Bracing achievement
Improving clubfoot treatment
Scaling new heights  First-year medical students spent a day climbing and bonding as part of a team-building exercise held at Greensfelder Park, an outdoor recreation area located in west St. Louis County. Sponsored by the School of Medicine’s Office of Diversity Programs, the annual Diversity Retreat and Ropes Course focuses on group dynamics, confronting stereotypes and cross-cultural communication. Getting the hang of it, left to right, are: Toyin Falola, Scott Harring and Danielle Alfano.
New Beginnings
8 Parents who adopt children from around the world now have a convenient and reliable way to evaluate their child's overall health.

Lab Cultures
13 Minority undergraduate science majors came to St. Louis this summer to learn more about the day-to-day world of scientific investigation.

Sighting the Inner Ear
16 Using computer modeling, researchers are developing more effective treatment for patients with severe inner ear disorders.

Ready for Action
21 A new, nonsurgical treatment lets kids walk, crawl and move their legs independently, all as it works to correct clubfoot.

COVER Pediatric orthopaedic surgeon Matthew B. Dobbs, MD, is treating 18-month-old Jimmy Page to correct congenital clubfoot. The new brace he has developed not only has been shown to significantly improve compliance and complications — it also prevents recurrence of this common disorder. For more on this story, please turn to page 21.

PHOTO BY TIM PARKER
Little transplant, big promise
Mouse lung model could help prevent rejection

Lung transplants have been performed successfully for more than 20 years in humans but never before in mice — until now.

School of Medicine surgeons have developed the first mouse model of lung transplantation, and they're hoping it will help explain why success of the procedure in humans lags far behind other solid organ transplants. Ultimately, the mouse model could pave the way for developing new therapies to prevent lung transplant rejection.

The mouse model is described in the June 2007 issue of the American Journal of Transplantation.

"The high failure rate of lung transplants is a huge problem," says lung transplant surgeon Daniel Kreisel, MD, PhD, assistant professor of surgery and lead investigator of the research. "Unlike other organs, lungs are constantly exposed to bacteria and viruses in the environment, and we think this exposure increases the risk of chronic rejection and the eventual failure of the organ."

Lung transplants are the only treatment option for end-stage lung disease. Following transplant, patients take drugs that suppress the immune system and prevent it from attacking the new lung. This leaves them vulnerable to upper respiratory infections, which can quickly develop into pneumonia.

Mouse lungs measure less than an inch in length, and the pulmonary vein and artery, which carry blood to and from the heart, are as thin as a human hair.

Lung grafts in mice when the donor is genetically identical to the recipient appear normal with little evidence of inflammatory cells. However, when the donor is unrelated to the recipient, the lung graft tissue becomes infiltrated with inflammatory cells that attack cell membranes within the graft, impairing gas exchange and eventually causing rejection.

These illnesses may alter the immune response and increase inflammation, which eventually leads to chronic rejection, says Alexander Sasha Krupnick, MD, assistant professor of surgery, who was involved in the research.

Developing a mouse model for lung transplantation has proved to be a technical challenge. Postdoctoral fellow Mikio Okazaki, MD, adapted the lung transplantation technique used in rats to the mice.

The mouse model does have an advantage over those in rats and larger animals because the genetics of mice are well documented and their genes are easier to manipulate, says Andrew Gelman, PhD, assistant professor of surgery and a lead investigator of the research. "By understanding the genes that control lung graft survival, researchers will be able to better guide the development of therapies to counteract chronic rejection."
Women's infectious diseases to be focus of major new effort

Collaboration between disciplines is key

The School of Medicine has launched the center for Women's Infectious Disease Research (cWIDR), a new effort to study infectious diseases that preferentially affect women. The center focuses on issues including:

- microorganisms that cause urinary tract infections (UTIs) and other conditions that make urination and intercourse painful or difficult
- infections that lead to premature delivery and vaginitis
- potential contributing roles for microorganisms in life-threatening conditions such as cancer, heart disease, neurodegenerative disorders and diabetes.

"Infectious diseases of women is a tremendously underserved area," says Scott J. Hultgren, PhD, the Helen L. Stoever Professor of Molecular Microbiology and the center's director and principal investigator.

"UTIs, for example, are one of the most common bacterial infections in women. They're not fatal, but we need new and improved therapeutics because they're a very significant cause of suffering, lost work days and health care expenses."

The center and five new faculty positions will be supported in part by funding from the school's departments of Medicine, Molecular Microbiology, Infectious Diseases and Cardiology.

Lending a hand Lacey Chandler, a second-year physical therapy doctoral student, right, assesses the hand function of Tomoyo Ikawa, a pre-health student from Nagoya Gakuin University in Nagoya, Japan. A group of students from the Japanese university spent a week at the School of Medicine taking part in classes in the Physical Therapy and Occupational Therapy programs. In the background are, from left: Japanese students Junko Oishi and Kanako Ito and second-year physical therapy doctoral student Tom Barbata.

Eberlein on cancer research board

Timothy J. Eberlein, MD, the Spencer T. and Ann W. Olin Distinguished Professor and director of the Siteman Cancer Center at Washington University School of Medicine and Barnes-Jewish Hospital, has been elected to a three-year term on the board of directors of the Association of American Cancer Institutes (AACI). Eberlein also serves as the Bixby Professor and chair of the Department of Surgery.

The AACI comprises 89 of the leading cancer research centers in the United States, which form the country’s cancer research infrastructure. It supports the common interest of 16,000 scientific and clinical investigators at cancer centers nationwide and strives to ensure that the public and policymakers understand and support their work. AACI cancer centers serve as headquarters for most of the nation’s clinical trials and are largely responsible for training the cancer workforce that will practice in the years to come.

Over the course of his 30-year career, Eberlein has excelled as a physician and scientist devoted to cancer treatment and cure, particularly in the area of breast cancer. He was instrumental in developing the Siteman Cancer Center.
High schoolers experience science

Hannah Lee, a senior at Parkway Central High School, spent six weeks this summer running high-energy electric shocks through cultured cells taken from a cervical cancer tumor. Lee participated in the 2007 Pfizer-Solutia Partnership of Universities' Students and Teachers as Research Scientists (STARS) program for gifted high-school students.

Seventy-two academically talented high school juniors and seniors from the United States, and a few from Greece and Korea, worked with more than 50 professor-mentors in science and engineering. The mentors were from Washington University, Saint Louis University, the Danforth Plant Science Center and the University of Missouri-St. Louis.

Lee's project was part of a larger effort in the laboratory of Joseph L. Roti Roti, PhD, professor of radiation oncology, to improve radiation treatment for cancer. Her plan is to attend either Washington University or Stanford University.

Project ARK helps individuals and families with new grant

Greatest benefit to minorities and the poor

Project ARK, the St. Louis area's only organization that coordinates medical care, social support and prevention services for children, youth, young adults, women and families living with or at risk for HIV infection, has received a $6.7 million, five-year grant from the U.S. Department of Health and Human Services. The grant, the largest that supports Project ARK and the foundation of the program, was awarded through the Ryan White HIV/AIDS Treatment Modernization Act Part D, allowing Project ARK to continue to provide HIV care to children, youth ages 13–24 and women through a family-centered approach.

Project ARK, or AIDS/HIV Resources and Knowledge, is a collaboration among Washington University School of Medicine, St. Louis Children's Hospital and other area health care providers, including Saint Louis University School of Medicine. Together, they provide HIV primary care, case management, mental health and substance abuse evaluation and treatment, counseling, support groups and primary prevention education.

Outstanding educators honored

The Samuel R. Goldstein Leadership Awards in Medical Student Education for 2006 went to Krikor T. Dikranian, MD, PhD, Jay F. Piccirillo, MD, and David W. Windus, MD.

Dikranian, instructor of physical therapy and of anatomy, is considered by students to be well-prepared, knowledgeable and always enthusiastic in delivering his insight.

Piccirillo, professor of otolaryngology, of occupational therapy and of medicine, established a program to provide clinical and translational research training under initiatives established by the National Institutes of Health. He is a role model for students, recognized for his devotion to the education of future practitioners and investigators.

Windus is associate professor of medicine and assistant medical director of the Chromalloy American Kidney Center at the medical school. He recently implemented team-based learning into the Renal Pathophysiology course and in clinical pathophysiology conferences, resulting in greater understanding and appreciation of nephrology by students. He also developed a curriculum for the first medical school in the African country of Eritrea and trained health care professionals there in an effort to improve care for diabetes.
Much more than comfort
Surgeon Jeffrey A. Lowell, MD, boards hospital ship USNS Comfort to serve on humanitarian mission to Central America

In late July, Jeffrey A. Lowell, MD, was in El Salvador operating on a Salvadoran soldier who had been injured by a grenade explosion while serving in Operation Iraqi Freedom. Lowell and a colleague from the U.S. Navy spent about an hour removing tiny pieces of shrapnel from the soldier's neck and shoulder.

