2014

Outlook Magazine, Spring 2014

SPEEDING STROKE CARE ⋮ ADVANCING PSYCHIATRY ⋮ MATCH DAY

Outlook

Washington University in St. Louis
SCHOOL OF MEDICINE

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SPRING 2014

Making BETTER DOCTORS

Actors as patients enhance education

Baby crazy

Rolling, crawling, and some already walking, 20 infants put "Baby Day" in full motion. Accurately guessing the babies' ages was the goal of first-year physical therapy students, using motor development assessments they've learned in Kinesiology (motion science) class. Clockwise from left, the babies and their proud moms: Isa with physical therapy instructor Patty McGee, DPT; Emma with Carolyn Holman, DPT '06; and Sophie with physical therapy instructor Stacy Tylka, DPT.

ALLISON BRAUN

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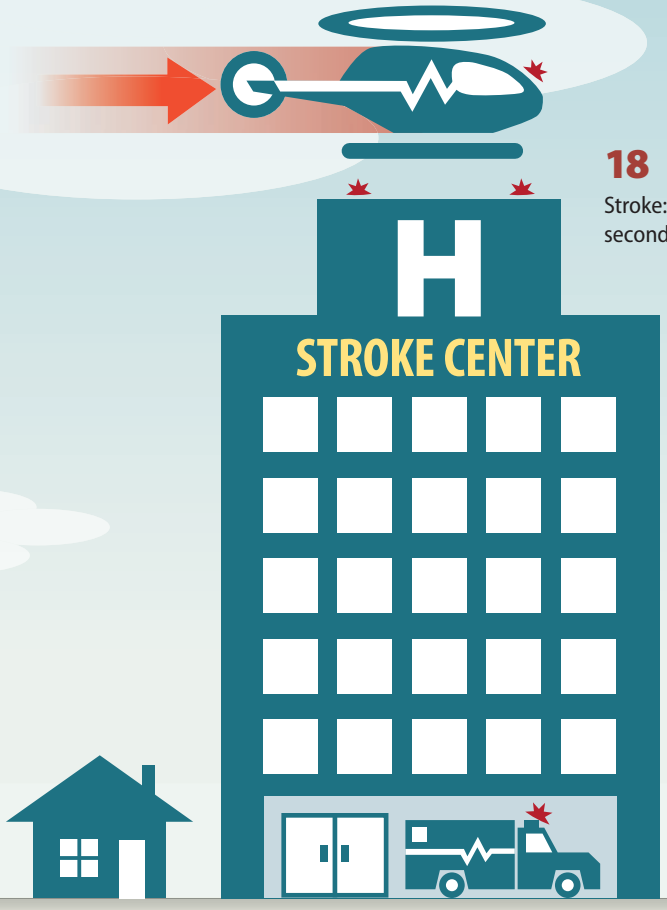
Outlook

Washington University School of Medicine

OUTLOOK.WUSTL.EDU SPRING 2014

24 Match Day dance



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The patient will see you now

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Expediting stroke treatment

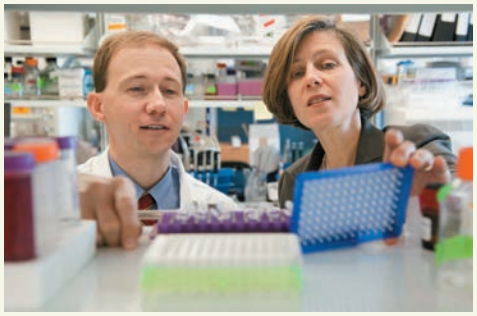
18 A multidisciplinary team provides some of the fastest stroke critical care in the U.S., redefining time-critical protocols and pioneering evaluation methods.

Meeting their match

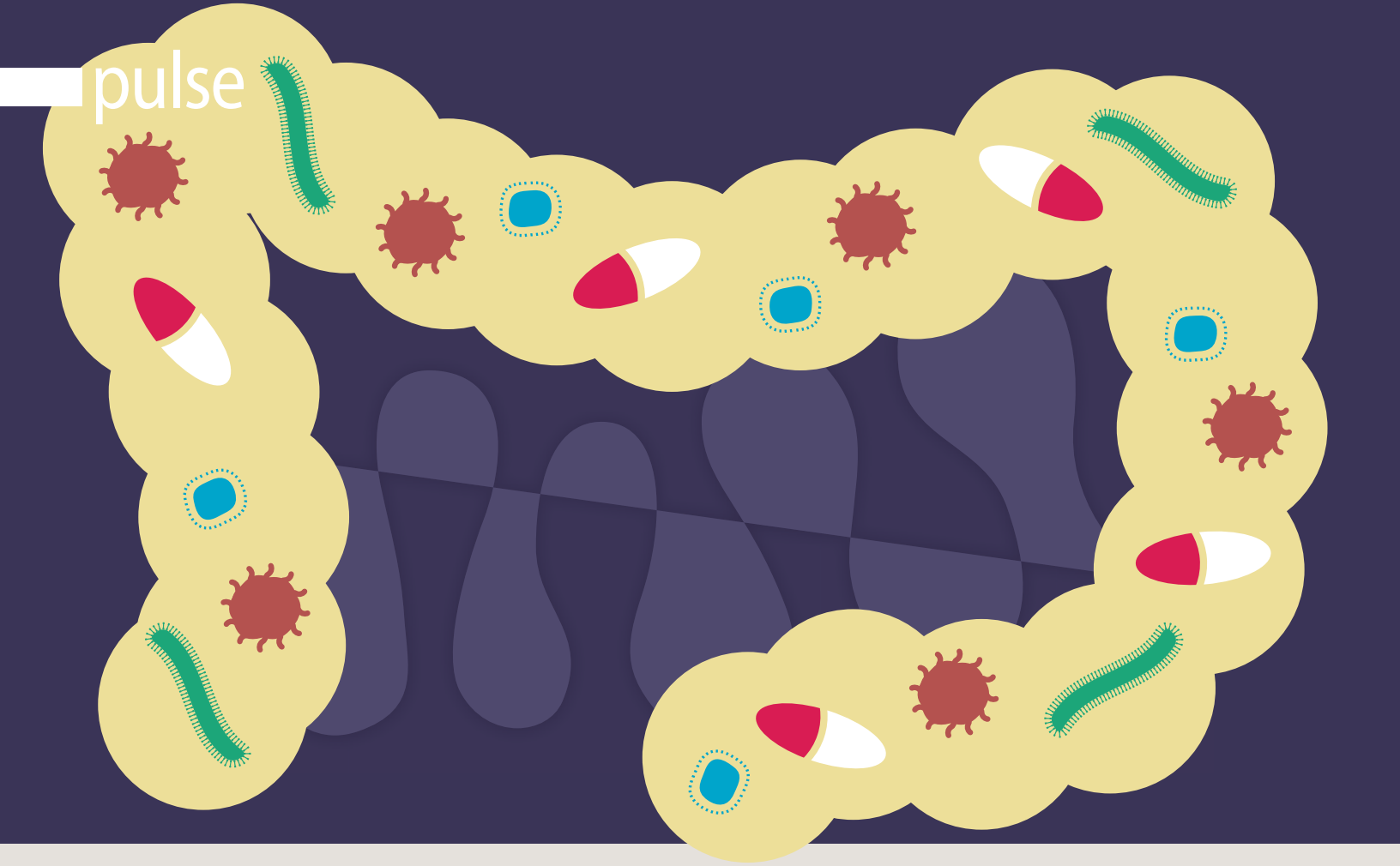
24 This year's graduating medical students learn where they will do their residency training.

COVER Second-year students Jenny Yu and Lawrence Benjamin interact with standardized patient Theresa George, a local actress simulating real symptoms. Dehra A. Glueck, MD (second from right), medical director of the Standardized Patient Program, offers some helpful guidance. To learn more, turn to page 10.

PHOTO BY ROBERT BOSTON



34 Fellowships help promising students achieve their goals.



Early exposure

Gut microbes in healthy kids carry antibiotic-resistance genes

Friendly microbes in the intestinal tracts of healthy American children have numerous antibiotic-resistance genes, according to a pilot study by School of Medicine scientists. The genes are cause for concern because they can be shared with harmful microbes, interfering with antibiotic effectiveness in ways that can contribute to serious illness or death.

"From birth to age 5, children receive more antibiotics than during any other five-year time span in their lives," said senior author Gautam Dantas, PhD, assistant professor of pathology and immunology. "Frequent exposure to antibiotics accelerates the spread of antibiotic resistance. Our research highlights how important it is to only use these drugs when they are truly needed."

With funding from the Children's Discovery Institute, the International Center for Advanced Renewable Energy and Sustainability, the National Academies Keck Futures Initiative and the National Institutes of Health (NIH), the researchers analyzed fecal samples from 22 infants and children ages 6 months to 19 years. Phillip I. Tarr, MD, the Melvin E. Carnahan Professor of Pediatrics at the medical school, provided the samples.

Despite the small sample size, the analysis identified 2,500 new antibiotic-resistance genes, expanding the list of known antibiotic-resistance genes by more than 30 percent.

"Microbes have been battling each other for millennia, regularly inventing new antibiotic-synthesis genes to kill off rivals and new antibiotic-resistance genes to defend themselves," Dantas said.

> **"There were quite a few resistance genes in microbes from every child we looked at."**
> — GAUTAM DANTAS, PhD

The scientists identified the new resistance genes by testing intestinal microbial DNA from the children against 18 antibiotics. The identified genes impaired the effectiveness of all but four of the drugs.

