Walking their talk are Simone French, left, and Mary Story, School of Public Health obesity researchers.
Page 7
“In this life, there is one source of continuous energy, which is given to you when you are serving others,” said America Bracho. The national expert on community health urged health professional students and professors to be caring and involved with their communities when she spoke at the University Sept. 10 on “How Universities can Partner with Underserved Communities.” Bracho is Executive Director of Latino Health Access in Santa Ana, Calif., which uses participatory approaches to community health education.
PICTURES OF HEALTH

University physician Joseph Clinton uses SimMan to teach emergency medicine to personnel from U.S. embassies. Page 5

In pictures:

- West Nile Virus affects humans and other species, like this red-tailed hawk being treated by Patrick Redig of the University Raptor Center. Pages SF 1-4

- Investigating therapies for patients after transplant are, from left, Henry Emmons, Mary Jo Kreitzer, Val Russas, and Cynthia Gross. Page 8

- University physician Joseph Clinton uses SimMan to teach emergency medicine to personnel from U.S. embassies. Page 5

SNAPSHOTS
A quick look at news from the Academic Health Center.

EDUCATION
REALITY CHECK
Simulations give students a risk-free chance to test their abilities in real-life situations.

OUTREACH
PUTTING THE PIECES TOGETHER
Patients benefit as the University and Fairview Health Services partner on pharmaceutical care.

CROSSING DISCIPLINES
OUNCE OF PREVENTION
To fight the obesity epidemic, University public health experts focus on youth-oriented programs and studies.

RESEARCH
LIFE AFTER MIRACLE
Investigators are studying whether alternative therapies help patients after their transplants.

- Cell Division
- Of Mice and Medicine

Health Talk & You

SPECIAL FOCUS: IMMUNOLOGY AND INFECTIOUS DISEASE
Understanding of infectious disease, from its molecular basis to its spread in populations, is growing.

Back Page: Room to Grow
The University of Minnesota has been designated a National Center of Excellence in Women’s Health by the U.S. Department of Health and Human Services Office of Women’s Health. “This is truly an interdisciplinary effort including the schools of nursing, public health, pharmacy, medicine, the Duluth campus, and community partners, that will allow us to share superb University resources across the state,” said Anne Taylor, co-director of the program and the Medical School’s associate dean of faculty affairs. “Because women are the key health managers in families, improvement in women’s health in Minnesota will strengthen family and community health.” A National Center of Excellence in Women’s Health designation is a formal commitment to improvement in women’s health in Minnesota will strengthen the priority for women’s health. The University was chosen because of its superiority in five key areas: clinical care, education, research, leadership development, and outreach. With this designation, the University of Minnesota joins the company of Harvard University, University of Pennsylvania, and the University of California campuses of San Francisco and Los Angeles.

Black, Hispanic, and Native American children have somewhat lower survival rates of acute lymphoblastic leukemia than do white children. Acute lymphoblastic leukemia (ALL) is the most common childhood cancer. James Gurney, below, is the study’s lead investigator, a professor of pediatrics and a member of The Cancer Center. “The good news is that over the last several decades, childhood ALL has gone from a fatal disease to a survivable disease in most cases,” said Gurney. “Each group of children, regardless of race or ethnicity, has seen dramatic improvements in survival.”

Linda Lindeke, School of Nursing, has been named a National Health Service Corps Ambassador. This new U.S. Department of Health and Human Services program focuses on developing the next generation of primary health care clinicians committed to serving underserved populations across the country. As a service corps ambassador, Linda will provide career guidance to students who are interested in primary care for the underserved, recommend students for the NHSC Scholarship program, and assist those scholars to ensure they are ready to serve by the time they graduate.