Lowell, known at the School of Medicine as professor of surgery and of pediatrics, was deployed on a mission serving in his role as a commander in the U.S. Public Health Service Reserve. Cmdr. Lowell was deployed on the Military Sealift Command hospital ship USNS Comfort July 13 through August 6 to serve as a general surgeon while the ship was in Panama, Nicaragua and El Salvador.

The 900-foot-long ship, originally built as an oil tanker, had a four-month mission in South America, Central America and the Caribbean providing training, free medical treatment and humanitarian assistance.

Lowell and the other physicians on board saw patients in land-based clinics, most without electricity or air conditioning in stifling heat, to provide adult and pediatric medicine, optometry, dermatology, preventative medicine and dental care.

Because the ship was too large to dock at many of the ports, patients who needed surgery were taken to the ship via boat or Blackhawk helicopter. The surgeons each handled about six or seven cases a day, including hernia repair, clubfoot repair and other orthopedic operations, as well as gynecological and urological procedures.

"The experience was personally and professionally gratifying," Lowell says. "These people have no money and little access to health care. The frustrating thing was not being able to help more of them."

The ship's Seabees (construction battalion) repaired medical equipment, restored existing medical facilities and provided needed construction services on hospitals, schools and other facilities in the countries visited.

Patients lined up by the hundreds to visit land-based clinics, and traveled by boat or helicopter to the USNS Comfort (above) when surgery was needed (below, left).
Federal grant to fund kidney disease research center

Underlying causes, new treatments

Kidney disease research is the focus of a $5.7 million grant establishing a new center at the School of Medicine. Directed by Marc R. Hammerman, MD, the Chromalloy Professor of Renal Diseases in Medicine, the center will investigate the underlying causes of kidney disease to speed development of new treatments. Funding comes from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), one of the National Institutes of Health.

"Kidney disease is a devastating illness, and we don't fully understand its causes," says Hammerman, who also directs the Division of Renal Diseases and is a staff physician at Barnes-Jewish Hospital.

Washington University was one of only three institutions to receive funding from NIDDK to establish a new kidney disease research center of this type. The grant brings together 43 basic scientists and clinical researchers at Washington University and 12 investigators based at several other academic medical centers in the United States and around the world. Their overarching mission will be to gain a better understanding of the way the kidney develops, including the role that particular genes play in the structure and function of the organ.

The investigators also hope to determine how gene abnormalities and their expression increase an individual's risk of developing kidney disease.

The renal organogenesis group (or core) will focus on transplanting tissues destined to become kidneys from animal embryos into adult animals as a tool to study kidney development and as a possible technique for replacing damaged kidneys in humans. Investigators also will provide embryonic pig tissues destined to become pancreas to researchers interested in studying whether transplanting these cells can be a viable treatment for diabetes.

A second core will concentrate on developing models of kidney disease in mice and rats and evaluating how particular genes and their expression affect kidney development and function, while a third core will work to establish a database of biological samples donated by patients treated at Washington University. A fourth core will focus on education and identifying promising scientists and providing start-up support for their projects.
Itch gene discovery promises better treatments, sweet relief

Itching for a better anti-itch remedy? Your wish may soon be granted now that scientists at the School of Medicine have identified the first gene for the itch sensation in the central nervous system. The discovery could lead to new treatments targeting itchiness and providing relief for chronic and severe itching.

The "itch" gene is GRPR (gastrin-releasing peptide receptor), which codes for a receptor found in a small population of spinal cord nerve cells where pain and itch signals are transmitted from skin to brain. The researchers, led by Zhou-Feng Chen, PhD, found that laboratory mice lacking the gene scratched much less than their normal cagemates when given itchy stimuli.

Experiments confirmed the connection between GRPR and itching, offering the first evidence of a receptor specific for the itch sensation in the central nervous system.

The findings were reported in the August 9, 2007 issue of Nature. Chronic itching is a widespread problem. It can be caused by skin disorders or can stem from kidney failure or liver disease. It also can be a serious side effect of cancer therapies or powerful painkillers.

Historically, scientists regarded itch as a less intense version of the pain sensation. "Many genes have been identified in the pain pathway," says Chen, associate professor of anesthesiology, psychiatry and of molecular biology and pharmacology. "But itch research has lived in the shadow of pain research, and no one knew which gene was responsible for itching in the brain or in the spinal cord until now."

In fact, Chen's team became interested in GRPR because they were looking for genes in the pain pathway. Among the potential pain-sensing genes they identified, GRPR stood out because it is present in only a few nerve cells in the spinal cord known to relay pain and/or itch signals to the brain.

When postdoctoral fellow Yan-Gang Sun, PhD, injected the spinal cords of normal mice with a substance that stimulates GRPR, the mice started scratching themselves as if they had a bad itch.

Chen hopes that his laboratory's study of these scratching behaviors will soon lead to effective treatment for itching in humans.
NEW BEGINNINGS

SOUTH KOREA Thomas Sholtis, with occupational therapist Carol Finkes and his mom, Gina (ready with pacifier), was the first child seen at the International Adoption Center.

GUATEMALA Luis "Mateo" Regier and his new dad, Michael Regier, have some fun between medical appointments.
The International Adoption Center provides health evaluations when a new family member comes from a world apart.

BY CANDACE O'CONNOR

RUSSIA  Ksenia Suddeth surrounded by her happy family: parents Nate and Kim, along with older brother Christopher
in distant Siberia, two-year-old Ksenia — blonde, blue-eyed, cute as a button — was living in an orphanage and waiting for a home. For the Suddeth family of St. Louis, who adopted her in 2006, it was love at first sight. But what of their small daughter's health, they wondered? Were there any underlying problems they should deal with as she began her new life? “We weren’t concerned about anything in particular,” says Kim Suddeth, reflecting on her daughter’s institutional past, “but you never know.”

A few weeks after Ksenia’s arrival, they took her to the International Adoption Center, a joint effort of St. Louis Children’s Hospital and Washington University School of Medicine, for a thorough evaluation. Since its founding in December 2005, the center and its team of specialists, headed by pediatrician Rachel C. Orscheln, MD, has seen a stream of young patients like Ksenia from China, Guatemala, Vietnam, Ethiopia and South Korea.

“Over the Urals Mountains,” in distant Siberia, two-year-old Ksenia — blonde, blue-eyed, cute as a button — was living in an orphanage and waiting for a home. For the Suddeth family of St. Louis, who adopted her in 2006, it was love at first sight. But what of their small daughter’s health, they wondered? Were there any underlying problems they should deal with as she began her new life? “We weren’t concerned about anything in particular,” says Kim Suddeth, reflecting on her daughter’s institutional past, “but you never know.”

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“If you look around our community, there are lots of families who have come together through international adoption,” says Orscheln, an infectious disease expert. “Many of these children were in resource-limited or institutional settings that put them at risk for various problems: physical, developmental, psychological. So we thought, ‘What if we came together as a multidisciplinary center to evaluate these kids?’”

With several colleagues, she began laying the groundwork for such a center, first surveying local agencies to discover what medical services adoptive families need. Then occupational therapist Carol Finkes was granted an 11-week, part-time sabbatical from Children’s Hospital to visit other institutions — the University of Minnesota’s pioneering international adoption center in particular — to develop a model of care.

They also gathered a team of professionals with experience in this kind of work. Children’s Hospital social worker Karla Jacquin had done home studies for agencies that place overseas children in St. Louis families. Stephanie Lutter, a fellow in infectious disease, had done medical mission work in Central America. And pediatric infectious disease coordinator and nurse Lisa Robertson was easy to enlist; she is an adoptive parent herself, as is her twin sister, Teresa, also a Children’s Hospital nurse.

“I admire parents who choose to adopt, since I know the process can take quite a while and is difficult,” says Robertson, whose children are now 14, 12 and 5. "Even though my children were adopted..."
Mateo's **VERY BIG** day at St. Louis Children's Hospital

*Photos by Tim Parker*

- **Let's get started**
- **Something fishy here**
- **Every part matters**
- **Audiology: Have you heard about the International Adoption Center?**
- **Hmmm... puzzling**
- **Lots to do in occupational therapy**
- **Upside down test: Check**
- **General exam: Questions, special tools, bright lights, smiling doctors**
- **Good to go, Mateo!**
locally, I feel that all adopted children go through the same kinds of adjustments with a new family, and I thought I might be able to ease those adjustments a little by sharing my experiences.”

The program devised by Orscheln's team is triggered when a family, having heard about the center through its own pediatrician or adoption agency, makes an appointment to come in. First, Orscheln does a basic screening by phone and e-mails the results to her group. Then Jacquin calls the family to do a psychosocial assessment.