Babies lack microbes in their intestinal tracts at birth. They establish their communities of gut microbes through ingestion of microorganisms in their environment — from crawling on the floor, for example, to putting toys and other objects into their mouths, to contact with their primary caregivers.

According to the Centers for Disease Control and Prevention, antibiotic-resistant infections cause at least 2 million illnesses and 23,000 deaths annually, adding $20 billion in health-care costs. Methicillin-resistant *Staphylococcus aureus* now causes more U.S. deaths than HIV. Scientists use the term "resistome" to refer to the collective antibiotic-resistance genes of a microbial community.

"There were quite a few resistance genes in microbes from every child we looked at," Dantas said. "This was true even in children who were only 6 months old. When we compared their resistomes to those of older children, there didn't seem to be much difference."

Babies with leukemia inherit strong genetic predisposition

Both parents carry DNA variations

Babies who develop leukemia during the first year of life appear to inherit an unfortunate combination of genetic variations that can make the infants highly susceptible to the disease, according to a new study at the School of Medicine and the University of Minnesota. The research is available online in the journal Leukemia.

Doctors have long puzzled over why it is that babies just a few months old sometimes develop cancer. As infants, they have not lived long enough to accumulate a critical number of cancer-causing mutations.

The babies appear to have inherited rare genetic variants from both parents that by themselves would not cause problems, but in combination put the infants at high risk of leukemia. These variants most often occurred in genes known to be linked to leukemia in children, said Todd E. Druley, MD, PhD, a Washington University pediatric oncologist who treats patients at St. Louis Children's Hospital.

Only about 160 infant leukemia cases are diagnosed annually in the U.S. But unlike leukemia in older children, which often can be cured, about half of infants who develop leukemia die of the disease.

The researchers sequenced all the genes in the DNA of healthy cells from 23 infants with leukemia and their mothers. Looking at genes in the healthy cells helped the researchers understand which genetic variations were passed from a mother to her child, and by process of elimination, the scientists could determine the father's contribution to a baby's DNA.

Among the families studied, there was no history of pediatric cancers. Other children in the families typically don't develop leukemia because a roll of the genetic dice likely means they did not inherit the same combination of harmful genetic changes, he added.

STEVE DOLAN

Todd E. Druley, MD, PhD, studies the genetics of leukemia.

ZACH SMYTH/ERIC YOUNG

MIR VISUAL MEDIA CENTER PHOTOS

Blue behemoth Workers lower a cyclotron into its East Building vault on the Medical Campus. The unit, in the works for more than a decade, is a particle accelerator that will produce radioactive compounds, many of which are used with positron emission tomography (PET) scanners to detect types of cancers. Eventually, the new cyclotron will replace two others on campus that make these compounds. The new cyclotron will have higher energy and increased capacity to produce needed PET drugs.The Cyclotron Facility is part of Washington University's Mallinckrodt Institute of Radiology.

Holtzman named AAAS fellow

Michael J. Holtzman, MD, has been named a fellow of the American Association for the Advancement of Science (AAAS). The rank of fellow is the highest honor awarded by AAAS in recognition of distinguished efforts to advance science or its applications.

Michael J. Holtzman, MD

Holtzman, the Selma and Herman Seldin Professor of Medicine, is being honored for his contributions to understanding and treating chronic lung diseases such as asthma and chronic obstructive pulmonary disease and the role of respiratory viruses in these disorders.

Holtzman has performed pioneering research on the unsuspected link between acute viral infection and chronic inflammatory disease. His recent insight uncovered the possibility that viral infections may reprogram lung stem cells as a renewable trigger for chronic inflammation.

In addition to defining the cause of lung disease, Holtzman has led the development of a drug discovery program that includes new facilities for high-throughput screening, medicinal chemistry and structural biology. As part of the program, scientists are identifying new therapeutics and translating them into practice to reduce excess mucus production, combat viral infection and inhibit inflammation in the airway.

A key characteristic of Holtzman's approach has been the multidisciplinary nature of his group's research activities.

RAY MARKLIN

Good medicine Rowan Karvas, a research technician in radiation oncology, and Daniel Kober, a PhD student in microbiology, play "Sonata for Two Clarinets" at the third annual winter concert. Held in the Center for Advanced Medicine lobby, the free concert showcases Medical Center musicians in a range of genres. The program is designed to connect current and future health-care providers through music and bring comfort to patients and guests.

Head of ophthalmology named

Todd P. Margolis, MD, PhD, has been named head of the Department of Ophthalmology and Visual Sciences. With the appointment, Margolis also becomes ophthalmologist-in-chief at Barnes-Jewish Hospital.

Todd P. Margolis, MD, PhD

Margolis comes from the University of California, San Francisco (UCSF), where he was professor of ophthalmology and the Rose B. Williams Chair for Research in Corneal Diseases.

His clinical expertise is in the diagnosis and management of infectious and inflammatory eye disease, with a particular interest in eye disease due to herpes viruses and ocular infections in immune-compromised patients.

A 1977 graduate of Stanford University, Margolis subsequently received a doctorate in neuroscience and a medical degree from UCSF in 1984. After an internship in San Francisco, he trained as a resident in ophthalmology at UCSF and later did subspecialty training in corneal and external diseases at the F.I. Proctor Foundation. He completed postdoctoral research training in the Department of Microbiology and Immunology at the University of California, Los Angeles, where he served as a visiting assistant professor at the Jules Stein Eye Institute.

Margolis replaces Michael A. Kass, MD, who led the department since 1999, building it into one of the largest eye and vision research centers in the U.S. Kass will maintain a clinical practice and continue serving as senior associate dean for human research protection.

Diabetes drugs affect the hearts of men and women differently

Widely used treatments for type 2 diabetes have different effects on the hearts of men and women, even as the drugs control blood sugar equally well in both sexes, according to School of Medicine researchers.

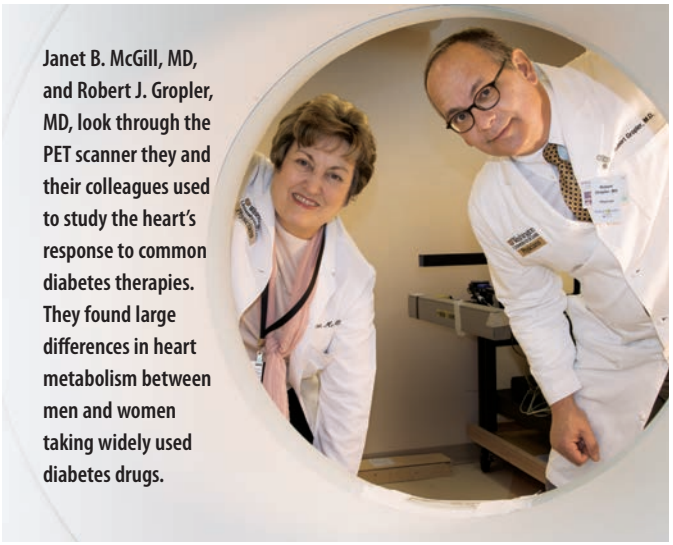
In particular, the commonly prescribed diabetes drug metformin had positive effects on heart function in women but not in men, who experienced a shift in metabolism thought to increase the risk of heart failure.

"We saw dramatic sex differences in how the heart responds to the different therapies," said senior author Robert J. Gropler, MD, professor of radiology. The study appeared in the American Journal of Physiology — Heart and Circulatory Physiology.

To the researchers' knowledge, this is the first study to investigate sex differences in the heart's response to diabetes treatments. In type 2 diabetes, the pancreas continues to make insulin, but the body can't use it effectively to move glucose out of the blood and into the tissues. And for reasons that are not entirely clear, patients with diabetes are at higher risk for heart failure.

"It is imperative that we gain understanding of diabetes medications and their impact on the heart to design optimal treatment regimens for patients," said Janet B. McGill, MD, professor of medicine and a study co-author.

The investigators evaluated commonly prescribed diabetes drugs in 78 patients. The research suggests that divergent responses in men and women may provide at least a partial explanation for the conflicting data surrounding some diabetes drugs. Specifically, the proportion of men and women participating in a clinical trial may play an unappreciated role in whether drugs are deemed safe and effective.



ROBERT BOSTON

Janet B. McGill, MD, and Robert J. Gropler, MD, look through the PET scanner they and their colleagues used to study the heart's response to common diabetes therapies. They found large differences in heart metabolism between men and women taking widely used diabetes drugs.

ROBERT BOSTON

Residents honored with high-flying breakfast

The Division of Medical Education treated residents to games, prizes and lots of good food in "Funuary" to keep them energized and ready to face the final weeks of winter. Above: Victoria J. Fraser, MD, the Adolphus Busch Professor of Medicine and chair of the Department of Medicine, and Melvin S. Blanchard, MD, division chief and associate professor of medicine, showed off their culinary — and pancake-flipping — skills as they served breakfast to the hardworking house staff.

GENETIC TESTING

Alerting to the risk for sudden death

The School of Medicine now offers genetic testing to help diagnose and treat patients with heart disorders that can lead to sudden death.

The new test, offered though the school's Genomics and Pathology Services (GPS) and developed in collaboration with Washington University cardiologists, analyzes genes linked to arrhythmias and cardiomyopathies.