On Oct. 22, the College of Pharmacy, Duluth officially welcomed its first class of 52 students. They will follow a curriculum that emphasizes providing pharmaceutical care in medically underserved Greater Minnesota. “The college is acutely aware of the need to educate pharmacists for all the communities of the state,” said pharmacy dean Marilyn K. Speedie. “We are pleased to have the opportunity to do so.” The support from the University of Minnesota Duluth and the community has been significant, said Stephen Hoag, senior associate dean for the program. Hoag, at center in photo, joins Speedie and Cerra in cutting the ribbon to open the expansion of the only pharmacy school in Minnesota.

Colleagues from the Medical School, the Academic Health Center, and the community gathered Sept. 5 at a memorial service to celebrate the life of pediatrician G. Scott Giebink. A tireless advocate for children, Giebink died suddenly of heart failure at age 59. He served the Department of Pediatrics most recently as interim head of pediatrics and as head of the Division of Pediatric Infectious Diseases. He was an internationally recognized expert in middle-ear disease and other pediatric infectious diseases and immunizations. Giebink also served as a galvanizing force behind MinnesotaCare, a state health-insurance program for the underprivileged. He was the first CEO and president of University of Minnesota Physicians, the faculty practice plan. Born in Edina, Giebink earned his M.D. at the University of Minnesota Medical School, and after residency, returned for a fellowship in pediatric infectious disease. He is survived by his wife, Susan Casey, sons Peter and Brent, and daughter Kathryn.
The patient is struggling for breath. His chest heaves. His heart rate soars. “Doc, I feel like I could die!” he gasps. And then he dies. Disappointed but undaunted, the students talk over what went wrong, revive the patient, and try again.

Impossible? In real life, yes. But this is SimMan, a computer-run mannequin that joined the Academic Health Center last summer. Piloted by sophisticated, customizable software, SimMan is not “just a dummy lying on a gurney,” says Jane Miller, director of the Interprofessional Education and Resource Center, better known as the Clinical Skills Lab. He breathes and has a heart rate, body temperature, blood pressure, lung sounds—all of which change to correspond to the normal course of the condition he’s been programmed to experience and the interventions attempted by attendants. “There isn’t much he can’t do,” Miller says.

The AHC brought SimMan on board to expose students to a variety of emergency and real-life situations they might not otherwise encounter. “Practicing procedures on an actual patient is becoming less and less possible and certainly has some ethical questions,” Miller says. “If we expect students to be competent in certain skills we have to be able to provide situations where they can practice and do that safely.”

Students and continuing education participants in all health professions have the opportunity to use SimMan. This fall, he starred in a workshop for U.S. embassy personnel from around the world.

“It’s really for people to understand how different sorts of conditions, especially emergency conditions, play themselves out . . . and how making good choices and bad choices makes a difference,” Miller says.

Another way University of Minnesota medical students get a dry run on real life is through the Minnesota Virtual Clinic, an online, simulated primary-care clinic begun last year under the direction of Catherine Niewoehner, professor of medicine.

The clinic’s patients, created by Niewoehner and many other faculty members, are old, young, rich, poor, friendly, cranky. They have a wide range of histories and medical conditions, which vary depending on what’s being covered in class. One is pregnant; two are about to enter adolescence. “The patients are not just real patients with their names changed,” Niewoehner says. “They are composites with complete stories.”

Students visit the virtual clinic and assess patients using medical, family, and social histories, as well as results from examinations, lab tests, and X-rays. Patients grow and change much as they would in a real clinic.

Medical student Nancy Luger says last year some students expressed interest in having more opportunities for decision making, so efforts are underway to make the experience more interactive. “I think it’s a good concept,” Luger says. “It does give you an idea of what you’d see.”

Jim Pacala uses computers to help future doctors sample yet another type of reality—the ins and outs of managed care. He’s developed a Web site that lets first- and second-year medical students serve as board members for a fictitious health plan. The goals are to provide insights into health plan managers’ perspectives, explore the meaning of health care quality, and introduce the concept of population-based medicine.

At first students take the role of consumer, choosing among three health plans. Then they put on their “board member” hats. Each month the Web site gives them an issue to address, such as deciding whether to cover certain tests or formulating a response to patient satisfaction surveys. They choose responses and receive feedback on their choices from real health plan executives.