“Do they have any concerns?” says Jacquin. “Sometimes they just want to get the child checked, but other times there are developmental issues. One child was not meeting his milestones — not pulling up and walking when he should. And children who have spent time in orphanages may have behavioral issues, such as hoarding food.”

When the family arrives for the visit, Jacquin greets them and escorts them from one specialist to another. The visit includes a meeting with Orscheln and Lutter, who test for a variety of infectious diseases, including viral infections, latent tuberculosis and parasitic infections. A careful evaluation of the vaccination history, which is often incomplete, also is performed. The family then continues on to see Finkes for an occupational therapy evaluation, Mary Michaelene Cradock for a psychological screening, and audiologist Robin Hudson for a hearing test.

If the child is healthy, they return him or her to the care of the referring doctor, but if there are problems, they can send the child on to other Children's Hospital physicians. One child with a cleft lip and palate underwent plastic surgery, while another with a serious heart defect had successful cardiac repair. A third, with severe scoliosis, has had several operations and will need continuing follow-up.

In these cases, the family knew in advance that the problems existed, but occasionally a child has unexpected health issues.

“We had a family from a rural area who adopted a little girl,” says Jacquin. “One day, the mother was vacuuming in back of this child and realized that she didn’t even flinch. She started putting two and two together, and brought the child to us for diagnosis of hearing impairment.”

The center has translators available, but for the most part it hasn’t needed them. While adoptive children of any age are eligible for the clinic, most so far have been in the infant to 3-year-old range. Helping these children get off to a strong start has been very rewarding, say staff members.

“We saw an adorable little one, about six months old, who had some movement patterns that weren't appropriate for his age and some challenges with eating, as well as waking/sleeping cycles,” says Finkes, who has five children of her own. “When they came in, we could show them ways to help him eat from the spoon and ways to hold the baby that promote better posture and quality of movement.”

Institutionalized children often display fine and gross motor skill delays, she adds. Typically, for every three months in an orphanage they have one month of developmental lag. But the happy news is that, thanks to the resilience of childhood and the eager attention of their new parents, many catch up within a year or two.

“It has been fabulous to see these children adopted into families, some of which have biological children or previously adopted children, while for some this is their first child,” says Orscheln, who has three young children herself. “We’ve seen single parents and married couples; some have been through infertility and other issues that have made parenthood long sought after and difficult to attain.”

In one of these new families, the adoptive mother was a nurse/midwife who had helped bring other people's children into the world but had never had any of her own. She and her husband adopted a baby boy from Russia, says Robertson, “and it seemed to me that the family was extra blessed.”

The Suddeth family is another such family — now happily complete with parents Nate and Kim, Christopher, 7, and Ksenia, now 4. At the center, they received the reassuring news that Ksenia was fine, except for a minor problem with low muscle tone. Today, she loves books, loves Disney characters, "loves life," says her mother. "You’d think she had been here a million years."

“Every time we see one of these families, it puts a big smile on my face,” says Orscheln. “It’s amazing to be a part of caring for these children.”
LAB CULTURES

To get more minorities in scientific research, first get them in the laboratory.

BY CAROLINE ARBANAS

Devin Luckett and his mentor, Susan K. Dutcher, PhD, interim head of the Department of Genetics and professor of cell biology and physiology, compare alga cultures in the lab.
With funding from the National Human Genome Research Institute, the GSC brought eight promising college students — all minorities majoring in the sciences — to Washington University this summer, where they received their first independent laboratory experience and close mentoring as part of the new Opportunities in Genomics Research program.

“We are tremendously excited about the program and its prospects for exposing bright young students to PhD careers in research, particularly in genetics, and preparing them for top PhD or MD/PhD programs,” Wilson adds. “During the eight weeks the students were here, you could sense a change in their thinking. They came away with a much better idea of how basic research forms the foundation for advances in medicine. They were excited, and we were excited.”

The GSC has been involved in outreach efforts to minorities for years, but those focused exclusively on students in kindergarten through high school. The new emphasis on undergraduates is intended to reach students at a time when they are making career choices.

The lack of minorities pursuing PhDs in the sciences is a multifold problem, according to Cherilynn R. Shadding, PhD, director of outreach for the GSC.

“Certainly, there’s a lack of minority role models — you just don’t see a lot of minority scientists out there to begin with,” says Shadding, who earned her PhD in physiology from Meharry Medical College in Nashville. “Also, many undergraduate minority students are focused on pre-med, and research is not seen as an attractive career path.

“But we need to find ways to encourage these students,” she adds. “They are an untapped pool of talent, and they bring a lot of enthusiasm and a diversity of ideas and solutions to help answer the many questions posed by science today.”

The students were assigned independent research projects and paired with mentors in the Department of Genetics. Having this research experience takes away any misconceptions the students have about what research is like. “They come here, and they see that real lab experience is not like it is in class,” Shadding says. “They’re asking real questions to which no one knows the answer. That’s the difference.”

The experience got Olivia Knowles excited about genetics. A Washington University biology major, she has aspired to be a doctor since she was a little girl. She grew up watching doctors treat patients on TV, played doctor with her dolls.

Fewer than 3 percent of PhDs awarded in science, mathematics and engineering go to African-Americans. For Latinos, the numbers are only slightly better. Nationwide, research institutions struggle to entice minorities to obtain advanced science degrees. “The problem is pervasive,” says Richard K. Wilson, PhD, director of the School of Medicine’s Genome Sequencing Center (GSC). But now a program can at least lure them into the lab.
and, when her younger sister was seriously ill, Knowles, then nine, was prepared to cure her herself.

But Knowles also was drawn to the laboratory. In high school, she joined the chemistry club, entered a regional titration competition and took third place. Despite her increasing knowledge, Knowles never seriously considered a career at the bench — until this summer.

"The program really opened my eyes to the possibilities of pursuing a combined MD/PhD," says Knowles, who just began her junior year. Even though she likes her laboratory courses in college, Knowles says she was intimidated by laboratory research. She wondered how scientists come up with new ideas and how they know what to do, particularly if an experiment does not work the way it's supposed to.

"My mentors, Rob Mitra and Todd Druley, were incredibly supportive and so willing to help me," she says. Four days a week, she studied excessive mutations in the p53 gene, known to be involved in cancer; one day a week, she shadowed Druley, a hematologist-oncologist at St. Louis Children's Hospital, who also works in Mitra's lab.

"Research is not something that scares me anymore," Knowles says. "I thought you had to be absolutely brilliant to attempt research. What I didn't realize is that scientists do not work alone. A lot of research is a team effort, with support from mentors, graduate students and technicians."

A good mentor is "absolutely essential" for any student who wants to pursue a graduate degree in the sciences, emphasizes Susan Dutcher, PhD, interim chairman of the Department of Genetics and professor of cell biology and physiology, who served as a mentor for Devin Luckett, a sophomore microbiology major at Purdue University.

Luckett studied the green alga Chlamydomonas to map mutations in genes that code for cilia, hairlike structures on the surface of the alga's cells. Almost every cell in the human body has cilia, and defects in their function are linked to genetic disorders that affect the ear, nose, sperm, placement of internal organs and number of fingers and toes.

"Mentors expose students to a different way of thinking and provide guidance and encouragement along the way," Dutcher says. "Some students become unraveled when an experiment does not turn out the way they expected. A good mentor can help the student get back on track and think about what they want to do next. Science is a long-term project."

The students also received individual career counseling about the classes they need to take as undergraduates, a GRE preparation course, and advice about graduate schools they should consider applying to.

Luckett, who now has his eye on a PhD in bioinformatics or computational biology, says the experience was tremendous. "No one has ever sat me down before and said, 'This is what you need to do.' I found that advice very, very useful."

Miriam Ortiz, a senior at the University of El Paso in Texas, says her summer experience has given her more confidence in the laboratory. She had planned to become a laboratory technician but now is serious about getting a PhD. "I thought after I graduated from college, I would go straight into the workforce," Ortiz says. "But now I'm focusing on getting a PhD. Working with graduate students and seeing what they do every day makes me see that I can do that, too."

Students in the program will be able to return each summer until they graduate from college, as long as they remain in good academic standing. Next year, the GSC plans to add an additional four slots, for a total of 12 students.

"Their experience here is valuable because they will need it to be competitive for a graduate program at Washington University or Harvard," adds outreach director Shadding. "They will be competing against everyone — not just fellow minority students — so they need as many opportunities as possible to stand out."
MOST PEOPLE ARE BLISSFULLY UNAWARE of a pair of oddly shaped organs embedded in their skull behind their earlobes. Each of these organs is an inner ear, which looks a little like a three-tentacled squid emerging from a snail shell. The “squid” part of the inner ear contains the vestibular system, responsible for balance and motion sensing; the “snail shell” is the cochlea, where sensory cells for hearing are located.