Physicians who treat patients with indications of these heart conditions can submit a blood sample for gene sequencing. In two to three weeks, they receive a report from GPS describing any mutations identified in the patient's DNA that may contribute to disease and affect response to treatment.

"Results from this test can help us refine diagnoses and allow us to personalize management and treatment of our patients," said Phillip S. Cuculich, MD, assistant professor of medicine and one of the cardiologists involved in test development. "The results also may help family members of affected patients decide if they want to be tested to see if they are at risk for developing the disease."

Called the Washington University CardioGene Set, the test builds on another first-of-its-kind test offered by GPS that analyzes multiple genes in tumors. Seeking genomic clues to personalize cancer diagnosis and treatment, oncologists nationwide have been sending tissue samples to GPS for this test for two years.

"The CardioGene Set is the next major step in our effort to bring the promise of human genomics to the clinic," said Karen Seibert, PhD, director of GPS. "With rapid and sensitive gene-sequencing technology, we check dozens of heart disease genes simultaneously to cost-effectively identify the likely genetic cause."

The cardiac testing panel includes genes linked to eight cardiac disorders that are characterized by irregular heartbeats (arrhythmias) or heart muscle problems (cardiomyopathies).

For example, the test analyzes the sequences of genes linked to long-QT syndrome, a rare inherited arrhythmia that lengthens the time between heartbeats, potentially causing heart palpitations or cardiac arrest.

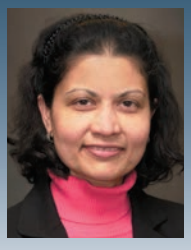
GPS

These genes can help doctors identify particular subtypes of long QT. Different forms of long QT respond to different therapies, so this information helps guide treatment decisions.

Patients with hypertrophic cardiomyopathy (HCM), a thickening of the heart muscle that can lead to sudden cardiac arrest and other problems, also can benefit from the CardioGene Set.

HCM is infamous for causing sudden fatal cardiac arrests in young athletes who never showed any symptoms of heart problems. Genetic diagnosis of this condition may lead physicians to advise a patient against physical overexertion.


Hruz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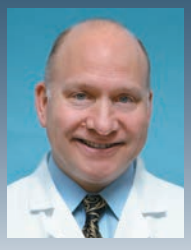
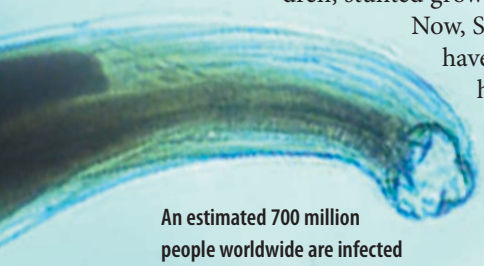

White

Scholars in pediatrics The School of Medicine and its Department of Pediatrics have established funding for three pediatric scholars named in honor of a trio of highly regarded former pediatricians at the university. The medical school is funding these awards with $3 million to be divided among the three faculty members, in support of their time and efforts devoted to scholarship and teaching. The funding recipients, each of whom practices at St. Louis Children's Hospital, are: Paul W. Hruz, MD, PhD, as the Julio V. Santiago, MD, Scholar in Pediatrics; Shalini Shenoy, MD, as the Teresa J. Vietti, MD, Scholar in Pediatrics; and Andrew J. White, MD, as the Philip R. Dodge, MD, Scholar in Pediatrics. The scholars are appointed for three years.

Researchers decode hookworm DNA

Going barefoot in parts of Africa, Asia and South America contributes to hookworm infections, which afflict an estimated 700 million of the world's poor. The parasitic worm lives in the soil and enters the body through the feet. By feeding on victims' blood, the worms cause anemia and, in children, stunted growth and learning problems.

Now, School of Medicine researchers have decoded the genome of the hookworm, *Necator americanus*, finding clues to how it infects and survives in humans and aiding in the development of new therapies to combat hookworm disease.


An estimated 700 million people worldwide are infected with hookworms, which feed on blood, causing anemia and, in children, stunted growth and learning problems.

"This information will accelerate development of new diagnostic tools and vaccines against the infection," said Makedonka Mitreva, PhD, assistant professor of medicine and of genetics and a member of The Genome Institute at Washington University.

In the U.S. and other industrial countries, hookworms are gaining attention for their therapeutic potential in the treatment of autoimmune conditions, such as inflammatory bowel disease, multiple sclerosis, asthma and even allergies.

The scientists discovered that hookworms, to evade detection by the host immune system, appear to suppress molecules that promote inflammation. This same approach may prove valuable in the treatment of autoimmune conditions.

Alcohol, tobacco, drug use far higher in severely mentally ill

Links with shorter life expectancy

In the largest assessment of substance use among people with severe psychiatric illness, researchers at the School of Medicine and the University of Southern California have found that rates of smoking, drinking and drug use are significantly higher among those who have psychotic disorders than among those in the general population. The study is published online in the journal JAMA Psychiatry.

The finding is of particular concern because people with severe mental illness are more likely to die at a younger age.

"These patients tend to pass away much younger, with estimates ranging from 12 to 25 years earlier than individuals in the general population," said first author Sarah M. Hartz, MD, PhD, assistant professor of psychiatry at Washington University. "They don't die from drug overdoses or commit suicide — the kinds of things you might suspect in severe psychiatric illness. They die from heart disease and cancer, problems caused by chronic alcohol and tobacco use."


A higher incidence of chronic alcohol and tobacco use causes more deaths than suicide.

The study analyzed smoking, drinking and drug use in nearly 20,000 people, including 9,142 psychiatric patients diagnosed with schizophrenia, bipolar disorder or schizoaffective disorder.

The investigators also assessed nicotine use, heavy drinking, heavy marijuana use and recreational drug use in more than 10,000 healthy people without mental illness.

The researchers found that 30 percent of those with severe psychiatric illness engaged in binge drinking, defined as drinking four servings of alcohol at one time. The rate of binge drinking in the general population is 8 percent.

Among those with mental illness, more than 75 percent were regular smokers, compared with 33 percent of those in the control group. There were similar findings with heavy marijuana use: 50 percent of people with psychotic disorders used marijuana regularly, versus 18 percent in the general population. Half of those with mental illness also used other illicit drugs, while the rate of recreational drug use in the general population is 12 percent.

ROBERT BOSTON

Back row, from left: Susan George, Sarah Fowler-Dixon, Linda Van Zandt, Jamie Rose, Rick Chandel, Debbie Aumer and Carla Pinkston. Front row, from left: Nikki Koehnemann, Kerri Morgan and Jacki Epps-Wilbanks.

Tread the Med

Tread the Med, the School of Medicine's popular program that encourages employees to walk 10,000 steps daily, began Feb. 27 with an Olympics-themed kickoff on the Medical Campus. Kerri Morgan, an instructor in occupational therapy and neurology, spoke to participants about her journey to becoming a bronze-medal winner in the 2012 London Paralympic games. The event included a recap of the most recent Tread the Med and recognized top achievers. Participants are given pedometers and challenged to record progress online — with the ultimate goal of 500 miles, or 1 million steps, in 100 days. Tread the Med is sponsored by the School of Medicine's Wellness Committee.

OPHTHALMOLOGY RESEARCH

Shining a light on older adults' vision

Older adults who have 20/20 vision in their eye doctors' offices may not see as well at home. School of Medicine researchers suggests dim lighting may be the culprit.

Their study is published online in the journal JAMA Ophthalmology.

"It's very common for older patients to have concerns about their vision but then test well on the eye charts when we examine them," said first author Anjali M. Bhorade, MD, a Washington University ophthalmologist at Barnes-Jewish Hospital. "In this study, we found that vision in patients' homes was significantly worse than in the clinic. The major factor contributing to this difference was poor lighting in the home."

The researchers studied 175 patients ages 55-90. These included 126 with glaucoma. All patients had their vision measured at home and at the Glaucoma and Comprehensive Eye Clinics at the School of Medicine.

The average scores on vision tests were better in the clinic than at home, Bhorade said. Nearly 30 percent of the patients with glaucoma were able to read at least two or more extra lines on an eye chart in the clinic than on the same chart at their homes, and 39 percent of those with advanced glaucoma read three or more additional lines in the clinic.

"Older adults with and without glaucoma had similar differences in vision between the clinic and home," said Bhorade, an associate professor of ophthalmology and visual sciences. "These differences occurred not only with distance and near vision, but with contrast sensitivity and glare testing, too. The biggest difference we observed was for distance vision in patients with advanced glaucoma. They had even bigger declines in vision at home."