One of the virtual health plan’s advantages is that it lets students experience the consequences of their decisions. Last year when the “board members” voted to keep costs down by not promoting breast-cancer screening to women under 50, Pacala responded with a simulated newspaper article blasting the simulated health plan.

“The bottom line is to give them some practical experience in the realm of resource allocation,” Pacala says.
Putting the Pieces Together

IN A UNIVERSITY-
FAIRVIEW PHARMACEUTICAL CARE COLLABORATION, PATIENTS AND PROVIDERS BENEFIT.

Every year, America spends $177 billion to correct problems caused by medication-related illnesses. The tab runs high for several reasons, among them: Patients don’t take their medication as prescribed; patients are inadvertently prescribed too much or too little; or, drugs interact dangerously with each other.

Researchers and providers at the University of Minnesota and Fairview Health Services are working to address those problems. A recent study shows the collaboration is achieving its goals.

Six Fairview clinics in the Twin Cities area house pharmaceutical-care clinics where patients meet with pharmacists. Pharmacists review patient medications—including herbal and over-the-counter medications—and determine whether changes need to be made to the patient’s drug regimen.

The program began in 1999 and allows all patients, regardless of their ability to pay, to receive pharmaceutical-care services. Pharmaceutical care is the practice of identifying, resolving, and preventing drug therapy problems that adversely affect patients’ care.

The project began with patients talking to pharmacists in a semi-private consulting area of the pharmacy. Within nine months, physicians saw the therapeutic benefits of the interactions and invited the pharmacists to join them in clinic exam rooms.

“Pharmacists can assess whether medications may be causing problems for a patient, whether medications are being given at a subtherapeutic dose, or whether there are medications that might be added to optimize a patient’s health,” says Loie Lenarz, a physician and Fairview Clinics president and senior medical director. “In the course of a routine office visit, this level of attention is simply not possible for a physician. Additionally, we are not trained as pharmacists and do not have as extensive an understanding of drug interactions.”

Each of the patients’ providers might not be aware of what the others have prescribed, a situation that could leave patients confused and cause potentially dangerous drug interactions, says Brian Isetts, a pharmacy professor who helped establish the pharmaceutical-care clinics. Moreover, in 10 percent of all drug therapy problems, patients don’t realize that medications borrowed from friends could cause problems.

“We step in to provide this care,” Isetts says. “It’s like we put Humpty Dumpty back together again.”

Isetts and Lenarz were lead authors of a study on the safety and effectiveness of pharmaceutical care published recently in the Archives of Internal Medicine. Researchers found that pharmacists trained in pharmaceutical care can safely solve patient medication problems, including potentially dangerous drug interactions, by using the collaborative care approach. A pharmacist-physician partnership is one type of collaborative care, which is increasingly offered in health-care settings.

The study, conducted by researchers from the University and Fairview Health Services, found that 74 percent of patients experienced desired effects from their drug therapy during their initial visits to the pharmaceutical-care clinic. That percentage increased to 89 percent at their latest visit. The study also found pharmacists were able to resolve most drug-therapy problems without directly involving the patients’ physicians. For example, pharmacists made complicated drug regimes easier to understand and manage for patients.

Patients benefit by having someone spend time discussing their medications and what improvements they actually see, Isetts says. They may be more likely to avoid potentially dangerous drug interactions. The study also shows the clinics increased patient compliance with medication requirements.

The pharmaceutical-care partnership has another benefit: It shows collaboration can work, Isetts says. Lenarz agrees.

“It allows us to take academic research being done at the Academic Health Center into the community,” Lenarz says. “This benefits our research effort by giving us a broader and more diverse patient base and benefits our patients by giving them access to cutting-edge care.”

Rebecca Lentz
Ounce of Prevention

Public health researchers seek ways to help young people become active so they can stay healthier for a lifetime.