Although seldom noticed when they are working correctly, the inner ears are hard to ignore when something goes wrong. Inner ear disorders can lead to hearing loss, ringing or buzzing sounds, dizziness, spinning sensations or nausea.

Not surprisingly, much remains to be learned about the complex and convoluted inner ear, also called the labyrinth, but Alec N. Salt, PhD, professor of otolaryngology, is offering a new view of its winding passages. He and colleagues have created two- and three-dimensional computer models to simulate the pharmacokinetics of the inner ear — how drugs move through the ear’s fluid and supporting structures, both across distance and over time. Their work promises to make treatment of inner ear disorders safer and more effective.
Computerized reconstruction of the inner ear structure in animals points the way to modeling drug movements in the ears of humans.

The complex three-dimensional spaces of the inner ear—called the labyrinth for good reason—include some of the uncharted frontiers of anatomy. Small, convoluted and deep within the skull, these structures evade detailed physical inspection, making it hard to comprehend how all the parts relate to each other. Computerized scans now allow the generation of dynamic simulations of the inner ear, letting researchers "fly inside" and visualize spaces never seen before.

Digitizing a new view
The intact inner ear is optically sectioned using OPFOS (orthogonal-plane fluorescence optical sectioning) 1, producing a series of images 2. These images are then painstakingly mapped by hand 3 in order to link congruent spaces. The computer translates this series of data into three dimensions 4, which allows scrutiny inside and out and provides a basis for simulating drug movements in the fluid spaces (facing page).

Pharmacokinetics: Drugs in motion
When delivering drugs within the body there are two options: the scattered shot approach of systemic delivery (most injections and pills) and the pinpoint accuracy of localized delivery. The latter puts the correct dose in the exact spot where it is needed, which becomes critical when the substance could harm other areas. However, in the inner ear there are complicating factors of size, structure and fluid dynamics. Scientists seek to know how drugs can move through the inner ear—and how they can leak out.

The dimensional models now aid in the simulation of fluid dynamics within the spaces.

Modeling the dynamics of drug distribution
Once inside the inner ear, a drug quickly pervades a mouse's short cochlea, whereas in the much longer human cochlea, the concentration of the drug more slowly pervades the space and diminishes along the length. This computer analysis reveals how difficult it is to get the right amount of drug exactly where needed within the human ear.

MOUSE
GUINEA PIG
HUMAN

LENGTH OF COCHLEA
The completed computer model allows researchers to examine the structure from all angles, inside and out. The ability to "fly through" the shapes, as revealed in the samples below, has proven particularly valuable for visualizing tiny unseen spaces within the cochlea.
Here's an example of what can happen when too little is known about drug diffusion in the inner ear: In the late 1970s, doctors began using the antibiotic gentamicin to treat an inner ear disorder called Meniere's disease, which is characterized by intermittent sudden hearing loss and severe attacks of vertigo. They found that although gentamicin can be toxic to the delicate sensory cells of the inner ear, the right dose of the drug could selectively knock out the cells responsible for balance, stopping the patient's vertigo attacks, while preserving the cells used for hearing. So gentamicin was—and still is—used to alleviate the debilitating spinning sensation experienced by Meniere's patients.

Fast forward several decades—in 2001, researchers running a medical study on Meniere's disease were delivering what was considered a safe dose of gentamicin. But they used a different method than previously, applying gentamicin gradually through a catheter located in the middle ear where the drug could then diffuse into the inner ear. To their surprise, eight out of 10 patients in that study lost their hearing in the gentamicin-treated ears.

That result would have been unpredictable if our computer models had been used to simulate the protocol, Salt says. "Our models replicate the diffusion of a substance from the base of the inner ear through its various chambers and show how the dose is affected by the concentration of the drug and how it is applied," he explains.

Given the prevalence of inner ear problems, Salt's computer models of drug diffusion in the inner ear have the potential for widespread benefit. Meniere's disease affects millions worldwide, and even more people suffer from hearing loss caused by noise, age or their genetics. Tinnitus, a persistent ringing or humming that stems from inner ear defects, is found in about 10 to 15 percent of adults.

Salt's models meticulously account for the proximity of the inner ear's various loops, coils and sacs. They also incorporate the speed at which substances seep through the membranes and support tissues that separate the chambers and how fast they leak into adjacent blood vessels.

A researcher using the computer models virtually injects a defined dose of a specified drug at the base of the inner ear. Then a colored cloud representing the drug begins moving along the simulated inner ear passages at the same rate as in an actual inner ear. The researcher can sample the model's passages to find the drug's concentration at any place and time of interest.

Salt and colleagues studied inner ear fluids in laboratory animals to create their models. They pioneered more sensitive and less invasive ways to measure drug movements without creating the artificial fluid flows associated with taking fluid samples that had plagued prior research. Yet at first they found themselves somewhat hampered when trying to extrapolate to human anatomy because there wasn't as much data on the exact size and shape of the human inner ear; the delicate membranes and numerous open spaces make the inner ear notoriously difficult to dissect without distortion.

But now, new laser-based techniques are giving more precise information that Salt is taking advantage of. "We are creating a 3-D simulation of the human inner ear that you can rotate and 'fly' through," Salt says. "Until now, no one had ever done that."

Salt's computer models of the human inner ear show that there can be much larger gradients of drugs along the human cochlea than are in animal models, researchers running a medical study on Meniere's disease. At the base of the cochlea, where high frequency sounds are sensed, the drug concentration may be a thousand times higher than at the apex, where low frequency sounds are heard. That's a good thing when treating Meniere's disease—the steep concentration gradient protects most hearing cells from exposure to gentamicin—but not so helpful when treating other hearing problems, where drugs need to reach down the entire length of cochlea. Among the many new therapies for disorders of the cochlea are calcium channel blockers to stop tinnitus, antioxidants to prevent chemotherapy-related hearing loss, stem cell or gene therapy agents to correct noise-induced or age-related hearing loss and growth factors to induce nerve growth toward the electrodes of cochlear implants. Thanks to Salt's computer models, researchers can now more easily create methods that will get these substances precisely where they are needed.

"Drug companies and cochlear implant companies are asking us to do work for them so they can develop their applications scientifically instead of by trial and error," Salt says. "When it comes to inner ear modeling and pharmacokinetics, we are leading the world."
ready for action

A new dynamic brace for correcting clubfoot lets kids be kids.

BY BETH MILLER
When Nathan and Sarah Page got an ultrasound during her second pregnancy, they saw that their little boy would be born with clubfoot. "I was very upset," Sarah Page says. "As the mom, you think 'This baby isn't even here yet and there is already something wrong.' It was terrifying."

Nathan Page, a fourth-year resident at Barnes-Jewish Hospital, asked his colleagues which doctor they needed to see, and everyone recommended Matthew B. Dobbs, MD, associate professor of orthopaedic surgery and an orthopaedic surgeon at St. Louis Children's Hospital. 

"Once we saw Dr. Dobbs and realized that treatment wouldn't require major reconstructive surgery, we were relieved," Sarah Page says.

Matthew B. Dobbs, MD, monitors the progress of treatment for Jimmy Page.

Until recently, the most innovative, nonsurgical treatment for clubfoot was developed in the 1950s. The treatment, developed by Dobbs' mentor at the University of Iowa, Ignacio Ponseti, MD, involves weekly casting and manipulation of the clubfoot starting soon after birth. Then, the children wear a fixed-bar brace at night until about age 4 to maintain the correction of the foot. But that brace restricts the child's movement and has the potential to cause skin blistering, which led many parents away from using the brace as prescribed. Using the brace less than prescribed can lead to recurrent clubfoot deformities, which may eventually require extensive surgery.

Intent on making the brace easier to tolerate for both patients and families, Dobbs designed a new dynamic brace to allow active movement, preserve muscle strength in the foot and ankle and be less restrictive to the child than the traditional version. The new brace, patented as the Dobbs brace, has shown significantly improved compliance and fewer complications than the traditional brace. In a two- to three-year follow-up study of patients treated for clubfoot at St. Louis Children's and St. Louis Shriners hospitals, 95 percent of parents used the Dobbs brace as prescribed on their children, compared to 60 percent compliance when parents used the traditional brace.

"I explain to parents that clubfoot correction is 2 percent in our hands and 98 percent in theirs."

Matthew B. Dobbs, MD, orthopaedic surgeon.
Clubfoot is a congenital birth defect that occurs in about one in every 1,000 live births and affects boys twice as often as girls. About half of clubfoot cases affect both feet, including the bones, muscles, tendons and blood vessels. If untreated, those affected walk on the outside of their feet, a part of the physiology not designed to bear weight.