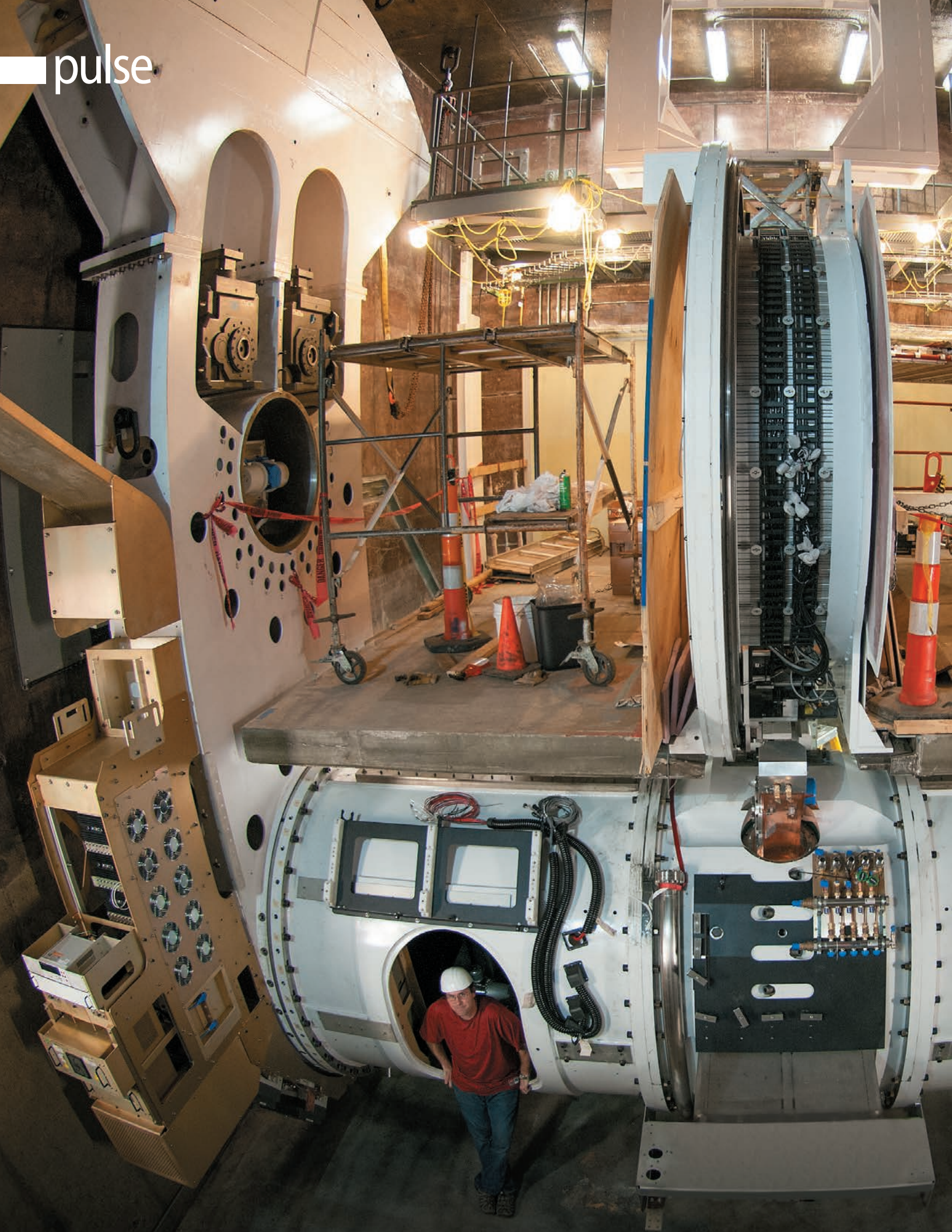
Lighting levels were below the recommended range in more than 85 percent of the homes visited.

"Since most older adults spend the majority of time at home, our study suggests that better lighting may increase vision and possibly improve the quality of life for a large number of people," Bhorade said.

Although the study didn't look specifically at potential dangers associated with low light, such as falls, other research has determined that a difference of two or more lines on an eye chart is associated with a significant difference in how a person functions in daily life.

The findings suggest that a simple solution may help older adults function at their maximum potential.

"Clinicians should refer their patients for a customized in-home evaluation by an occupational therapist or low-vision rehabilitation specialist who can make suggestions to optimize the lighting in people's homes," Bhorade said.



Shown during installation: A superconducting synchrocyclotron proton accelerator is a key component of the new proton therapy system. This is the first single-room proton therapy unit in the world. The $20-million device improves upon traditional systems, which typically are housed in football field-sized buildings and cost more than $150 million.

ROBERT BOSTON

The proton beam delivers a dose directly to the site of the tumor and to the correct depth, leaving critical organs untouched.

Cancer destroyer

Powerful innovation; precision therapy

Radiation oncologists at Washington University School of Medicine have a new option for treating cancer patients — proton therapy.

The S. Lee Kling Proton Therapy Center, which opened in January, provides proton therapy to adult patients of the Alvin J. Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine and pediatric patients of St. Louis Children's Hospital. Patients eligible for the therapy have cancer near vital structures such as the spine, brain, heart and eyes.

Jeffrey D. Bradley, MD, shows one of the custom-made apertures that precisely targets a tumor.

"Proton therapy is unique because it allows for very precise adjustments to the radiation beam, so we can target tumors," said Jeffrey D. Bradley, MD, director of the proton therapy center. "It helps to minimize damage to surrounding tissue and is especially useful when treating growing children."

For example, treatment of a brain tumor with proton therapy may be less likely to result in blindness or other complications, said Bradley, who also is the S. Lee Kling Professor of Radiation Oncology at Washington University.

The S. Lee Kling Proton Therapy Center plans to treat 20 to 25 patients a day. Treatment typically requires daily 30-minute sessions for two months. The center will serve the Midwest; the next closest location offering proton therapy is 225 miles away.

The MEVION S250 Proton Therapy System was developed and manufactured by Littleton, Mass.-based Mevion Medical Systems with the assistance of radiation oncologists and physicists at Washington University.

THE PATIENT *will see you now*

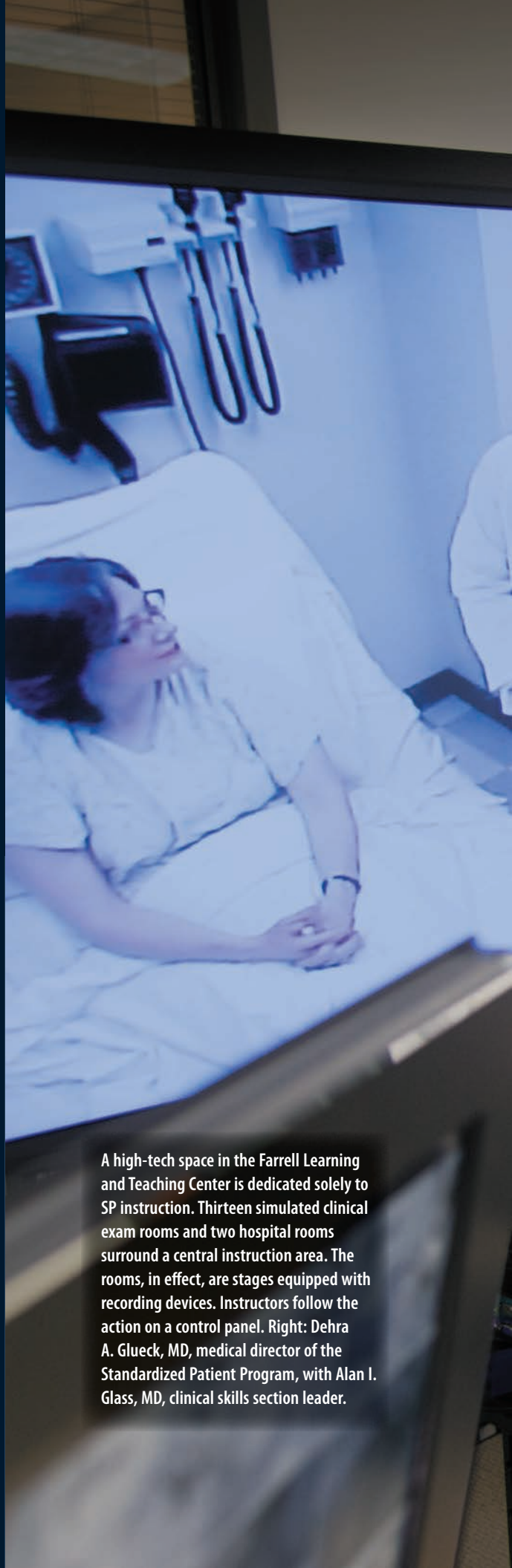
Scripted scenarios, intelligent improv and informed feedback hone the clinical skills of tomorrow's physicians

BY DEB PARKER

ED REGGI HAPPILY REPORTS THAT, since 2009, he has suffered from tuberculosis, bouts of depression, stomach ulcers, acid reflux, diabetes, sleep apnea, migraines, night sweats, chest pains and high blood pressure. He looks forward to developing many more ailments in the coming years.

Committed to helping medical students become better doctors, he is one of nearly 70 local professional actors working as standardized patients (SPs) at Washington University School of Medicine. They portray real patients, and repeatedly subject themselves to physical exam by inexperienced hands. In this safe practice environment, medical students hone their clinical skills.

Through this immersive program that builds in complexity over four years, students undergo a stunning transformation. Here, they learn to get comfortable touching and examining patients, taking histories, asking personal questions and writing notes. By the program's conclusion, the students will have practiced delivering a terminal diagnosis.



ROBERT BOSTON

A high-tech space in the Farrell Learning and Teaching Center is dedicated solely to SP instruction. Thirteen simulated clinical exam rooms and two hospital rooms surround a central instruction area. The rooms, in effect, are stages equipped with recording devices. Instructors follow the action on a control panel. Right: Dehra A. Glueck, MD, medical director of the Standardized Patient Program, with Alan I. Glass, MD, clinical skills section leader.


Washington
University in St. Louis
Physicians
AN GLASS, M.D.
00:00

Furniture, equipment, lighting — each "classroom" simulates a real-world clinical setting. Students gain experience and confidence through feedback from faculty instructors as well as the standardized patients. A camera, left, records the interactions for in-depth evaluation.

