Message from the Dean

This past year marked a milestone at the University of Chicago Medical Center. We successfully integrated the two separate areas of our institution into one—Chicago BioMedicine—uniting all of the university’s activities in biology and medicine under a single governance and management structure.

Like the rest of the nation, we cannot escape the economic downturn and its effects on health care and education. At the end of 2008, we made the decision to reorganize our resources in order to concentrate on our highest strategic priorities and maintain our ability to invest in them during this difficult time. I believe we will emerge stronger, more unified and with more clarity of mission.

We continue to be guided and strengthened by our values and commitment to our missions: scientific discovery, educating tomorrow’s leaders, collaborating with our community and providing care that only we can offer. As was our intent, we are able to strategically invest in our programs and facilities, including the Knapp Center for Biomedical Discovery, opening in June; and planning for the New Hospital Pavilion: community engagement, as evidenced by the expansion of the Urban Health Initiative to include the South Side Health and Vitality Study, and planning for the Center for Community Health: investment in science, including the Global Health Initiative; Genomics, the Office of Clinical Research, and Cores; and educational programs, including the Chicago Fellows program, which attracts internationally competitive postdoctoral scholars, and the expansion of Pritzker scholarship support.

This publication, Medicine on the Midway focuses on our alumni, faculty, students and staff, and their dedication to creating new knowledge that keeps us at the forefront of medicine. It is one of the important ways that we share news about our breakthroughs and successes, and the ways the institution is changing the future of science and medicine.

Sincerely,
James L. Madara, MD
Chief Executive Officer,
University of Chicago Medical Center
Dean, Division of Biological Sciences
and Pritzker School of Medicine
University Vice President
for Medical Affairs

Robotic equipment helps rebuild bladder

A 10-year-old Chicago girl has become the first child in the world to undergo a robotic-assisted bladder reconstruction. The innovative surgical method used the da Vinci robotic system to create a new bladder.

The patient suffered from a very small, spasmic bladder, a birth defect that led to gradual kidney damage and loss of urinary control. The girl always felt that she urgently had to go to the bathroom. She stopped drinking juice or soda and cut back on water, to less than two cups a day. Medication helped, but despite two years of trying different treatments, the problem continued to get worse and began to cause kidney damage, which made surgery necessary.

The typical surgery to treat the condition begins with a large incision, about 6 inches long, from above the navel down to the pubic area, followed by placement of retractors to pull the stomach muscles out of the way. With robotic-assisted surgery, the medical tools enter the abdomen through five small, dime-sized holes.

"The robotic approach enabled us to avoid that entire incision, which causes significant post-operative pain, presents an infection risk and leaves a big scar," said Mohan S. Gundeti, MD, assistant professor of Surgery and chief of Pediatric Urology at the University of Chicago Comer Children's Hospital.

In the operation, the surgeons used about 12 inches of intestine to reconstruct a larger bladder and converted the appendix into a "continent conduit," a drain for the new, expanded bladder, with one end implanted into the wall of the bladder and the other end leading outside the body through a small outlet in the lower abdomen.

"Patients prefer surgery without significant scars," Gundeti said. "In addition to the benefit of no big wound to heal—just five small punctures—there is a quicker recovery time, less risk of infection and less pain."
More zzz’s, healthier arteries

One extra hour of sleep per night could help keep the human heart healthier.

A research team led by Diane Lauderdale, PhD, found that more sleep decreased the risk of coronary artery calcification, an early step down the path to cardiovascular disease.

In a study of healthy volunteers in their 40s, about 12 percent developed coronary artery calcification over five years of follow-up. Calcified arteries, however, were found in 27 percent of those who slept less than five hours a night. That dropped to 11 percent for those who slept five to seven hours and fell to 6 percent for those who slept more than seven hours a night.