The Dobbs brace has a soft, custom-molded insert that is placed inside of a solid ankle-foot orthosis, an orthopedic appliance designed to maintain alignment of the bones in the foot and ankle. The lighter-weight bar connecting the feet has a release mechanism that allows parents to easily detach and reattach the bar to place the child in a car seat or high chair or change a diaper without removing the entire brace, and hinges at each end so the feet can easily pivot. In addition, children wearing the brace can walk, crawl and move their legs independently — things that were difficult or impossible wearing the traditional brace. It secures to the ankle-foot orthosis using Velcro straps instead of buckles or laces used on the traditional brace.

Dobbs says these design changes are key to preventing a recurrence of clubfoot.

"While we've had good success in obtaining correction in clubfeet, maintaining that correction has been more challenging," he says. "If the kids are happier and are tolerating the brace well, then they have happier parents, which leads to improved compliance."

Sarah Page says their 18-month-old son, Jimmy, has used the Dobbs brace since he was 3 months old. "We decided to use the Dobbs brace after Jimmy's casting treatment, and we never questioned it," she says. "Jimmy has been fine with it, and now he helps us when we put the brace on him and is very possessive of his shoes. It hasn't limited what he can do."

The Page family lovingly refers to Jimmy's Dobbs brace as "Jimmy's Choo," a play on fashion shoe designer Jimmy Choo.

Sarah Page says when they met with Dobbs before Jimmy's birth, he told them that most of the treatment depended on the Pages.

"I explain to parents that clubfoot correction is 2 percent in our hands and 98 percent in theirs," Dobbs says. "Our casting work takes about two months, but the parents are bracing the feet for three to four years. If they don't put the brace on the child, the clubfoot will recur."

Some parents of patients with clubfoot whom Dobbs treats still want a quick fix with surgery, he says. "It seems like a quick fix, but what parents don't realize is that 20 years later, their child's foot will likely get stiffer and develop painful arthritis."

All 28 patients in Dobbs' study, published in the Journal of Pediatric Orthopaedics, had worn casts for their clubfoot before being fitted for the brace. Eighteen patients who had not been wearing the traditional brace as prescribed were fitted for the Dobbs brace. The remaining patients were fitted only for the Dobbs brace. All but two patients wore the brace as prescribed.

Of the two patients who were noncompliant in wearing the brace, one patient had skin blistering due to improper use of the brace, which was eventually corrected, while the other patient was not kept in the brace because of the caregiver's work schedule.

Dobbs says the bar connecting the feet eventually will be available independently and can be used with other types of corrective footwear for clubfoot. "Just having the flexible bar makes a huge difference in compliance and convenience," he says.

"The newly designed, more flexible foot abduction orthosis is equally effective, or more so, than the traditional brace, considering rates of clubfoot relapse were less with the new orthosis than those reported in several series using the traditional brace," Dobbs says. "Although our experience with the dynamic brace has been favorable, a randomized study comparing the dynamic orthosis to the traditional brace would provide a more accurate assessment of outcome."

What a difference the Dobbs brace makes
The front and back views of another child's feet reveal the remarkable results that families are achieving using the dynamic brace.
Breaking down the barriers describes the efforts of the Office of Technology Management (OTM), the group dedicated to realizing the commercial potential of research. OTM evaluates discoveries, then licenses and patents technology developed by Washington University faculty. Michael T. Marrah, JD, and Bradley J. Castanho, PhD, were appointed co-directors of the office in January 2007, after serving as interim directors for nearly a year. Marrah, a skilled patent lawyer, and Castanho, a scientist with extensive experience in commercial development of biotechnology, answer questions about the challenges scientists face when translating discoveries into beneficial — and marketable — products.

What are OTM’s main priorities?

Marrah: We are building a stronger office so that we can handle more and better deals. So far, we’ve devoted considerable effort to getting the office organized, focused and developed so we have a strong infrastructure that can support a higher volume of better-quality deals all around. For example, we have implemented a docketing system that allows us to track and manage the university’s entire patent portfolio. A patent starts out as an application — and it can take anywhere from three to 10 years to get a patent approved. We have to keep track of each application every step of the way and, in the past, this had been done manually — literally on paper — which is incredibly time consuming. With an automated, centralized computer tool, we can more efficiently manage patent applications, and we’ll be able to meet deadlines faster.

Castanho: We want OTM to work more efficiently, with a turnaround time for licensing deals, contracts and research agreements that is substantially faster than what we have today. To accomplish this, we are bringing in people with more diverse skills. We already have senior-level people who are quite experienced, but we need other staff to support them. Before the end of 2007, we’ll add two additional people to handle licenses and contracts and one more to handle patents. We’ll be able to add this additional staff without increasing the overall budget because of efficiencies elsewhere. Eventually, over the next five years, other staff will be added.

Putting WUSM research to work

After developing an implantable defibrillator that gives a much milder jolt to get hearts working again, Igor R. Efimov, PhD, associate professor of biomedical engineering, and graduate student Crystal Ripplinger worked closely with OTM to market and license their technology.
How does OTM benefit the university and its faculty?

Castanho: The revenue that comes into the office from licenses, patents and research agreements is shared among the inventors (faculty), the university and OTM. Currently, 40 percent of revenue goes to the dean of the school represented by the faculty member. The dean then distributes these funds to the faculty member’s department or directly to his or her lab. That’s up to the discretion of each dean. Separately, the faculty member receives 35 percent of the total revenue, and he or she can decide to take it as income or invest it back into the research laboratory. The rest of the revenue — 25 percent — goes to OTM. So, 75 percent of the monies generated by licenses, patents or research agreements goes back to the inventors or to departments within the university, which supports our mission to teach and do research. As federal research funding becomes more competitive, one of the benefits of working with OTM is that licensing and/or patent revenue is a great conduit for faculty members to support their research projects. Some fund a substantial portion of their labs with this money, and this gives them autonomy from having to write so many grant proposals.

Marrah: OTM also provides nonfinancial research support. We negotiate and develop material transfer, licensing and master research agreements, which provide a way for researchers to do industry-sponsored research. This means faculty do not need to spend their time negotiating individual contracts and research agreements. A really vibrant OTM also can play a significant role in recruiting young, entrepreneurial faculty. These scientists want to know how much support they can expect from OTM for non-NIH funded research and the likelihood that OTM will be able to commercialize their technologies.

What advice do you have for faculty who think they might have something with commercial or patent potential?

Castanho: The key issue is to notify us as early as possible. If you publish before a patent application is filed, you lose a significant proportion of your patenting rights outside the United States. We also like to be ahead of the game and have enough lead time to evaluate intellectual property and to understand the potential commercial implications.

Marrah: We ideally need 30 to 90 days to do a market analysis, patentability analysis and title work for technologies with commercial application. The reality is that far too often we are notified and there’s not enough lead time to properly evaluate the technology. If faculty members contact us when they are ready to submit a manuscript for publication, that gives us plenty of time. If researchers think they have something of commercial value or that is patentable or a really novel idea, we want to hear from them.

What research strengths will OTM be building on in the years ahead?

Marrah: Washington University is widely recognized for its broad research base, which gives us many technologies to develop and, in recent years, has provided the basis for establishing specialized centers of expertise, such as the Hope Center for Neurological Disorders and the Consortium for Translational Research in Advanced Imaging and Nanotechnology (C-TRAIN). These multidisciplinary centers focus on translational research — taking discoveries from the bench to the bedside. Certainly, there will be a high level of intellectual property to come out of those types of collaborations.

Castanho: Many new grants now require that intellectual property that develops from research be managed and licensed to interested companies. The government wants more value created from its investment and results that benefit society. In response, we need to be more sophisticated in looking for ways to translate basic science into technologies with commercial potential.
Lasting impression

For 47 years, Mildred Trotter, PhD, taught in the anatomy laboratory, instilling equal measures of fear and respect in students. Two families recall a great teacher.

"S"he was a demanding teacher," says Mary Langston Parker, MD 53, remembering Trotter. "She wanted you to learn, but she wanted you first to want to learn the material."

Mary Langston and Charles Parker met "across cadavers" in Trotter's lab. After graduating, marrying and settling in St. Louis, Mary studied human growth hormone with endocrinologist William Daughaday, MD, and directed Washington University's Student Health Services. Charles also joined the School of Medicine faculty, where he conducted allergy and immunology research with Herman Eisen, MD, and had a clinical practice. Additionally, he directed the medical school's Division of Immunology.

As professionals, they became good friends of Trotter. "She would call me at work and suggest doing something, and I would always acquiesce because I loved to spend time with Trot," Mary Parker says. "Of all the people in the medical school, Trot came closer to becoming a member of our family than anyone."

On weekends, Trotter often accompanied Mary and Charles and their five children to their rustic lake cabin in Catawissa, a tiny spot about 40 miles southwest of St. Louis. About 10 other families had nearby cabins, and they spent their days picnicking, swimming and canoeing.