As the process unfolds, students learn more about who they are as individuals and how they can better connect with their future patients. In a benefit not afforded in the real world, SPs are trained to critique the students' techniques — breaking character after a simulation and telling them exactly what it felt like to be their patient.

Program organizers say, in the real world, most people "vote with their feet": If displeased with a doctor's lack of attentiveness or communication, they simply won't come back or won't follow health recommendations.

THE STUDENT MUST suspend disbelief, read the door note, knock and enter.

A standardized patient, already in character, awaits.

"Patients today tell us, 'I want you to be a good diagnostician and practice evidence-based medicine, but that's not sufficient. I also want you to be able to talk to me,'" said Dehra A. Glueck, MD, assistant professor of psychiatry and medical director of the Standardized Patient Program. Glueck also served on a communications skills task force for the National Board of Medical Examiners.

The initial, one-on-one standardized patient encounter happens early in the first year. The student must suspend disbelief, read the door note, knock and enter. A standardized patient, already in character, awaits.

The challenge: ask the right questions, keep the patient on topic, gather information, respond to concerns and be empathic.

"This is about being fully present in the moment," said Jamie Pitt, Standardized Patient Program coordinator. As with real practitioners, these doctors-to-be must put personal difficulties aside. Regardless of whether students are having a bad day, or if someone cut them off in the parking lot, it all becomes secondary to patients' needs.

"This changed my idea of what it means to learn to be a doctor," said first-year student Giuseppe D'Amelio. "When we practice on each other, we're just going through the motions. It's very different when you don't know what they (the patients) are going to say."

Lack of confidence is a common problem, as is talking about highly personal subjects. As first-year student Jared Goodman explains: "Unlike any other conversation you've had in your life, you realize that every sensitive detail comes out in the first five minutes."

From bowel movements to sexual behavior, all topics are open for discussion. "Up until now, social conditioning taught students not to talk about these things," Glueck said. "They're not always sure what words to use. That's where we come in."

Through video playback, students critically assess themselves, quickly realizing how often they say "um," fidget, click their pens or look down at the floor. With input from faculty mentors, students go right back in, adjust the approach

and try it again. Individualized attention is the program's hallmark.

In a word, most students describe those early experiences as "terrifying"; many walk into the simulated exam room, nervous and trembling, not exactly sure what to do. Clipboards are dropped. Hand sanitizer squirts across the room. Just a month before, these students were college kids. Now, they must face a patient — albeit, pretend — and appear "doctorly."

The SPs are ready: They've memorized symptoms, medication dosages, family medical history and work-life balance.

Together, Glueck, who enjoys screenwriting, and Pitt, who acts with local and national theater companies, have found their calling. The pair researches and develops a wide range of realistic scripts, complete with backstories, costume and props. Actors are carefully coached and scripts are rehearsed extensively.

ROBERT BOSTON

Despite thoughtful scriptwriting, the actors never know exactly what a student will ask. The job requires intense concentration. At times, SPs are interviewed by up to 10 students in succession.

"It's not about an Oscar-award-winning performance," Pitt said. "It's about a consistent, reliable portrayal of symptoms. In our auditions, we look for people who have experience providing honest, constructive feedback without any medical biases."

"You had a good demeanor," five-year SP veteran Aarya Locker told one student. "I think our rapport derailed a bit when I asked you a question and you didn't know the answer. It's always fair to say, 'I don't know. Let me research that and get back to you.' I would have been floundering a bit, had I left the office without a solid understanding of the next steps I should take with my child."

In one small-group session, a student decided his peers were "dancing around the subject too much." He went into the exam room and flatly told the SP, "You've got cancer." The SP burst into tears.

"The actors respond exactly to what's in front of them," Glueck said. "And this dramatically changes what a student can learn. In the student's second attempt, he gave the diagnosis and met the patient where she was, rather than thinking he knew how it should be done."

St. Louis' large professional acting community offers expertise and versatility. "It's an absolute dream to play someone else and see if it's believable,"

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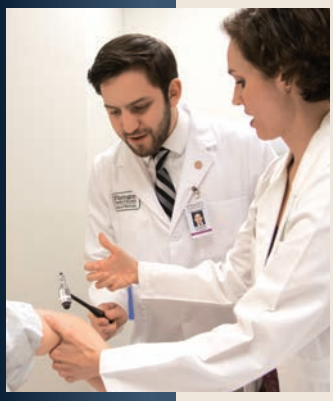
Standing before the wall of local acting talent that fuels the Standardized Patient Program, coordinator Jamie Pitt (left) reviews a script with Aarya Locker.



ROBERT BOSTON PHOTOS

LIGHTS, CAMERA, ACTION!

Sampling the SP repertoire

Bill Worthington, a 56-year-old male, unemployed, complains of discomfort in the chest, problems at home.

Jennifer Walsh, a 23-year-old female, in for a routine checkup, exhibits signs of abusive physical injuries.

Anna Smith, a 30-year-old female smoker, presents for shortness of breath and is discouraged after a recent failed attempt to quit.

Travis Jones, a 16-year-old male, in for evaluation after his mother found text messages about suicide; reports issues at school after coming out as gay.

Fred Johnson, a 70-year-old male, in because his wife says he has trouble remembering things.

Alice McCoy, a 46-year-old female, nervously awaits biopsy results.

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High-tech eavesdropping with a purpose: Alan I. Glass, MD, watches and listens as a student group interacts with a standardized patient.

said Reggi, an actor, director and producer who trained at Second City. "I have to step outside of myself, remain neutral and think about how this other person would respond. Certainly, it's less random than improv, but it still requires spontaneity. It's where art and science meet."

Program facilitators design simulated cases that reflect the region's actual patient population, deriving input from clinical faculty, and building in elements of religious, ethnic and economic diversity. They strive to promote the use of appropriate, inclusive language and create scenarios that may be outside of the students' comfort zone, such as a same-sex couple seeking treatment for an adopted child.

The students are given a host of increasingly difficult scenarios each year. In their second year, students simulate an evolving physician-patient relationship by visiting the same SP multiple times. Third-year students participate in specialized SP encounters during rotating clerkships.

"The idea is that the more robust you make the practice environment, the more powerful and richer the insights," Glueck said.

"Students bring innate abilities of varying degrees," added Alan I. Glass, MD, assistant vice chancellor and director of Habif Health & Wellness Center. As a clinical skills section leader for first- and second-year students, Glass works closely with the SP program.

"For some students, it's very easy," Glass said. "For others — like in any subject — it takes more effort. We can teach them skills to be more effective."

Glueck cautions, however, it's not about making students all the same. It's about helping students discover their individual styles so they can communicate in a way that feels natural and genuine.

"Over the course of time, we have a record of multiple patient encounters, and footage of them interacting with different people," Glueck said. "We use this to see where students are struggling and translate this into actionable steps we can work on together so they can become the kind of doctor they want to be."

Having gone through the entire SP program, fourth-year student Phillip McGuiness feels he is ready to face the real thing. "Much of the mental acrobatics, the awkwardness, is gone. The standardized patients just take it all in stride. These professionals have played a big part in making me a more efficient, compassionate doctor."

Examining "bedside manner"

For many medical school alumni, fellow classmates were the first "standardized patients." "We learned physical exam skills on each other," said Alison J. Whelan, MD, senior associate dean for education at the medical school. "There was no instruction on communication. Over time, the medical community has realized that body language does matter — how you sit, how you look at a patient, how you acknowledge what they are saying."

Nationally, medical schools are paying more attention to so-called "soft" skills and adding standardized patient programs into their curriculums.

In 2004, the National Board of Medical Examiners added the Step 2 Clinical Skills component, a pass/fail test that is one of three steps students must complete before applying for a medical license.

In Step 2, fourth-year medical students travel to a testing center and assess 12 standardized patients over eight hours, with 15 minutes for each encounter and 10 minutes to record each patient note.

Prior to taking Step 2, Washington University requires students to complete an in-house Clinical Competency Exam — in which they must evaluate six standardized patients in a day. Not all medical schools offer this preparatory advantage for Step 2, the results of which factor into the residency match.

