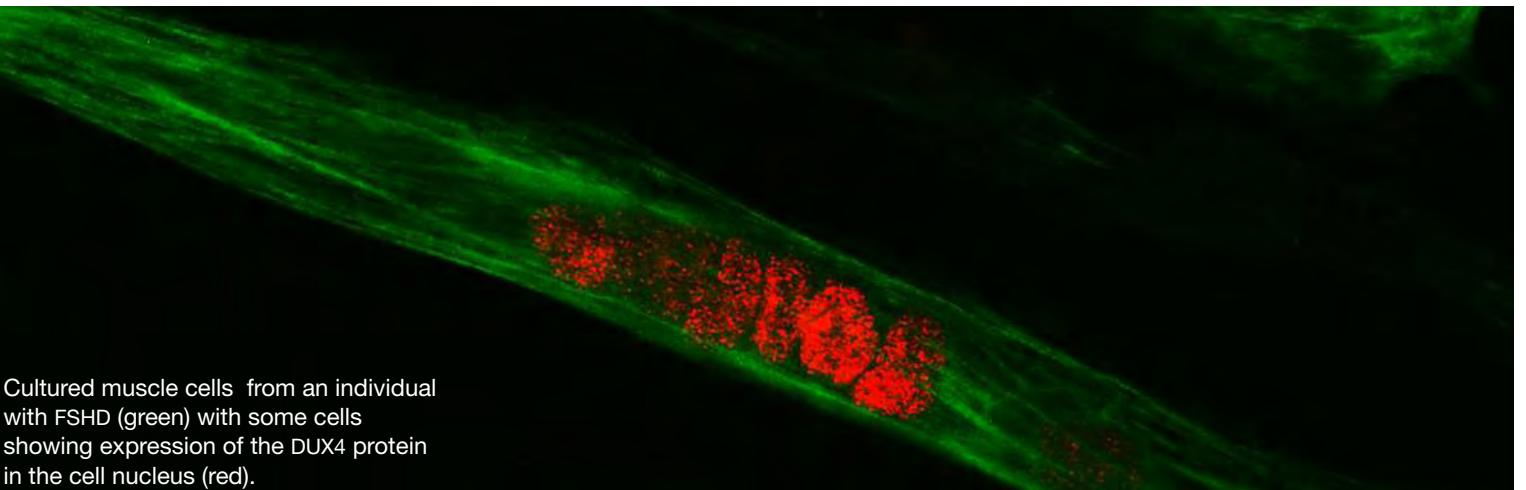
Cells in the brain called pericytes that have not been high on the list of targets for treating diseases like Alzheimer's may play a more crucial role in the development of neurodegenerative diseases than has been realized. The findings, published in November, 2010, in *Neuron*, cast the pericyte in a surprising new role as a key player shaping blood flow in the brain and protecting sensitive brain tissue from harmful substances. By manipulating pericyte levels, scientists were able to re-create in the brains of mice an array of abnormalities that mirror in striking fashion the brain difficulties that occur in many people as they age. Chronic vascular damage due to pericyte loss results in neurodegeneration, said **Berislav Zlokovic, M.D., Ph.D.**, Dean's Professor in the Department of Neurosurgery and Department of Neurology.

### Scientists discover gene regulation mechanism unique to primates

Scientists have discovered a new way genes are regulated that is unique to primates, including humans and monkeys. The newly identified mechanism, reported in February in *Nature*, involves Alu elements, repetitive DNA elements that spread throughout the genome as primates evolved. Lead author **Lynne E. Maquat, Ph.D.**, professor of Biochemistry and Biophysics, found that Alu elements team up with molecules called long noncoding RNAs (lncRNAs) to regulate protein production. They do this by ensuring messenger RNAs (mRNAs), which take genetic instructions from DNA and use it to create proteins, stay on track and create the right number of proteins. If left unchecked, protein production can spiral out of control, leading to the proliferation or multiplication of cells, which is characteristic of diseases such as cancer.

### Early studies show anti-depressants boost brain cells after injury

Anti-depressants may help spur the creation and survival of new brain cells after brain injury, according to a study published in April in the *Journal of Neurotrauma* by neurosurgeons at the University of Rochester Medical Center. **Jason Huang, M.D.**, associate professor of Neurosurgery, and colleagues undertook the study after noticing that patients with brain injuries who had been prescribed anti-depressants were doing better in unexpected ways than their counterparts who were not taking such medications. Not only did their depression ease; their memory also seemed improved compared to patients not on the medication. The scientists found the anti-depressant imipramine boosted the number of neurons in the hippocampus, the part of the brain primarily responsible for memory. By one measure, mice treated with imipramine had approximately 70 percent more neurons after four weeks than mice that did not receive the medication.



Cultured muscle cells from an individual with FSHD (green) with some cells showing expression of the DUX4 protein in the cell nucleus (red).

### **Scientists pinpoint earliest steps of common form of muscular dystrophy**

Nearly two decades after they identified the specific genetic flaw that causes a common type of muscular dystrophy, scientists believe they have figured out how that flaw brings about the disease. The finding by an international team of researchers, including scientists at the University of Rochester Medical Center led by neurologist [Rabi Tawil, M.D.](#), settles a longstanding question about the roots of facioscapulohumeral muscular dystrophy or FSHD. The work is published in August, 2010, in *Science*. Scientists have discovered that several deleted versions of a gene trigger the remaining copies of that gene to be much more active than usual. That's because the DNA that codes for the gene is not as tightly coiled or elusive to the body's molecular machinery as usual when some copies are missing, and so the gene – known as DUX4, which makes a protein harmful to muscle cells – is more active than it should be.