The Parkers' youngest daughter, Sandra Parker Bigg, earned a teaching degree at Washington University in 1982 and is now a stay-at-home mother of three boys. The Parkers' other four children carried on the School of Medicine tradition. Keith L. Parker, GR 81, MD 81, is chief of endocrinology and metabolism at University of Texas Southwestern Medical School in Dallas, and Charles S. Parker, MD 82, practices emergency medicine in Albany OR. Katherine Parker Ponder, MD 83, is a professor of medicine at Washington University School of Medicine, while her twin, Christina M. Parker, MD 83, serves as assistant director for faculty activities at the Dana-Farber Cancer Institute in Boston.

"The children could see that we liked what we did and felt as if our work was important," says Mary, who retired as professor emerita of preventive medicine in 1990. "We emphasized that you can go into medicine and be a business executive, a general practitioner or a hotshot Nobel researcher. There are so many opportunities."

Charles, who retired as professor emeritus of medicine in 1997, is proud that his children chose Washington University. His father, William B. Parker, was the medical school's longtime registrar, and a number of his cousins also are Washington University alumni.

Mary echoes those sentiments. "The School of Medicine was always considered an excellent, quality source for education. It seemed to be a marvelous stepping stone for someone who wanted to use their intellect for the betterment of mankind."
James G. Telfer Sr., MD 34, and three of his children all had one teacher in common.

They all took the rickety cage elevator to the fourth floor of the North Building to learn anatomy from Mildred Trotter, PhD, the anatomy department head.

"After about a month of anatomy classes, Dr. Trotter brought out a picture of the class of 1934 and showed our father's image to my sister and me," recalls Robert Telfer, MD 65, a neurologist in Burlingame CA.

He and his older sister, Peggy Telfer, MD 65, were classmates at the School of Medicine. A year apart in age, they applied to the school from opposite ends of the country, without knowing the other had made the decision to attend. Peggy is now an associate professor of medicine at Rush University Medical Center in Chicago.

She fondly remembers classmates gathering around the radio to listen to the Cardinals games — they won the National League pennant and the World Series in 1964 — and the thrill of attending Muny shows. "We would sit sweltering under the fans, with large glasses of ice with a little Coca Cola," she says. "The music was always wonderful."

Sunday mornings, she often had idle breakfasts in the tiny flat on Euclid Avenue that Robert and his wife, Gail, shared with their two small children.

During his medical school years, their younger brother, James G. Telfer Jr., LA 68, MD 71, lived in a small community of students who shared three old mansions on Forest Park Boulevard. "From there, we enjoyed the late 1960s," says James, who now is an internist in Raleigh NC.

"My father dreamed of starting a Telfer Clinic in California with the three of us," Robert says. "It never happened, but it was fun to imagine."

Four other members of the Telfer family are alumni of the Danforth Campus. A sister, Katherine T. Glakas, graduated in 1966, and two of her sons, Gavin and Christian, graduated in 1998 and 2000. A niece, Laura Mitchell, is a 2005 alumna.

At a family reunion this past summer, the Telfers drank a toast to all of their Washington University graduates. "We all feel that we received an excellent education at Washington University and are proud of its international reputation," Robert says.
An enduring legacy

Gratitude spurs couple to support clinical teaching effort

Seventeen days after Kelly Loeb was born prematurely, she contracted a serious infection. For the next three months, her mother, Carol Loeb, spent 12 hours a day at her bedside at St. Louis Children’s Hospital, wondering if her tiny baby would survive. “It was so hard,” Loeb recalls. “There were some days that we thought Kelly would not make it.”

Like many parents, Carol and her husband, Jerry, agonized as doctors worked tirelessly to save their newborn. Kelly did survive, went on to earn a PhD in bioinorganic chemistry, and today is senior director of information technology at Baxter BioPharma Solutions and the mother of two sons.

The Loebs would go on to endure more surgeries and medical challenges in the years ahead, none more devastating than Jerry’s diagnosis of leukemia, which claimed his life in 2004.
Steven Lipstein, president and CEO of BJC HealthCare, left, was on hand to congratulate the Loebs at a 2004 event celebrating the establishment of the Carol B. and Jerome T. Loeb Professorship and Teaching Fellows Program at the School of Medicine.

The outstanding clinical care the Loebs received from their St. Louis physicians motivated the couple to establish the Carol B. and Jerome T. Loeb Professorship and Teaching Fellows Program at the School of Medicine in 2004.

“We’ve been very fortunate,” Carol Loeb says, “and we wanted to honor and thank the many excellent clinicians in our community and encourage teaching that excellence to generations of residents and students.”

David J. Murray, MD, professor of anesthesiology and a national leader in the field of clinical simulation, was named the first Loeb Professor in 2007. He directs the Clinical Simulation Center, a joint effort involving the School of Medicine and its Departments of Anesthesiology, Pediatrics and Surgery, as well as BJC HealthCare.

Alex S. Evers, MD, the Henry Elliot Mallinckrodt Professor and head of the Department of Anesthesiology, says the Loeb Professorship provides needed support for the department’s efforts to fully realize the benefits of clinical simulation technologies in training young physicians. In the Clinical Simulation Center, medical students and residents are placed into simulated scenarios that give them experience dealing with complicated or unusual situations that they may one day face in clinical practice.

The Loebs’ Teaching Fellows Program appoints two fellows to two-year terms to focus extra time on teaching medical students and residents. When the fellowship program was initiated in 2004, the Barnes-Jewish Hospital Foundation recognized the Loebs’ generosity with a matching gift to provide for two additional teaching fellowships.

“We wanted to try to narrow the gap between the clinical care delivered now and what could be delivered,” Loeb says. “Maybe it is a utopian idea, but we believe that we need to be much more committed to teaching these clinical skills.”

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Teaching, building bridges

As an undergraduate at Oberlin College in Ohio, Robert A. Swarm, MD 83, was interested in marine biology and environmental studies. But while walking across campus one day during his senior year, he suddenly realized that he wanted to become a doctor. “I realized that my real motivation was to help people,” he says. “Biology was interesting, but I saw clinical medicine as an unparalleled opportunity to aid others.”

Swarm had heard about Washington University all of his life. His parents, Richard L. Swarm, BSc 49, MD 50, and Pauline A. Swarm, MD 51, both graduated from the School of Medicine. His grandfather and a great uncle also attended Washington University. Although he was accepted at a number of medical schools, Swarm chose to follow in his family’s footsteps.

“In the end, the School of Medicine was simply the best school and was affiliated with the best teaching hospitals,” says Swarm, now a pain management specialist and associate professor in the School of Medicine’s Department of Anesthesiology.

By moving to St. Louis, he also was able to spend time with his elderly grandparents. Many Sundays, Swarm rode his bicycle to their apartment near the Fox Theatre, and the trio would take a bus somewhere in the city to have lunch after church.

After graduation, Swarm completed an anesthesiology residency at Washington University before joining the faculty in 1989. He has been director of the pain management program in anesthesiology since completing fellowship training in pain management at the University of Sydney in 1990–91. Under his leadership, the department offers the only ACGME-approved pain management fellowship in Missouri.

Swarm now serves as president of the WUMC Alumni Association, viewing his efforts as a way of giving back and connecting with current medical students, and he believes playing a larger role in the alumni association will help him become increasingly aware of those efforts.

Today’s medical students, he says, will be adapting to rapid changes in clinical practice, most of which are linked to expanding knowledge of diseases and treatments.

“Physicians are left struggling with more information and new treatments but less time to actually be involved in the care of individual patients,” Swarm says. “The challenge is to stay abreast of recent developments while still maintaining high quality patient care.”

He believes the alumni association’s key roles are to provide support to the medical school to maintain and improve curriculum and to build bridges between alumni and medical students. “Some of those bridges are financial, in terms of funding scholarships, but it’s also important to teach and mentor and support these students in other ways,” he says.
Funding promotes student interests

In addition to their demanding course work this past year, medical students took on the challenges of leading a "Freedom from Smoking" group, organizing an art exhibit by artists with mental illness, and teaching skin cancer and sun protection to adolescents, all as a result of financial assistance from the Washington University Medical Center Alumni Association.

Jeffrey L. Thomasson, MD 82, president of the Alumni Association's Executive Council for 2006-07, elaborated on the council's funding decisions during the School of Medicine alumni reunion in May.

WUMC Alumni Association Fund Allocation 2006-07
Total: $314,880

- Distinguished Alumni Scholarships: 8%
- Farrell Learning and Teaching Center: 18%
- Twelve student organizations and community service projects: 19%
- Other student-initiated activities: 51%
- Primary care preceptorships: 4%

The Executive Council approved nearly $60,000 for student activities such as the Smoking Cessation Project, the Mental Health Outreach Project, and SPOTS (Sun Protection Outreach Teaching by Students). These groups and other student-initiated projects all secured funding and demonstrated a wide variety of student participation.