The benefits of sleep appeared to be greater for women and did not vary according to race. “The consistency and magnitude of the difference came as a surprise,” said Lauderdale, associate professor of Health Studies at the University of Chicago Medical Center. “It’s also something of a mystery. We can only speculate about why those with shorter average sleep duration were more likely to develop calcification of the coronary arteries.”

Previous studies have correlated decreased sleep times with established risk factors for calcification, including high blood pressure, excess weight and poor glucose regulation. But in this study, “after adjusting for age, sex, race, education, smoking and apnea risk,” the authors note, “longer measured sleep duration was associated with reduced calcification incidence.”

Dangerous drug cocktails

With more than half of older Americans taking five or more medications and supplements, a recent study of participants ages 57 to 85 warns that at least one in 25 older adults is at risk for a harmful drug-drug interaction.

Although the number of people taking medications has remained stable for the last decade, the number of drugs taken by older people has significantly increased. This increase may be because of more intense therapies for chronic illnesses, improved access to medications due to Medicare Part D and the growth of the generic drug market.

“Older adults are the largest consumers of prescription drugs,” said study author Stacy Tesler Lindau, MD, assistant professor of Obstetrics/Gynecology and Medicine at the University of Chicago Medical Center. “We find that they commonly combine these prescription medications with over-the-counter medications and dietary supplements, which can increase their vulnerability to medication side effects and drug-drug interactions.”

Ninety-one percent of all respondents regularly used at least one medication, a percentage that increased with age. Twenty-nine percent of older adults took more than five prescription medications. Sixty-eight percent of the adults who took prescription drugs also used over-the-counter medications or dietary supplements.

To avoid potentially risky interactions, follow these tips from the researchers:

- Carry a list of all medications.
- Use the same pharmacy or chain for all medications.
- Be alert for drug-safety information and ask physicians about medication safety for older adults.

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Treating cancer with venom

Scorpion venom can be deadly to insects—and leads to pain, numbness or swelling for humans who have the misfortune to get stung by the eight-legged creatures. But the venom toxin, in synthetic form, may have another effect: eliminating brain tumors.

Three Medical Center physicians, radiation oncologist Steve Chmura, MD, and neuro-oncologists Ramas Lukas, MD, and Kelly Nicholas, MD, are studying the treatment in a clinical trial. The synthetic venom targets glioma cancer cells in the brain, attacks them and cuts off blood supply to the tumors.

“A synthetic version of a certain scorpion venom appears to have the amazing trait of horning right in on the malignant cancer cells while avoiding the healthy cells,” Chmura said.

The Medical Center is the first in the nation to launch a study of the synthetic venom in patients whose brain cancer has recurred after surgery, chemotherapy and radiation. Ten patients will be treated here in the first round of the study, and each will receive up to six intravenous doses of the venom.

Hot study: Microwaves pose major burn risk

Microwave ovens should be equipped with safety controls to prevent children from opening them and being burned by hot foods and drinks, according to a study published by University of Chicago Medical Center researchers in the October 2008 issue of the journal Pediatrics.

Severe scalds can be devastating for children because they can leave scars and wounds that can restrict movement. The study recommends extra protections, such as locking mechanisms and stepped-up warning campaigns, to reduce accidental injuries to children when they remove food from the microwave.

Study author Lawrence Gottlieb, MD, professor of Surgery and director of the Medical Center’s Complex Wound Center, added that burns have long-lasting effects on appearance and physical function. “It is far better to prevent these injuries than to treat painful burns and try to fix the resultant scars,” he said.
Removing part of brain controls girl's epilepsy

Surgeons at the University of Chicago Comer Children’s Hospital told Jessica Nelson one of the scariest things she will ever hear as a parent: They wanted to treat her daughter’s epilepsy by cutting out or disconnecting half of her brain. Then something extraordinary happened. The surgery worked.

Nelson’s daughter, Brooklyn Bauer, had undergone different treatments and tried different medications for more than three years with no success in controlling her seizures. Her speech and motor skills were extremely delayed. She walked on her knees and spoke in two-word phrases.