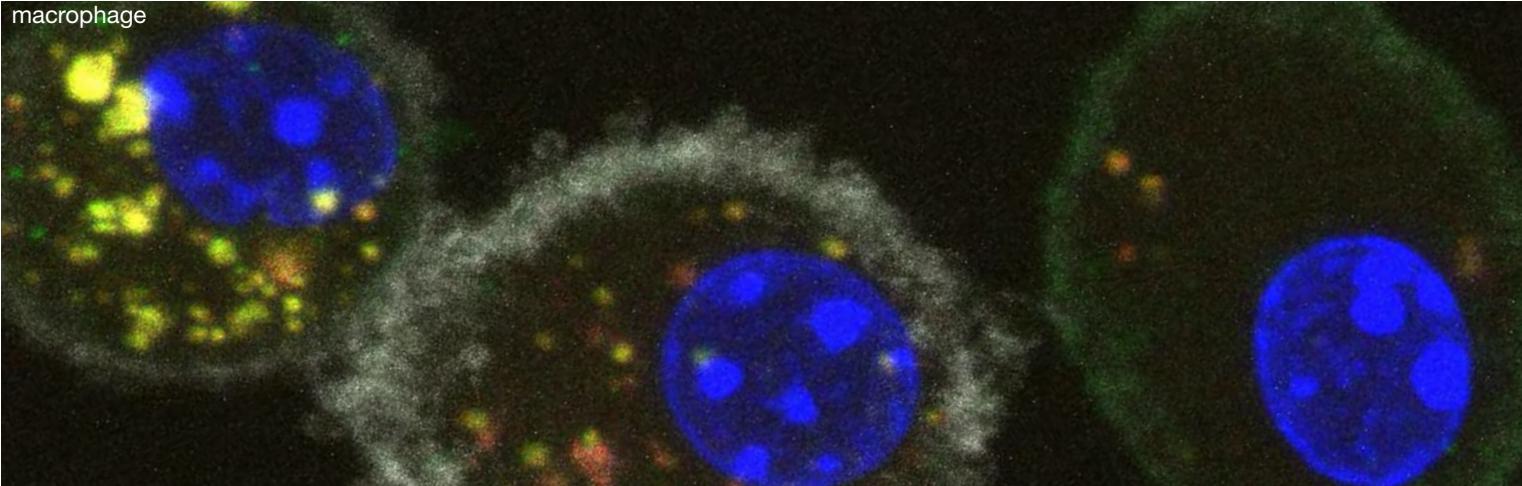
### **Widely used arthritis pill protects against skin cancer**

A widely used arthritis drug reduces the incidence of non-melanoma skin cancers, according to a study published in December, 2010, in the *Journal of the National Cancer Institute*. The COX-2 inhibitor celecoxib led to a 62 percent reduction in non-melanoma skin cancers, which includes basal cell carcinomas and squamous cell carcinomas. COX-2 inhibitors may have an effect on the ability of non-melanoma skin cancers to grow and thrive. They may also suppress or weaken the cancer's ability to invade surrounding tissue and spread from the initial site to other parts of the body. [Alice Pentland, M.D.](#), chair of the Department of Dermatology, was the study author.

### **Researchers focus on human cells for spinal cord injury repair**

For the first time, scientists discovered that a specific type of human cell, generated from stem cells and transplanted into spinal cord injured rats, provide tremendous benefit, not only repairing damage to the nervous system but helping the animals regain locomotor function as well. The study, published in March in *PLoS One*, focuses on human astrocytes, the major support cells in the central nervous system, and indicates that transplantation of these cells represents a potential new avenue for the treatment of spinal cord injuries and other central nervous system disorders, according to lead author [Chris Proschel, Ph.D.](#), assistant professor of Genetics.

macrophage



### Old drug holds promise against opportunistic lung bug

A drug to treat inflammation plays a surprising role reducing the level of infection caused by an opportunistic bug that is deadly for AIDS and cancer patients and others with weakened immune systems. The drug, sulfasalazine, spurs the body to get rid of the fungal evaders by enhancing the body's ability to chew them up instead of leaving the debris to litter the lungs, where it would continue to provoke an onslaught of harmful inflammation. Besides opening a new avenue for research on *Pneumocystis pneumonia* or PCP, caused by the fungus *Pneumocystis jirovecii*, the work with mice also offers the possibility of manipulating immune cells called macrophages to improve treatment of infections. The findings by [Jing Wang, Ph.D.](#), research assistant professor in Pediatrics, [Terry Wright, Ph.D.](#), associate professor of Microbiology and Immunology, and their colleagues, were reported in August, 2010, in *PLoS Pathogens*.

### Breast cancer cells outsmart the immune system and thrive

Scientists discovered a new way breast cancer cells dodge the immune system and promote tumor growth, providing a fresh treatment target in the fight against the disease. While comparable mechanisms to avoid the immune system have been identified in mice with breast and other cancers, the study tested human breast tumor cells, putting researchers closer to understanding how the disease progresses in real patients. The study, published in February in *Cancer Research*, found high levels of the protein Hsp27 (heat shock protein 27) are released from human breast cancer cells and may not only render immune cells unresponsive to the tumor, but increase blood flow to the tumor as well, both of which fuel tumor growth. The study is unique because it used human breast cancer cells, which are extremely difficult to get, said [Asit De, Ph.D.](#), lead author and research associate professor in the Department of Surgery at the University of Rochester Medical Center.



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