Funding also was provided to support primary care preceptorships, which allow students to work closely with practicing physicians, and to social activities for the first- and second-year classes.

In addition, the council designated $160,000 to provide four new Distinguished Alumni Scholarships this year. When combined with School of Medicine funds, each student receives a full-tuition scholarship for four years. Each scholarship is named in honor of an alumnus who currently serve or formerly served on the School's faculty.

The Executive Council continued its $750,000, 10-year commitment to the Farrell Learning and Teaching Center. In recognition, three of the building's group rooms are named for the Alumni Association.

Thomasson also acknowledged that alumni gifts support Alumni Endowed Professorships for nine faculty members. "This program is not common among our peer institutions," says Thomasson. "It's an example of one creative way that alumni are helping the school to recruit and retain talented faculty."

WUMC Alumni Association
Officers and Members 2007-08

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<td>Herluf G. Lund Jr., MD 85*</td>
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<td>TREASURER</td>
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| DISTINGUISHED ALUMNI SCHOLARSHIPS | Subramanian Paranjotohi Jr., MD 93, HS 96* |
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| TWELVE STUDENT ORGANIZATIONS AND COMMUNITY SERVICE PROJECTS | Lee A. Rigg, MD 71* |
| OTHER STUDENT-INITIATED ACTIVITIES | Robert E. Schmidt, MD 76, PhD 76 |
| PRIMARY CARE PRECEPTORSHIPS | Gregory A. Storch, MD, HS 81 |
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| | Susan Bennett, MD, HS 91 |
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| | Louis Kuchnir, MD 97 |
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| | Executive Vice Chancellor and Dean |
| | Bernard L. Shore, MD 77 |
| | Emily L. Smith, MD 68 |
| | Steven Sperry, Fourth-Year Class President |
| | Alison J. Whelan, MD 86, HS 89 |

* Newly elected
Recipe for success
Two ingredients, big impact

The Annual Fund for the School of Medicine relies on two ingredients for its success: widespread participation and individual generosity. Each year, the Annual Fund provides important, flexible support for the school in pursuit of its three-part mission of education, research and clinical care. Although its impact is often felt most immediately by the students, notably through scholarship support and support for educational and community initiatives, the Annual Fund ultimately reaches into every corner of the School of Medicine community. Faculty, residents and the various departments and divisions where they practice all benefit from Annual Fund support.

Alumni and friends of the School raised the bar once again for the Annual Fund during the 2006-07 year. More than 5,500 donors surpassed $2.6 million in gifts to the School of Medicine's Annual Fund, setting a new record for generosity. Friends of the Siteman Cancer Center raised nearly another $1.1 million for their annual fund — another extraordinary effort.

Highlights of the 2006-07 Annual Fund include:
- WUSM alumni, who always lay the foundation for a successful effort, increased their support 23 percent from the year before, setting a record of their own (see graph at right for more details).
- The School of Medicine's Eliot Society, which recognizes Annual Fund gifts of $1,000 or more, ended the year with 826 members, the second-highest total on record.
- The School's newest alumni participated as well: The MD Class of 2007 and the PT Class of 2007 each participated in “senior” class gift efforts, with students making pledges to support the Annual Fund in the coming years.

MD Reunion 2007
The 12 MD classes that celebrated reunions from the 10th to the 65th made Annual Fund giving an important part of their celebrations. Reunion class gift efforts raised more than $360,000 in Annual Fund support, and the total raised, including pledges and restricted gifts, exceeded $650,000.

The MD Class of 1982 became the 14th consecutive class to celebrate its 25th reunion by launching a multiyear effort to endow a scholarship in the class’ name. Under the enthusiastic leadership of R.J. Tesi, MD 82, they became the first class to surpass the $50,000 endowment goal in outright gifts before their reunion in May. In all, classmates have made more than $150,000 in gifts and pledges, and their efforts will make a difference for deserving medical students for years to come.

Alumni giving increases
23 percent in 2006-07
JULY 1, 2006 - JUNE 30, 2007

Who are the alumni of the School of Medicine?
Although hundreds of non-alumni friends support the Annual Fund for a variety of reasons, the mainstay of the annual giving effort is the School's alumni, who come from a range of current and past programs:

- MD and MD/PhD
- Former House Staff
- PhD Programs
- Audiology & Communication Sciences
- Dental
- Health Administration
- Nursing
- Occupational Therapy
- Physical Therapy

Fall 2007
**1940s**

**Rudolph J. Maffei, MD 48**
Maffei, a resident of Hawaii, is retired from medicine and is most proud of his work in drug rehabilitation and with children of abuse, for whom he serves as a guardian ad litem.

**Gerald T. Perkoff, MD 48**
Perkoff is a curators' professor emeritus at the University of Missouri School of Medicine. He has published two books of poetry and a memoir left behind by his deceased sister-in-law. Piano and poetry are his favorite pastimes.

**1950s**

**Richard V. Bradley, MD 52**
Bradley is a retired emeritus associate professor of clinical surgery at Washington University School of Medicine. He recently completed nine years of service on the Board of the Physician Insurers Association of America and assisted with the completion of a merger of the Missouri Medical Insurance Company. He enjoys woodworking and fly fishing in his free time.

**Robert E. Neu, LA 48, MD 52**
Neu, after retiring from an active solo surgical practice in 1989, became interested in his family’s genealogy. He traveled to Europe 14 times to research his ancestors and has since written and published two volumes of *Always Neu: An Autobiography-Genealogy*, copies of which are housed in Washington University’s Olin Library, the St. Louis and Belleville IL public libraries, and the Library of Congress.

**George M. Bohigian, MD 58**
Bohigian, a professor of clinical ophthalmology at Washington University School of Medicine, spoke at the 2nd International Medical Congress in Armenia this past June on the topics of diagnosis and management of diabetic retinopathy, eye infections and current update on cataract surgery. The lectures were part of an eye medical/surgical mission to Armenia.

**Robert B. Winter, MD 58**
Winter is a clinical professor of orthopedic surgery at the University of Minnesota and a research consultant for the Twin Cities Spine Center. A world traveler, he has been to 50 countries. He says that he does not have a favorite country as “some are better for scenery, some for beaches, some for history, and some for mountains.”

**1960s**

**Richard H. Jacobsen, MD 62**
Jacobsen is an orthopedic surgeon in a private practice in Mountain View CA. He recently stopped performing surgery but continues to assist on total joints and some complicated fractures. He enjoys running and has raced in the 12K Bay to Breakers Race in San Francisco for 10 years in a row.

**Carl G. Kardinal, MD 65**
Kardinal received the National Surgical Adjuvant Breast and Bowel Project Lifetime Achievement Award for clinical cancer research at the group’s annual meeting in Jacksonville FL in April.

**Richard B. Counts, MD 67**
Counts is president and CEO of the Puget Sound Blood Center (PSBC) in Seattle WA and a professor of medicine at the University of Washington School of Medicine. In November 2006, the Board of Trustees of the PSBC honored him for his “innumerable contributions as the Blood Center’s president and CEO” by establishing the Richard B. Counts, MD, Research Endowment Fund. His hobbies include music, playing piano, woodworking and metalworking.

**Sandra Jo Counts, MD 67**
Counts is the medical director of Residence XII in Kirkland WA, an alcohol and chemical dependency treatment center for women and their families. She has served on the Board of Directors of the American Society of Addiction Medicine and chaired a committee to write the chapter “Pain Relief in Substance Abuses” in *Core Curriculum for Professional Education in Pain*, 3rd edition, International Association for the Study of Pain. She studies Native American basketry and is learning to weave baskets, including how to collect and process materials.

**Benjamin C.K. Kwan, MD 67**
Kwan is a clinical professor of ophthalmology at UCLA School of Medicine, treasurer of the Chinese American Educational Trust and past president of the Chinese American Ophthalmological Society. He enjoys ballroom dancing, singing and golf in his spare time.

### MD Classes of: 1943 \ 1948 \ 1953 \ 1958 \ 1963 \ 1968 \ 1973 \ 1978 \ 1983 \ 1988 \ 1993 \ 1998

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1970s

Lesley Z. Blumberg, MD 73
Blumberg is an appeal medical director for HealthNet of California. She enjoys writing fiction and has completed four novels; the first recalls her days at Washington University.

John Timothy Oldham, LA 74, MD 78
Oldham is an associate director of the Emergency Department at St. Mary's Health Center in St. Louis MO. He recently traveled to New Zealand to work for six months in a small city emergency room on the beach. He enjoys biking, remodeling and involvement in the National Multiple Sclerosis Society and his local church.

1980s

Edward Allen Michelson, MD 82
Michelson recently celebrated his five-year anniversary at Case Western Reserve University, where he is chairman of emergency medicine. The emergency department is in the middle of a new 54,000-square-foot, $41 million project and in the design phase of a second new emergency department as part of a new east suburbs hospital, which Michelson will staff and run when it opens in 2010. He lives in an eastern suburb of Cleveland OH with his wife, Carla, and two daughters, ages 4 and 12.