The statistics are sobering: Nearly two-thirds of Americans are overweight. The proportion of children ages 6 to 11 who are obese has tripled since the early 1970s. Treating ailments associated with obesity costs more than $70 billion per year in the United States.

“We’re in the midst of an obesity epidemic,” says Mary Story, professor of epidemiology in the School of Public Health.

Super-sized meals, sugary soft drinks, videogames, television—the culprits are legion. “There are so many influences—it’s easy to become inactive in our society and to overeat,” Story says.

Story and colleagues are working to reduce obesity by researching strategies for helping young people develop healthy habits. “People who are overweight as children are more likely to also be overweight as adults, so the implications are profound,” Story says.

Epidemiology professor Dianne Neumark-Sztainer is devising strategies to help girls understand the links among food, activity, and well-being.

Among the interventions she has tested is a breakout school physical education program for overweight girls encouraging exercise and providing nutrition advice and social support. Reactions from the girls, their parents, and their teachers indicated the program was helpful in planting the seeds for behavior change, Neumark-Sztainer says.

Several of Story’s studies focus on minority youth, who face elevated risk for obesity. One tested the impact on students in Indian reservation schools of improving school lunches, encouraging physical activity, and teaching the importance of nutrition and physical activity. Another provided an after-school program encouraging African American girls and their parents to be more active, eat more fruits and vegetables, and drink low-fat milk. Physical activity and healthy eating increased “and the girls really liked the program,” Story says.

Neumark-Sztainer is also leading a study aimed at understanding factors influencing adolescent choices regarding nutrition and activity. Five years ago researchers surveyed some 4,700 teens on topics such as social environments, personal traits, and behavioral traits. Researchers are now surveying the students a second time to see how things have changed.

Simone French, professor of epidemiology, is looking at ways to battle obesity by giving people better food choices. In one study, she and her colleagues added healthy foods to vending machines in workplaces and schools, with and without promotional signs and price breaks, and compared sales to sales of other items in the machines. They found that reduced price was a strong incentive. In another intervention, they worked with high school lunch providers to add low-fat foods to a la carte menus. The study showed that students will indeed buy healthy foods if they’re available, French says.

“The whole idea behind both of the studies was to try to look at the environmental strategies to change people’s food choices. We thought, let’s change the environment and then people will be able to make better choices,” she says.

Although research suggests there is no quick fix, Neumark-Sztainer still believes interventions can help Americans shift the balance from fat to fit. “I think it’ll probably get worse before it gets better,” she says. “But if we recognize this is a societal problem with societal solutions, not just individual problems, maybe we’ll see some positive changes.”

Stepping Up to Good Health

Convinced that good health, like charity, begins at home, the School of Public Health has begun an employee health campaign. The school’s Wellness Initiative issues pedometers to participating employees and challenges them to log 10,000 steps a day. It also provides educational and motivational messages aimed at improving activity and healthy eating.

While working to improve their health, participants will also be providing data for a study of whether this is a useful approach for increasing physical activity.

The program dovetails with a broader University Wellness Initiative that kicked off Oct. 21 with a two-mile cross-campus walk. That initiative offers University employees resources for improving their health in a variety of areas, including enhanced nutrition and exercise.
In 1974, a mother said a prayer, asking that her 9-year-old daughter’s diabetes be cured. On Valentine’s Day 2001, that prayer was partially answered. “On the day of love I received the gift of love and life from my kidney donor,” says the daughter, Kris Abrahamson, now 38. The gift came from a living donor, who answered an ad placed by Abrahamson’s mother in a small-town Wisconsin newspaper.

On Fathers’ Day that year, the prayer was answered completely when a father donated his son’s cadaver pancreas to Abrahamson. Following her second successful transplant surgery in four months at Fairview-University Medical Center, Abrahamson was healing and living a new life free of diabetes.

End of story? Not quite.