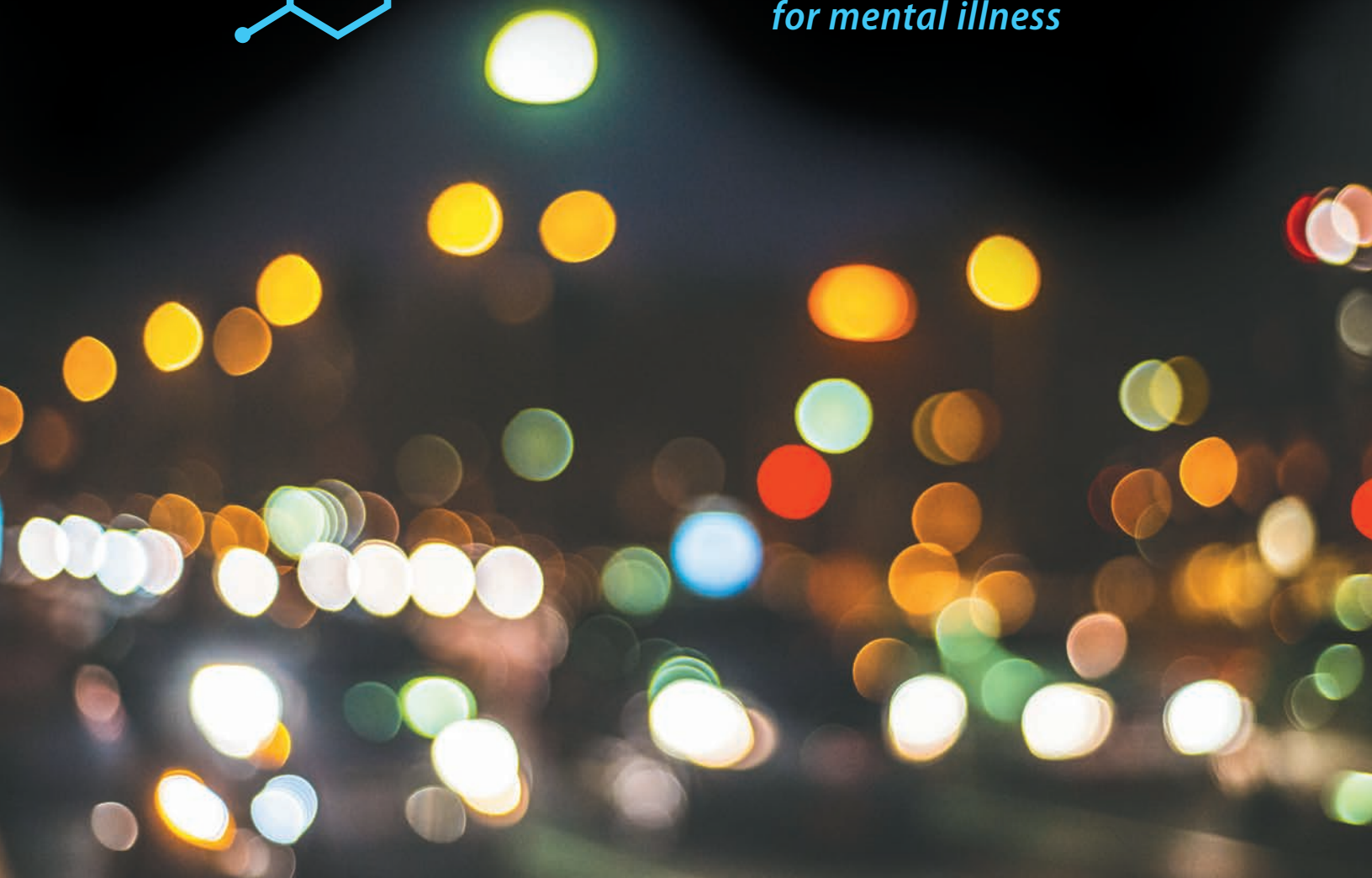
"The Washington University directors have developed novel approaches that serve as a fantastic model for those of us around the country teaching communication skills to our students," said Lisa Bernstein, MD, FACP, associate professor of medicine and director of Becoming a Doctor curriculum at Emory University School of Medicine. Bernstein also served on an NBME communication skills task force.

"SOME WILL SAY SPs don't make up for real patients, which is true. Our students still round on hospital patients, but this gives them a focused, observed opportunity to practice. Self-assessment is critical to lifelong learning." — ALISON WHELAN, MD

Taylor Family Institute For
Innovative Psychiatric Research

psychiatry's therapeutic frontier

Partnership envisions novel treatments for mental illness



Innovative collaborations

Ten investigators with six labs in four departments will pursue drug discoveries, novel therapeutics, lifestyle interventions, and partner with clinical affiliates

Novel chemistry → Drug discovery/ synthesis → Biochemical testing

PSYCHIATRIC DISORDERS AFFECT more than 80 million Americans, disrupting their ability to cope with daily living. Left untreated, the individual and societal costs are staggering — including disability, unemployment, substance abuse, physical illnesses, family discord, homelessness, incarceration and suicide.

Despite the prevalence of psychiatric problems, there are relatively few effective drugs for treating them. Even the best drugs are limited, treating a portion of a person's symptoms, and many cause side effects. Novel pharmacological targets remain the best hope for diminishing the major public health impact of psychiatric illnesses, but drug makers have largely abandoned the effort following failed clinical trials. Development, they have determined, is too risky and expensive.

Current antidepressants, antipsychotics and anti-anxiety drugs remain largely unchanged from past decades. Newer modifications might be safer or more tolerable, but a truly innovative drug hasn't been discovered for 30 years.

"Most of the drugs used today focus on the same molecular targets in the brain as drugs that were used in the 1950s and '60s," said Charles Zorumski, MD, the Samuel B. Guze Professor of Psychiatry and Neurobiology and head of the Department of Psychiatry.

Learn more about the institute:
taylorfamilyinstitute.wustl.edu

A new day may be dawning. Thanks to a visionary $20-million gift from Andy and Barbara Taylor and the Crawford Taylor Foundation, the School of Medicine now is home to the Taylor Family Institute for Innovative Psychiatric Research. Established in fall 2012, the institute seeks to advance the science underlying the diagnosis and treatment of psychiatric illnesses.

Historically, the School of Medicine has led the field of biological psychiatry and was among the earliest to define mental illness as a disease, not a character flaw — one that could be investigated in the same way as cancer or heart disease.

The institute unites basic and clinical researchers from several medical school departments. Together, the investigators bring complementary skills and interests ranging from medicinal chemistry to animal behavior.

"Our main objective is to find new treatment targets in hopes of developing more effective drugs," said Zorumski, the institute's director.

Scientists do not yet understand the mechanisms causing psychiatric illnesses, but Zorumski said it is clear they cannot be explained solely as chemical imbalances, as once was thought. "Neurochemistry may be involved, but there are many pathways to explore," he said.

Psychiatric drugs today often treat symptoms. Instead, the institute is looking at new therapies to alter the brain networks, or circuitry, associated with psychiatric disorders. It's these networks that are involved in the symptoms of the illnesses.

"Our current view is that major psychiatric illnesses reflect dysfunction in the brain networks that underlie cognition, emotion and motivation," Zorumski said.

Specifically, cognition refers to how people think, perceive and remember. Emotion is how people attach meaning, and motivation is how people set and work toward goals. These processes, which work through various neural pathways that have yet to be fully understood, often are impaired in mental illness. "The key is to find treatments (pharmacological and psychotherapeutic) that modify dysfunctional neural circuits," he said.

There is shared circuitry among psychiatric disorders, although specific illnesses may involve different parts of this circuitry. For example, changes in the hippocampus, a brain region involved in memory processing, occur in schizophrenia, depression and post-traumatic stress disorder. Yet, how this region is involved may differ among the disorders.

Schizophrenia, for instance, signals a breakdown in thinking and poor emotional responses. It involves three

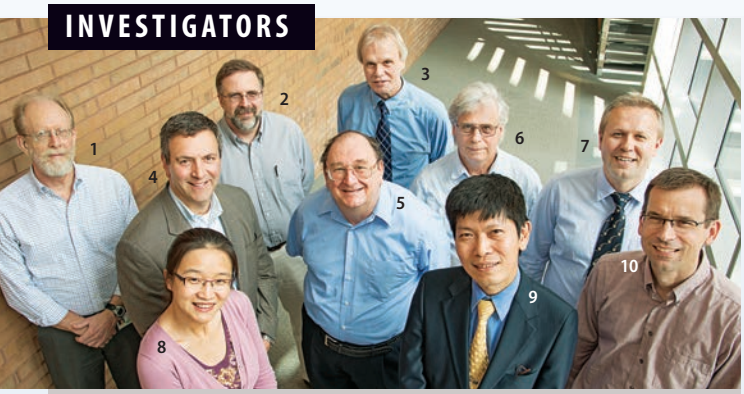
ROBERT BOSTON

types of symptoms: positive, meaning additional symptoms most people do not typically experience, such as delusions and hallucinations; negative, meaning symptoms reflecting deficiencies, such as social withdrawal and an inability to express emotions; and cognitive, meaning problems with attention, language and short- and long-term memory.

Current therapies treat schizophrenia's positive symptoms, but do virtually nothing for the negative or cognitive symptoms, which hamper one's ability to function in a job or relationship. Thus, investigators are looking for treatments that could address these cognitive and negative symptoms.

Initial research focuses on neurosteroids and oxysterols, naturally occurring, cholesterol-derived brain chemicals that may help regulate cognition, emotion and motivation.

INVESTIGATORS



1. David Wozniak, PhD; 2. David Reichert, PhD; 3. Charles Zorumski, MD; 4. Alex Evers, MD; 5. Douglas Covey, PhD; 6. Joe Henry Steinbach, PhD; 7. Gustav Akk, PhD; 8. Ziwei Chen, PhD; 9. Yuki Izumi, MD, PhD; and 10. Steven Mennerick, PhD.

In a recent Journal of Neuroscience article, School of Medicine researchers explained how, in animal models, oxysterols modulate cell receptors involved in learning and memory. These receptors differ from those targeted by current medications and so they could be useful in the development of new drugs. "Whether oxysterols are involved in the biology of schizophrenia is an unanswered question," Zorumski said. "Regardless, oxysterols may represent a new approach to improve brain function in patients with mental disorders."

Similar considerations can be made for neurosteroids, which help control how neurons respond to stressors in the brain. By modulating function of key brain networks, neurosteroids could serve as effective treatment strategies in a variety of disorders.