When doctors at Comer Children’s Hospital looked at EEG scans, they saw that Brooklyn was experiencing nearly constant epileptic activity every one to two seconds—whether she was awake or asleep. The left hemisphere of her brain showed significant damage with little positive brain function.

Michael Kohrman, MD, a pediatric epileptologist and associate professor of Pediatrics and Neurology, along with David Prim, MD, PhD, chief of Neurosurgery, reviewed her case and concluded that Brooklyn’s brain would function better without the left hemisphere. The right hemisphere of Brooklyn’s brain was healthy.

“The seizing tissue in Brooklyn’s brain had lost its capability to function productively, so disconnecting or removing it paradoxically allows the remaining brain to function better,” Prim said. “Once we identified Brooklyn as a candidate for surgery, we were able to move within two months to complete all testing and perform the surgery.”

Now, two years after surgery and recovery, Brooklyn is in kindergarten.

“She is right on track developmentally now, and started kindergarten this fall in a regular classroom—not a special-education class. I can’t describe how far Brooklyn has come from where she was. She just shines now,” Nelson said.

Brooklyn Bauer, now a healthy kindergarten student, pictured with her mom. Photo by Tarji Smedley

Doubling diabetes treatment costs

National costs for diabetes drugs have risen sharply, jumping from $6.7 billion in 2001 to $12.5 billion in 2007.

Researchers point to the increased number of patients, growing reliance on multiple medications and the shift toward more expensive new medicines as the causes behind the increase.

“Although more patients and more medications per patient played a role, the single greatest contributor to increasing costs is the use of newer, more expensive medications,” said lead author Caleb Alexander, MD, assistant professor of Medicine at the University of Chicago.

“But new drugs don’t automatically lead to better outcomes.”

The researchers used two national databases, one extending back to 1994, to assess trends in diabetes treatment. They found that the number of Americans diagnosed with diabetes rose steadily from 10 million in 1994, to 14 million in 2000, to 19 million in 2007.

This rapid growth reflects trends in American eating habits and behavior, the authors note, since the risk of developing type 2 diabetes increases with age, obesity and physical inactivity.

At the same time the average number of medications per patient has increased from 1.06 medications per patient in 1994 to 1.45 medications per patient in 2007. In 1994, 82 percent of patients were prescribed only one drug; in 2007, only 47 percent were.

Meanwhile, the average price of a diabetes drug prescription increased from $56 in 2001 to $76 in 2007, due in large part to the rapid uptake of newly available oral medications, increasingly prescribed as alternatives to injectable insulin.
Studying cells and systems

A new research center will bring together scientists to study how networks of genes work together to enable cells and organisms to respond to environmental and genetic change.

The National Institute of General Medical Sciences (NIGMS), part of the National Institutes of Health, awarded more than $15 million over five years to the University of Chicago to support the new Chicago Center for Systems Biology. The Chicago Biomedical Consortium, with support from The Siebel Funds at The Chicago Community Trust, will provide an additional $3 million over three years to the new initiative.

Systems biology, an emerging field, is distinguished by its focus on connections between multiple levels of biological organization—from networks of molecules to whole organisms. It is a discipline, according to the NIGMS, "at the intersection of biology, mathematics, engineering and the physical sciences."

One of 10 National Centers for Systems Biology and the only of its kind in Illinois, the Chicago center will combine experimental and computational tools to study the dynamic behavior of gene networks in cells, tissues and organisms.

"We have brought together from around the city more than a dozen experts in genomics, developmental biology, evolutionary biology, stress and physiology, chemistry and physics, with several computational specialists who focus on network modeling, and high-performance computing," said Center director Kevin White, PhD, the James and Karen Frank Family Professor in the Departments of Human Genetics and of Ecology & Evolution, and Director of the Institute for Genomics & Systems Biology.