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Forty years ago, University of Minnesota physicians conducted the first kidney transplant in Minnesota history. Today, the procedure seems nearly routine. As the number of transplants increase and survival rates climb, there’s an increasing number of transplant recipients living and they’re living longer. But many experience chronic conditions, including hypertension, depression, and sleep deprivation. Some conditions can be attributed to taking drugs such as immunosuppressants—which can cause significant side effects—and some to the stress of income loss, physical limitations, fear of organ rejections, and high medical costs.

“Transplant recipients receive a lot of medications and many of the problems they experience are related not to the new organ—which can be working very well—but from imperfect medications,” says Cynthia Gross, a professor in the University’s College of Pharmacy and School of Nursing. While “transplantation has been a miracle, the attention now needs to shift to this population who are living with a transplant—it’s no longer an acute, surgical issue, but a lifelong issue.”

Gross first began looking at quality of life issues related to transplant recipients in the early 1990s. Today, she’s the lead investigator on a $2.2 million, five-year study that will measure the impact of mindfulness-based meditation and yoga on quality of life for solid-organ transplant recipients. Funded by the National Institutes of Health, it is one of the largest mindfulness-based stress reduction studies done on any population and it’s the first large clinical trial with transplant patients.
Mindfulness-based stress reduction was effective in improving the quality and duration of sleep, according to a pilot study of 20 transplant recipients by Gross and co-investigator Mary Jo Kreitzer, director of the University’s Center for Spirituality and Healing and associate professor in the School of Nursing. An additional result, although not statistically significant: participants said they experienced decreases in anxiety and depression.

“We were encouraged that there were decreases in all of the variables and the decrease seemed to persist over time,” says Kreitzer, who says that her interest in pursuing the study was sparked partly by results from a separate survey showing that 88 percent of transplant recipients are using alternative therapies. “What our pilot study results mean for patient care is that there are other options to consider and that our work with patients isn’t finished.”

Participants in the larger study, scheduled to begin in January, will be randomized into one of three groups of 50. One group will learn and practice mindfulness-based meditation and yoga techniques popularized by author and University of Massachusetts integrative-medicine expert Jon Kabat-Zinn. A second will study the Living a Healthy Life with Chronic Conditions approach developed at Stanford University, an innovative, peer-led education program that emphasizes exercise, diet, and enhanced communication with health providers. The third group, the inactive control group, will be randomized into one of the first two groups after six months.

Along with providing a means to objectively study results, the formalized clinical trial aims to answer critics’ claims that alternative therapies are not backed by scientific evidence. “I think the one criticism about these alternative approaches to medicine is that they have not been rigorously tested,” says Hassan Ibrahim, a kidney specialist in the Medical School, who is helping to recruit patients for the new study. “However, this is such an amazing well-designed trial that it will address the question scientifically. If there are more studies like Cynthia’s, more doctors will be open to complementary medicine.”

Gross acknowledges the challenge. “I think health professionals are reluctant to recommend a particular therapy if there are doubts about its safety or usefulness. Our study, depending on the results, could give the scientific community evidence that this is something you can safely recommend.”

Meanwhile, Ibrahim is working on his own large drug-based study to address chronic rejection that some kidney and pancreas transplant recipients experience. He notes that other University researchers are currently exploring alternatives to immunosuppressive drugs.

Henry Emmons, a psychiatrist trained by Kabat-Zinn and adjunct professor at the Center for Spirituality and Healing, will teach the mindfulness-based stress reduction program. “Mindfulness-based meditation is kind of a way of taking a front-row seat and observing your mind, including the negative thoughts, and doing it without judging yourself or the experience,” Emmons says. Negative thoughts “are automatic and have no basis in truth very often. Partly the meditation is training to place the mind and thoughts into perspective to make them less important, so that they have less power over us.”

Each week for eight weeks, study participants receive training from Emmons on meditation and yoga techniques and they are also encouraged to practice at home. Participants will be followed for a full year.

“The reason that I am doing so well is because I do complementary things, such as acupuncture and meditation,” says Kris Abraham, who received a kidney and a pancreas.