Stress, the evidence shows, diminishes neurosteroid production; decreased neurosteroid levels are linked to depression, anxiety, alcoholism, epilepsy and Alzheimer's, among other disorders.

Replacing these depleted levels with synthetic neuroactive steroids may help alleviate the altered stress responses and allow the brain to function more normally.

Researchers are working to identify neurosteroids and oxysterols in the brain, how they are made and how they bind to cell receptors. They are studying natural and synthetic versions of these molecules not only as psychiatric treatments, but also as potential anesthetics.

Although the Taylor Family Institute is new, decades of prior collaborations brought researchers national recognition for neurosteroid, neuronal function and anesthesia research.

"We were mostly trying to learn about the anesthetic effects," said Douglas F. Covey, PhD. "Now, we're also looking at how those molecules might influence psychiatric health."

Covey, a medicinal chemist and professor of pharmacology in developmental biology, dedicates his career to identifying natural and designing synthetic neurosteroid molecules. Hexagonal drawings mark notebooks, countertops and the glass-covered hoods where the molecules are made in his lab.

Covey and his team have built a library of more than 700 compounds. Pointing to a large file cabinet, he half-kiddingly explained that the molecules documented in those drawers may be good candidates for anesthetics. It's possible, he said, that some of the therapies being sought by Taylor Institute scientists for mental illness already exist there.

Transforming a synthetic molecule into treatment requires significant resources. Taylor Family Institute scientists are excited about a partnership with Massachusetts-based SAGE Therapeutics, which develops medicines for central nervous system disorders. SAGE could quickly move promising therapeutic molecules into clinical trials, and already has licensed the contents of Covey's file cabinet.

Institute scientists also are studying potential treatments developed elsewhere. "The anesthetic drug ketamine may have the potential to alleviate depression in some patients with a treatment-resistant form of the disorder," Zorumski said. "We're testing that now, and we will investigate other novel therapies.

"The field of psychiatry has been doing the same things over and over again with the same result. We think it's time to try a new approach."

Accelerating the critical countdown

STROKE!

PHYSICIANS TODAY KNOW that time makes all the difference when it comes to stroke.

The brain is unforgiving to lack of oxygen. Without it, 1.9 million brain cells die every minute. But with prompt treatment, significant disability can be minimized. Hence, "time is brain" now is a nationally recognized stroke awareness campaign.

Leading School of Medicine specialists have worked vigilantly to beat the clock. As a result, patients seen at the Washington University and Barnes-Jewish Stroke & Cerebrovascular Center have improved outcomes and are given the best chance for survival and recovery.

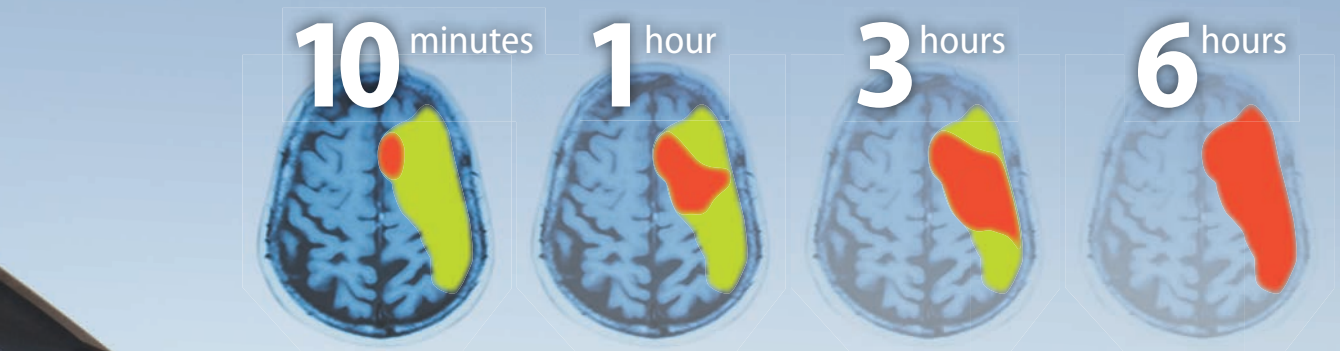
The multidisciplinary team provides some of the fastest stroke critical care in the U.S. — assembling in the Emergency Department within minutes and bringing deep resources to the high-stakes task of stroke diagnosis and treatment.

Further, School of Medicine physicians are helping to shape treatment regionally and nationally as they define and propose time-critical standards and continue to pioneer methods of evaluating and managing stroke.

BY DEB PARKER

Expediting response and treatment

Following stroke onset, **at-risk brain regions** *could be revived with prompt treatment.*



Some brain regions (red) already are irreversibly lost.

More time elapses, more brain tissue dies. Urgent treatment could still limit the disability.

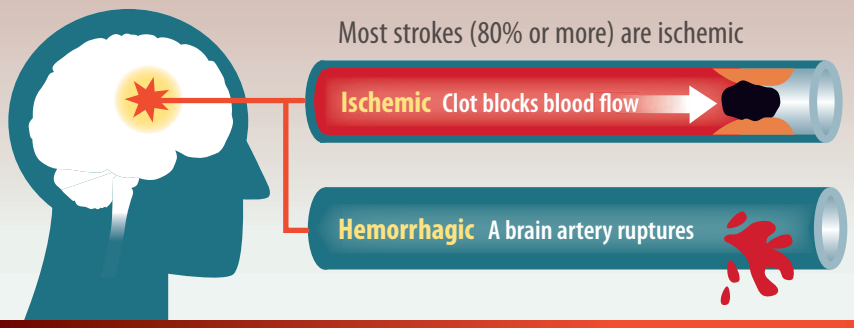
The window is closing. Treatment at this time may result in moderate disability.

Without treatment, all at-risk tissue has died; the unfortunate result may be severe disability.

EMERGENCY IN MOTION: Medical personnel participate in a training exercise for transporting a stroke patient to the Washington University and Barnes-Jewish Stroke & Cerebrovascular Center.

ROBERT BOSTON

Stroke's critical timeline



A crisis within

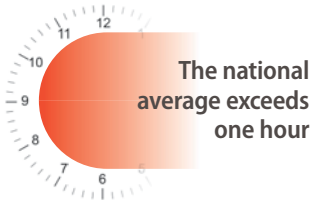
Brain cells need constant nourishment to survive; it's delivered by blood via the arteries. When blood flow is disrupted, myriad cells begin dying, short-circuiting vital functions. Soon, the person may no longer be able to see, speak or function in familiar ways.

Front door to ED door

Seconds count— from the moment of stroke onset, to the arrival of emergency personnel, through transport to a hospital. Expertise, equipment and enhanced protocols make a certified stroke center the destination of choice, even at a

Decreasing door-to-needle times

Washington University physicians at Barnes-Jewish treat 1,600 strokes annually, with four to 10 suspected stroke patients arriving each day. Despite these high volumes, the stroke center has achieved one of the fastest "door-to-needle" averages in the country.



D2N

"Door to needle" (D2N) is the time between the patient's arrival at the hospital and IV administration of the clot-dissolving drug tPA (tissue-plasminogen activator). The drug widely is considered the best course of action in an ischemic stroke, when a clot cuts off blood flow to parts of the brain.

Ideally, the drug should be delivered within 60 minutes of stroke onset, the so-called "golden hour." If tPA is given within three hours of an ischemic stroke, one in three patients will benefit and, within 4.5 hours, one in six patients will benefit.

A patient's maximum deficit, such as paralysis on one side of the body or slurred speech, happens at the time of stroke onset when a brain region is starved for oxygen. If blood is restored quickly, these effects essentially can be undone. The longer it takes to administer treatment, the more likely the patient will suffer permanent consequences.

Nationally, the average D2N time is as high as 80 minutes, according to the American Stroke Association. Today, the D2N median at Barnes-Jewish Hospital is 39 minutes, with many patients receiving tPA in 20 minutes or less. The next goal is to sustain a 30-minute median.

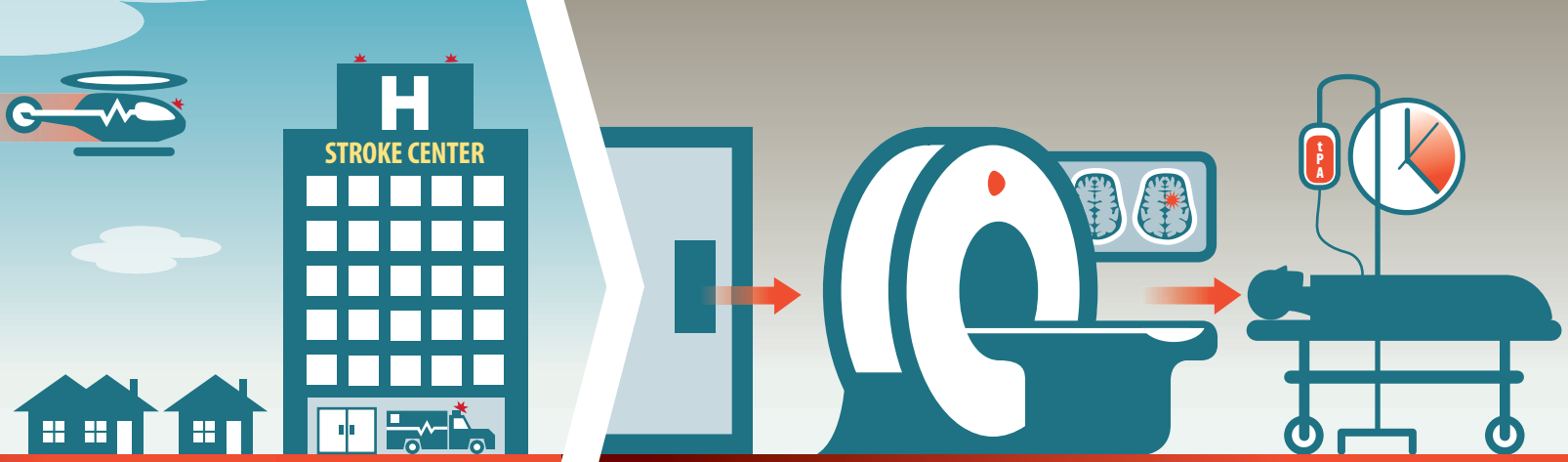
Transforming a complex process

How does a broadscale team — involving emergency medicine physicians, neurologists, neurosurgeons, radiologists, interventional neuroradiologists and dozens of ancillary staff — become that nimble?