Finding food poisoning culprits

Campylobacter jejuni causes more food poisoning around the world than E. coli, Salmonella, and Clostridium Listeria combined. And by tracing the DNA of the bacteria that sickened patients, Chicago researcher Daniel Wilson, PhD, has been able to show that the majority of those food poisoning cases can be traced to chicken and cattle.

Wilson, a postdoctoral scholar in Human Genetics, studied the bacteria from more than 1,200 patients and found that in 57 percent of the cases, chicken was the likely source. Another 35 percent of cases could be traced to cattle. Sheep and pigs accounted for about 5 percent. Wild animals and environmental sources were the likely source of the bacteria in only 3 percent of the patients.

"The dual observations that livestock are a frequent source of human disease isolates and that wild animals and the environment are not, strongly support the notion that preparation or consumption of infected meat and poultry is the dominant transmission route," Wilson said.

More Access for local patients

Grand Boulevard Family Health Center, a community collaborator in the Medical Center’s Urban Health Initiative, opened its doors last fall after a sizeable expansion.

The clinic, part of Access Community Health Network, has upgraded its facilities and almost doubled in size, creating the additional capacity necessary to provide specialty care. Thirteen Medical Center specialty care physicians currently serve patients at the Access Grand Boulevard site. A $350,000 grant from the Medical Center’s Urban Health Initiative (UHI) helped fund the expansion.

"Our collaboration with the Access clinics, such as Grand Boulevard, helps solidify an expanding, cooperative system of independent health care providers in our community," said James L. Madera, MD, chief executive officer of the University of Chicago Medical Center and dean of the Division of Biological Sciences and Pritzker School of Medicine. "These deep, partnering relationships with many South Side health care providers help us serve a vulnerable population."

Ginseng: New hope for colon cancer?

Chicago researchers are studying the anti-tumor effects of two varieties of ginseng.

American ginseng (Panax quinquefolius) and notoginseng (Panax notoginseng) are widely used but rarely studied herbal therapies for a variety of ailments, including prevention and treatment of colon cancer. This year, researchers at the University of Chicago Medical Center began studying the herbs and their possible medicinal effects. The National Center for Complementary and Alternative Medicine awarded the Medical Center $6 million over five years to create the Center for Herbal Research on Colorectal Cancer, one of four new centers funded this year.

"At least one-third of adults in the United States use some sort of dietary supplement and many of them take herbal remedies, such as ginseng, to supplement or substitute for conventional pharmacotherapy," said center director Chun Su Yuan, MD, PhD, the Cyrus Tang Professor of Anesthesia and Critical Care at the University of Chicago, "yet we know very little about how, when or even if these products are beneficial."

Yuan, a recognized expert in herbal medicine studies and director of the University of Chicago’s Tang Center for Herbal Medicine Research, is working with colleagues Tong-Chuan He, MD, PhD, associate professor of Surgery, and Wei Du, PhD, associate professor in the Ben May Department for Cancer Research, on three separate but interrelated projects designed to characterize the anti-tumor activities and mechanisms of the two types of ginseng.
Pediatrics chair brings sleep expertise

Comer Children’s Hospital has added one of the nation’s foremost leaders in pediatric sleep medicine to its faculty. David Gozal, MD, has been appointed professor and chair of the Department of Pediatrics.

Gozal comes from the University of Louisville where, since 1999, he served as vice-chair for research and director of the Kosair Children’s Hospital Research Institute. He was also chief of pediatric sleep medicine and the sleep medicine fellowship program at Louisville.

“David Gozal has been a pioneer in the study of childhood sleep problems and the relationship between sleep disorders and neurobehavioral or cardiovascular diseases,” said James L. Madara, MD, chief executive officer of the University of Chicago Medical Center and dean of the Division of Biological Sciences and the Pritzker School of Medicine. “He also built substantial training and clinical programs in these areas, with an impressive track record for innovative medical education and first-rate patient care.”