“Mindfulness-based meditation is kind of a way of taking a front-row seat and observing your mind, including the negative thoughts.”

—Henry Emmons

The University of Minnesota Celebrates 40 Years of Organ Transplantation

Over the last 40 years, more than 8,500 transplants have been performed at the University of Minnesota. Here are some of the highlights:

1963 Minnesota’s first kidney transplant.
1966 World’s first pancreas transplant
1967 World’s first simultaneous kidney-pancreas transplant
1968 Minnesota’s first lung transplant
1969 Minnesota’s first double-lung transplant
1970 Minnesota’s first simultaneous liver-pancreas transplant
1975 Minnesota’s first lung transplant from a living, related donor
1979 World’s first two successful single donor human islet transplants, allowing two lifetime diabetics to be insulin-independent.
1980 Minnesota’s first living donor liver transplant
1981 Minnesota’s first simultaneous heart-lung transplant
1985 Minnesota’s first infant heart transplant (in a 6-month-old)
1988 Minnesota’s first lung transplant
1989 Minnesota’s first double-lung transplant
1990 Minnesota’s first simultaneous liver-pancreas transplant
1991 Minnesota’s first lung transplant from a living, related donor
1993 World’s first two successful single donor human islet transplants, allowing two lifetime diabetics to be insulin-independent.
1996 Minnesota’s first living donor liver transplant
1997 Minnesota’s first simultaneous intestine-liver transplant
1999 Midwest’s first living donor intestine transplant
2000 Minnesota’s first living donor liver transplant in an adult
2001 Minnesota’s first simultaneous laparoscopic (minimally invasive) living donor kidney-pancreas transplant
2002 Most nondirected (i.e., recipient is unspecified) living kidney donations performed worldwide
2003 The 25th anniversary of U of M’s heart transplant program
2005 The 700th liver transplant performed by U of M surgeons
2006 The 6,000th kidney transplant performed by U of M surgeons
2007 The 40th anniversary of U of M’s organ transplant program

“THE REASON THAT I AM DOING SO WELL IS BECAUSE I DO COMPLEMENTARY THINGS, SUCH AS ACUPUNCTURE AND MEDITATION,” SAYS KRIS ABRAHAM, WHO RECEIVED A KIDNEY AND A PANCREAS.

MARK ENGBRETSON
Could human embryonic stem cells be used to “manufacture” blood products, such as red blood cells or platelets, for clinical care? That’s one goal of current research by Dan Kaufman, a faculty member of the University’s Stem Cell Institute.

Before coming to Minnesota, Kaufman was part of a team of University of Wisconsin researchers who were the first to isolate human embryonic stem cells in 1998. The Wisconsin group, led by biologist James Thomson, worked with embryos donated for research by couples undergoing in vitro fertilization. By carefully controlling the cells’ environment, Thomson caused them to continue dividing without maturing into any of the approximately 200 cell types in the human body.

Kaufman, a St. Louis Park native and Mayo Medical School graduate who had moved to Madison to pursue a fellowship in hematology, heard about Thomson’s work. He suggested a research project studying the earliest stage of blood development from human embryonic stem cells. He was hired. “It was a case of being in the right place at the right time,” Kaufman notes.

In 2002, he joined the staff at the University of Minnesota Stem Cell Institute to continue the work, partially supported by a three-year research grant from the NIH. At the institute, Kaufman has been focusing on two areas. One is the study of specific growth factors to better understand the conditions that cause undifferentiated cells to become blood cells. Kaufman also investigates the potential of these embryonic stem-derived cells grown in culture, to determine if they have the same potential as a source of blood products as cells derived from bone marrow or umbilical cord blood. “It appears that we have preliminary evidence that these embryonic stem-derived cells can engraft and grow in mice.”