Anne C. Goldberg, MD, HS 83
Goldberg was elected to serve as president of the National Lipid Association at its 2007 Annual Scientific Sessions held in Scottsdale AZ this past spring. She is an associate professor of medicine at Washington University School of Medicine. She is a fellow of the American College of Physicians and of the American Heart Association, and a diplomate of the American Board of Clinical Lipidology.

Griffin P. Rodgers, MD, HS
Rodgers was named director of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) on April 1. In this position, he oversees an annual budget of $1.8 billion and a staff of 650 scientists, physician-scientists and administrators. He also continues as chief of NIDDK's Clinical and Molecular Hematology Branch, a position he has held since 1998. An accomplished researcher and teacher, he has been honored with numerous research awards and named lectureships; published more than 150 original research articles, reviews and book chapters; edited four books and monographs, and served as a visiting professor at medical schools worldwide.

1990s

Grant Hoekzema, MD 92
Hoekzema is the residency program director of the Mercy Family Medicine Residency Program at St. John's Mercy Medical Center. He also is an associate clinical professor in family and community medicine at Saint Louis University School of Medicine, assistant clinical professor in the Department of Family and Community Medicine at the University of Missouri School of Medicine, and clinical instructor of the Family Medicine Clerkship at Washington University School of Medicine. He lives in Chesterfield MO with his wife, Kristin, and their five children.

Naomi Levine Zilkha, LA 88, MD 93
Zilkha is a general pediatrician on Long Island NY. In May 2006, she joined a smaller practice closer to home where she enjoys being one of two doctors. She also is an online volunteer for Sidelines, an organization that helps women with high-risk pregnancies. She was chosen as volunteer of the month in November 2006. She is proud of her husband, Ron, and two daughters, Joely, 10, and Jenna, 6.

Steven Jason Lawrence, MD 97
Lawrence is an assistant professor of medicine at Washington University School of Medicine and an associate director for emergency response planning at the Midwest Regional Center of Excellence for Biodefense and Emerging Infectious Diseases Research. In his free time, he enjoys running with his wife, Brooke Shadel, learning as much as possible about French wine and food, and exploring new restaurants.

In Memory

D. Cramer Reed, MD 41
Reed died on April 11, 2007, at age 91. A native of Wichita KS, Reed served as a vice squad agent for the police before embarking on his career in health care. He assisted with the establishment of the College of Health Professions at Wichita State and the founding of the Wichita-based arm of the University of Kansas School of Medicine. He recently played a part in the establishment of Wichita's Exploration Place science museum.

Ralph Bering Busch Jr., MD 46
Busch died on May 23, 2007, at home with his family. After serving four years with the U.S. Navy in the South Pacific, he interned at the University of Southern California's Los Angeles County Hospital, specializing in anaesthesiology. He was one of the first anaesthesiologists to practice in Ventura County CA in the 1960s, retiring from medicine in 1989. He was a past member of the California and American Societies of Anaesthesiology; Ventura County Medical Society, Community Memorial Hospital Board of Directors, Ventura County Museum of History & Art Board of Directors and Berry Petroleum Co. Board of Directors. He is survived by his wife of 48 years, Deborah Bennett, six children and 18 grandchildren.

Ruth Kauffmann Johnson, MD 48
Johnson died on Oct. 2, 2006, in Jefferson City MO at age 83. Born and raised in Morgan County MO, she returned there after completing her medical training to practice at the Gunn Clinic in Versailles MO. She served at the Gunn Clinic for more than 50 years, delivering many babies and making many house calls. She was a dedicated lifetime member of the Versailles United Methodist Church and also was involved in many other groups and organizations, serving on the Board of Governors for the University of Missouri Medical School and Board of Directors for the Morgan County Health Center, and as coroner of Morgan County for several years. She is survived by her husband, four children and 12 grandchildren.
Amos H. Lieberman, MD, 52

Max Baldridge, MD, HS 49
Baldridge died on Sept. 14, 2006, in Heber Springs AR at age 92. He practiced medicine for more than 50 years — as a general practitioner in Texas, as a U.S. Navy flight surgeon during World War II, and later as an ophthalmologist in Texarkana and Heber Springs. He is survived by his second wife, Charline Griffith Baldridge; his son, John Baldridge, MD; sister Charlsie Little, and four grandchildren. His first wife, Doris Allen Baldridge, preceded him in death.

Ralph B. Burroughs, MD, HS 51
Burroughs died on April 3, 2007, at age 92. Born in Swift Current, Saskatchewan, Canada, he earned his doctorate from the University of Manitoba in Winnipeg in 1944 and served as a captain in the Medical Corps of the Canadian Armed Forces during World War II. He practiced medicine for 50 years, retiring in 1994. He was a Knight of the Order of St. John of Jerusalem. Among his survivors are his second wife, Rosalind H. Kornfeld, PhD; sister Charlsie Little, and four grandchildren. His first wife, Doris Allen Baldridge, preceded him in death.

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FACULTY

Ray E. Clouse, MD
Clouse, professor of medicine and of psychiatry, died at his home on Aug. 31, 2007, of complications from lung cancer, although he was not a smoker. He was 56. A specialist in gastroenterology, Clouse maintained a large clinical practice at Barnes-Jewish Hospital for 27 years. He also pursued research into the mind's effect on illnesses, including inflammatory bowel disease and diabetes. He was a pioneer in the understanding of gastrointestinal motility, in particular studying the esophagus. An Indiana native, Clouse completed his undergraduate work at Purdue University and earned his medical degree from Indiana University School of Medicine in Indianapolis. He joined the Washington University faculty after completing his gastroenterology training in 1980. In 1996, he received the Janssen Award in Gastroenterology, which honors scientists and clinicians who have made important contributions to gastrointestinal research and patient care. In 2006, he was honored with the Distinguished Educator Award from the American Gastroenterological Association. He was a member of Christ Church Cathedral and was a Knight of the Order of St. John of Jerusalem. Among his survivors are his partner of 21 years, the Rev. Canon John W. Kilgore, MD, of St. Louis, and two nephews, Matthew C. Moberly and Aaron C. Moberly, MD, both of Indianapolis.

Daniel P. Schuster, MD
Schuster, the Virginia E. and Sam J. Golman Chair in Respiratory Intensive Care Medicine and a professor of medicine and of radiology, died unexpectedly on Sept. 11, 2007. He was 57. Schuster joined the Washington University faculty in 1981, and he served as associate dean of clinical research from 1996 until 2005. In that position, he was tireless in his efforts to enhance clinical research at the medical school. He initiated and led the Center for Clinical Studies and developed a master's degree program in clinical investigation. He was passionate about translating basic science into better treatments for patients and spent years building bridges between basic science and clinical departments at the medical school. He was a member of the Executive Committee of the Faculty Council and served as chair during the 2006 and 2007 academic years. Schuster was also a highly regarded and well-funded researcher devoted to advancing imaging techniques to diagnose and monitor inflammatory lung diseases. Schuster is survived by his wife, Debra; sons Jamie and Evan; his mother, Alice; and a brother, David. Memorial contributions may be made to the American Heart Association, American Lung Association or the Washington University School of Medicine, Division of Gastroenterology, Campus Box 8124, 660 S. Euclid Ave., St. Louis MO 63110.
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Asa C. Jones, MD 42, has found that a charitable gift annuity is a great way to receive lifetime payments, generate a charitable income tax deduction, reduce capital gain tax and support the School of Medicine. With him is Keith H. Bridwell, MD 77, the Dr. Asa C. and Mrs. Dorothy Jones Professor in Orthopaedic Surgery.
Physicians in training  The Class of 2011 officially marked its entrance into the School of Medicine on August 17, 2007, at the annual White Coat Ceremony held at the Eric P. Newman Education Center. At the event, students received their white coats and took the oath that welcomes them as part of the medical community. At left, W. Edwin Dodson, MD, associate vice chancellor and associate dean for admissions, helps Marc Sherman don his new coat while Will Ross, MD, associate dean for diversity and director of the Office of Diversity Programs, below, gives Kimberly Norris an assist.
Artistic evolution  Conversations, controversies and popular mythologies surround bioengineering, cloning and other topics in contemporary science. Exploring these issues through art, an exhibit at the School of Medicine’s Farrell Learning and Teaching Center features the work of Carmon Colangelo, dean of Washington University’s Sam Fox School of Design & Visual Arts and the E. Desmond Lee Professor for Community Collaboration in the Arts. In works such as “Evolution” and “Devolution” (above), Colangelo says that he injects humor and playfulness into a visual language that embodies the tensions surrounding these subjects. The exhibit runs through January 2008.