The University of Chicago is a pioneer in sleep research and continues to lead the nation for innovative studies on the importance of sleep and consequences of sleep deprivation. Gozal called the university “the perfect place for my life-long interest in pediatric sleep research and for impressing on physicians and on the community at large just how important sleep is.”

“Breathtaking” pictures of the human body

The first 256-slice computed tomography scanner in Illinois is bringing radically improved images and diagnostic abilities to patients at the University of Chicago Medical Center. With four times the capacity of the previous generation of multi-slice scanners, the new machine has been installed and is in clinical use at the University of Chicago Medical Center.

“The pictures are breathtaking,” said Michael Vannier, MD, professor of Radiology at the University of Chicago, “cleaner and crisper than anything we had seen before. We can perform detailed analysis of very complex anatomy within seconds.”

Called the “Brilliance iCT” and manufactured by Philips Medical Systems, Inc., the scanner combines power, speed and coverage to produce extremely high-resolution images with reduced radiation exposure. It produces three-dimensional images of blood vessels within an organ, including the arteries that supply the heart, which have always been difficult to study because of the heart’s motion. The sophisticated machine can take pictures fast enough to follow an injected dye that can be seen by x-ray as it travels through the blood vessels.
Fossils and Fisheyes
Sharing news on ecology, evolution, organismal biology and anatomy

Finding proof of the green Sahara

The largest Stone Age graveyard found in the Sahara, which provides an unparalleled record of life when the region was green, has been discovered in Niger by National Geographic Explorer-in-Residence and University of Chicago professor Paul Sereno, whose team first happened on the site during a dinosaur-hunting expedition.

The remarkable archaeological site, dating back 10,000 years, was brimming with skeletons of humans and animals—including large fish and crocodiles.

The site was pristine, apparently never visited. Two seasons of excavation supported by the National Geographic Society eventually revealed some 200 graves clearly belonging to two successive lakeside populations.

"Everywhere you turned, there were bones belonging to animals that don't live in the desert," said Sereno, PhD, professor of Organismal Biology & Anatomy. "I realized we were in the green Sahara."

Dinosaur teeth tell transition to omnivorous beasts

A tiny skull has shown how plant-eating dinosaurs branched off from their carnivorous counterparts.

The skull, from a young Heterodontosaurus, shows sharp canine teeth for biting and tearing, as well as flat teeth, for grinding and chewing. The discovery suggests that the creature was evolving from a diet of meat to one of plants. Laura Porro, PhD, a post-doctoral student in Organismal Biology and Anatomy, discovered the skull in a drawer in a South African museum.

"It's likely that all dinosaurs evolved from carnivorous ancestors," said Porro, who co-authored the study on the find. "Since heterodontosaurs are among the earliest dinosaurs adapted to eating plants, they may represent a transition phase between meat-eating ancestors and more sophisticated, fully herbivorous descendants."

Flatfish fossils show evolution of eyes

A graduate student has used fossils archived in museums for more than 100 years to solve an evolutionary riddle that stumped even Charles Darwin.

All adult flatfishes—including the gastronomically familiar flounder, plaice, sole, turbot and halibut—have asymmetrical skulls, with both eyes located on one side of the head. Because these fish lay on their sides at the ocean bottom, this arrangement keeps both eyes constantly in play, peering up into the water. This remarkable arrangement occurs during the youth of every flatfish, when one eye "migrates" up and over the top of the head before coming to rest in the adult position on the opposite side of the skull.

Until last year, no fish—fossil or living—had ever been discovered with such an intermediate condition. But by searching through collections of fish fossils at several museums, Matt Friedman, a graduate student in the Committee on Evolutionary Biology at the University of Chicago and a member of the Department of Geology at the Field Museum, found examples of such transitional forms.

"We owe this discovery, in part, to the European fondness for limestone," said Friedman. The fossils—which he found in museums in England, France, Italy and Austria, and came from limestone quarries in Northern Italy and underneath modern-day Paris—were stored in collections of underwater fossilized creatures from the Eocene epoch, about 50 million years ago.

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