Kaufman is one of a handful of researchers in the world focusing on blood development from embryonic, rather than adult, stem cells. Compared with adult cells, embryonic cells “are very easy to grow in large numbers, and also have broader development potential,” Kaufman explains. His work, he says, “is a new way to approach questions people have been working on for a long time.” By adding specific proteins or cytokines and growth factors to stem cells, scientists hope to figure out which cause them to become blood cells. If the experiments are successful, stem cells could be harnessed to expand the supply of blood products available for transplants and transfusion.

Several other researchers at the institute are engaged in related research into the potential therapeutic value of adult stem cells, including Stem Cell Institute Director and lead researcher Catherine Verfaillie, and John Wagner, professor of pediatrics and scientific director of clinical research for the University’s blood and marrow transplant program and the institute. Verfaillie is working with stem cells derived from bone marrow that can be cultivated to develop into other types of cells and tissue that make up the body, such as liver, brain, and heart. Wagner is studying possible methods to reduce the immunologic complications of transplants, including organ rejection and prolonged immune deficiency.

Because of ethical and political debates over using stem cells from human embryos, the research has been impacted by a federal mandate limiting their use. Under rules announced in 2001, federal funds are only available for research using government-certified human embryonic stem cell lines. Currently, 78 cell lines from 14 organizations are included in the National Institutes of Health stem cell registry. Kaufman works with human embryonic stem cells from federally approved lines.

Kaufman considers the recent federal ruling on human stem cell research a case of “good news/bad news. On one hand, it does allow for federal funding of human embryonic stem cell research. Since we started early in this work, we are in a good position to compete for funding, as long as we use approved existing embryonic stem cell lines.”

If the institute decides to derive its own cell lines, it will have to use private funding sources, Kaufman says. “There is potential interest in doing that here.”

Dan Kaufman brings a focus on embryonic stem cells to the University’s Stem Cell Institute.

“Since we started early in this work, we are in a good position to compete for funding.”

—Dan Kaufman
To advance human health, researchers sometimes examine how problems and solutions work out with animals.

Worldwide, nearly 200 million people used illicit drugs in 2002, according to United Nations estimates. But developing therapies for preventing and reducing drug use presents some thorny problems for academic researchers like psychiatry professor Marilyn Carroll. In testing ways to prevent relapse, for example, Carroll cannot simply try out her theories on recovering users, waiting to see if they swallow, smoke, shoot up, or spurn temptation.

Instead, Carroll conducts her experiments on rodents such as mice and rats. In lab tests, she has shown that several therapeutic drugs, such as antidepressants and opioid and dopamine types, significantly reduce self-administration of drugs among rodents. Behavioral reinforcers, such as the availability of sweets, social rewards, exercise, and other distractions, also reduce drug usage. Carroll’s findings have implications for human drug-treatment programs, but her work with rodents, she says, has been indispensable.

“It would be not only difficult, but also unethical to conduct these drug abuse initiation studies on human beings,” she says.

Animal models have long been an essential component for research in psychiatry, biology, and medicine. Today, they are increasingly important for studies in genetics, biomedicine, and even cancer research. The University of Minnesota, like many other companies or institutions engaged in these areas, authorizes animal studies when no alternative research approach is possible and the potential benefits to human—or in the case of veterinary research, animal—well-being are clear.

“The vast majority of animals used in research are mice and rats,” says Ann Fitzpatrick, a veterinary compliance officer with the Office of Regulatory Affairs. Dogs, cats, rabbits, and some nonhuman primates are also occasionally used, she adds, but regardless of the size of the subjects, the aims and outcomes of every animal-model-based research proposal is carefully weighed by a panel of experts. The University’s Institutional Animal Care and Use Committee, which includes 18 members representing various facets of the University and the local community, meets every two weeks to evaluate roughly 30 proposals for research involving animals. The committee evaluates each request with the following question in mind: Could refinements, reductions, or replacements be made that would eliminate the need for animal subjects?

In cases where computer modeling, in-vitro studies, and other methods are not viable alternatives, the use of animal models are approved. But researchers must comply with rules laid out in the federal Animal Welfare Act, guidelines set by the National Institutes of Health, and the University’s own Regents Policy. Researchers also must work closely with University’s Research Animal Resources unit, which provides for the overall health of lab animals. (A fee provided by each researcher helps fund the unit’s work.) Additionally, researchers must take precautions against causing animals unnecessary pain: “If any animal is undergoing pain and distress that is unable to be relieved, it is required that it be humanely euthanized,” Fitzpatrick says.

Animal models are “absolutely essential” to life sciences research, says Richard Bianco, the University’s assistant vice president for regulatory affairs and Director of Experimental Surgery. “The vast majority of the drugs we use today to treat both people and animals were developed years ago through research, at least in part, with animals,” he says.

Heart surgery, organ transplantation, and brain research impacting human health have advanced, too, because researchers first worked with animal models. In current and future research, transgenic mice, modified to mirror genetic problems in humans, will be equally important to medical advances.

Carroll, meantime, sees little difference between mice, rats, and humans—at least when it comes to the basics of drug addiction—escalation, binging, and relapse. Increasingly, she can predict addiction based on environmental and behavioral factors.

Results from a clinical program with drug users at the University of Vermont, Johns Hopkins University, and other major treatment centers, she notes, correlate with her own findings in rodents: Users who are offered material incentives to stay clean will reduce their usage.

“Rewarding nondrug events can decrease usage,” she says. In mice, or men, apparently.

—Joel Hoekstra
The conventional treatment suggested for Charles Yellow’s esophagus would probably be accompanied by constant gastric complaints—hard for a little boy to bear. “Additionally, he would lose 20 percent of the capacity of his lungs,” says his father, David Yellow. “He’s a sporty boy and that would kill him.”

Charles, 8 years old, has been seeing doctors all his life. When he was 5, a new doctor finally diagnosed the problem: his esophagus narrowed to a bottleneck that made eating solid food impossible. As Charles grew older, he was healthy and sociable but couldn’t eat at his friends’ houses. His parents, David and Karen Yellow, sought help in their native England but were not satisfied with an English expert’s solution, that Charles’s stomach would be pulled into his chest.

They decided Charles should see one more doctor: John Foker of the University of Minnesota and Fairview-University Medical Center. “He’d try to do the best for our child,” says David Yellow. “That’s what drove us.”

Foker offers an unusual treatment, one he has used for six or seven years. The Internet has helped to spread the word and child patients with esophageal and other problems and their families have arrived in Minnesota from around the United States, the Middle East, and various European countries. Foker has even had inquiries from New Zealand and Malaysia. Satisfied parents of patients, including the Yellows, also have become advocates for his method.

Foker calls himself an organic surgeon. Foker doesn’t substitute one part of the body for another—making the stomach substitute for a part of the esophagus. Instead, he aims to make the child’s own body grow new tissue. “When there’s not enough tissue,” says Foker, “the idea is to get things to grow.”

The principle, says Foker, is easy: stimulate growth by signaling the tissue to grow with traction. But the process takes time. “When you do a typical operation, you pull out the instruments, you close the skin, the operation’s done,” he says. “When I do these operations, I’m just starting because the first operation is to stimulate growth. Then you have to wait for the growth to take place.... You have to wait a week, you have to wait a month—and then you do the final operation.”

Most of Foker’s patients are children born without an esophagus. While most of those, about one in about every 3,000 to 4,000 births, can be treated by other surgeons. Foker treats those at “the far end of the spectrum, where they’re missing a whole lot.” He also has devised growth operations for children like Charles Yellow and for those with hearts that are too small.

Many of these patients have more than one problem, says Foker’s colleague Khalid Khan, a pediatric gastroenterologist. “The more other problems you have, you need a better result.” Khan treats complications that may occur in the middle of treatment. He says that Foker’s surgical outcomes are excellent. “That’s where the future is,” says Khan. “Even 20 or 30 years ago, kids weren’t surviving. Now that we know we can do it, we can do it the right way.”

Allison Campbell