In 2010, the median D2N time in the Barnes-Jewish Emergency Department (ED) was 55 to 60 minutes, but the stroke team determined it could do better by applying lean manufacturing principles developed by the Japanese car manufacturer Toyota.

Team members met for two days with lean engineers to examine each of the 50-plus steps leading to tPA administration. Each step — from patient registration and vital signs

TIM MUDROVIC



Door to needle

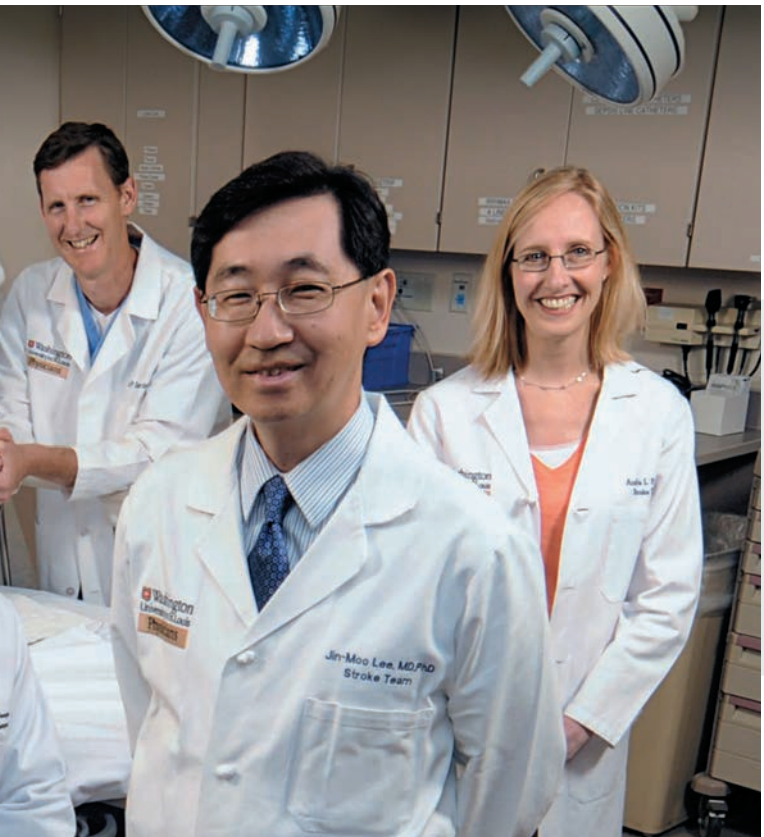
farther distance. However, when patients cannot make the journey, Washington University stroke physicians partner with community hospitals in critical care decisions, using telemedicine (see page 23).

Stroke teams seek to compress the time until treatment begins. Parallel processing — in which team members work simultaneously to perform a variety of tasks — facilitates this race against the clock. Innovative approaches to practical problems help deliver treatment in 30 minutes or less in some cases.

monitoring to labs and imaging — was evaluated from an efficiency perspective. The objective was to reduce bottlenecks, improve teamwork and communication and ensure that those caring for patients have easy access to supplies and equipment.

"We sought suggestions from everyone involved, from the paramedics who bring in patients, to admitting clerks, radiology technologists, nurses and physicians," said Jin-Moo Lee, MD, PhD, senior author of the study that was published in Stroke. Lee is a Washington University neurologist at Barnes-Jewish Hospital and director of the Department of Neurology's cerebrovascular disease section.

The complex treatment process could be streamlined, they decided — even before patients arrive at the hospital.



Activating the stroke team en route

In the past, emergency medical services (EMS) personnel brought the patient to BJH and clinicians there determined whether the person was having a stroke.

Paramedics now alert BJH staff when a potential stroke patient is en route. An immediate page goes out to stroke team members who are ready and waiting when the ambulance or helicopter arrives. EMS partners are well trained and fully entrusted to activate the team. "One thing we've learned is that you have to cast a very wide net," Lee said. "We have a very liberal policy for stroke pager activation. For every eight activations, only one is treated with tPA. It's a lesson to learn: capture as many as you can and consider all potential candidates."

Using clinical scales, EMS workers can determine the severity of a stroke. They also can lower a patient's high blood pressure en route, making tPA treatment a more viable option.

And to help determine time of stroke onset, which is critical when evaluating treatment options, EMS crews will begin a new practice: leaving calling cards with witnesses, encouraging them to contact the stroke team with more details.

Reinventing stroke care

Members of the stroke team and specialty areas: (back row, from left to right) Renee B. Van Stavern, MD, (neurology); David A. Carpenter, MD, (neurology); Gregory J. Zipfel, MD, (neurosurgery and neurology); Colin P. Derdeyn, MD, (neuroradiology, neurology, neurosurgery); and Andria L. Ford, MD, (neurology); and (front row) Peter D. Panagos, MD, (emergency medicine and neurology); and Jin-Moo Lee, MD, PhD, (neurology and radiology).

TEAMWORK

Acute stroke team members converge at the CT scanner upon patient arrival; ED nurses respond with carefully choreographed, pre-planned routines.

COMMUNICATION, ANALYSIS, DECISIONS

Emergency medical transport leader conveys patient information to stroke team physicians; physicians perform rapid neurological tests, assessing lab results and responding with real-time decisions.

DATA & DRUG DELIVERY

Patient is stabilized and ready for a brain scan and its immediate review by physicians. Intravenous drip is in place and ready to administer therapeutic drug.

Orchestrating a precision "parallel response"

Working in concert

Previously, suspected stroke patients first were taken to a trauma bay for history taking, blood draw and neurological exam. From there, they were transported to an ED-dedicated CT scanner to determine whether the stroke was ischemic or hemorrhagic (ruptured artery), before being taken back to the trauma bay for further assessment.

Based on recommendations of the process improvement team, paramedics now sidestep the trauma bay and take the patient directly to the CT scanner for prompt evaluation.

"We can obtain the story, begin the neurological exam, initiate patient registration, complete the brain imaging within minutes — all in the CT scanner room — quickly determining if the patient meets tPA criteria," said Peter D. Panagos, MD, associate professor of emergency medicine and neurology. "Eliminating these extra steps saves 12 to 15 minutes."

Using parallel processing, steps previously performed in sequence are carried out simultaneously with additional staff. Every team member has a role that is not duplicated. Instituting lab tests that could be performed at the bedside reduced time spent waiting for results.

Meanwhile, interventional radiologists are on standby for patients who do not respond to tPA. These patients may benefit from endovascular interventions using tools that can retrieve clots or open arteries in other ways. In the past few years, these devices have shown great improvement, according to Colin P. Derdeyn, MD, professor of radiology and director of the stroke and cerebrovascular center.

Improving patient outcomes

Following months of refinement, 78 percent of patients now are treated within "the golden hour" — up from 52 percent — and team members continue to speed the process.

"This is only one of our lean process success stories," Lee said, "but it nicely demonstrates how lean transformation can improve processes across the spectrum of stroke care."

After the patient is admitted to the hospital, the team puts much of its emphasis on preventing life-threatening complications and determining why the stroke occurred in the first place, taking steps to prevent the high risk of recurrence. For instance, as atrial fibrillation is a common stroke trigger, the patient may be placed on an anticoagulant.

Striving toward personalized care

Remarkably, School of Medicine researchers are beginning to suggest that some of those patients who miss the optimal three-hour treatment window may still have hope. In limited cases, physicians here are, in effect, throwing out the clock.

"Every stroke case is different," Lee said. "Some patients may have just enough blood flow to preserve brain tissue — even after six hours. Other patients might not have viable brain tissue after one hour." Future technologies may provide a more sophisticated determinant.

Lee is leading a study searching for new methods to image and identify salvageable tissue.

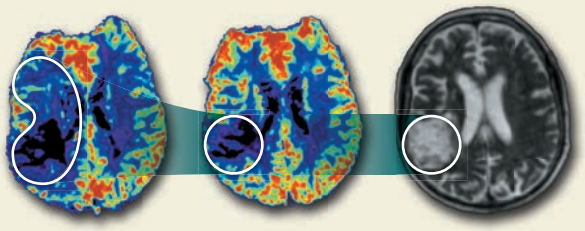
Oxygen metabolism is a good indicator of brain viability. Lee and Andria Ford, MD, assistant professor of neurology, devised a quantitative map of oxygen metabolic index (OMI) viewable on MR scans. As OMI drops, there is a threshold at which brain cells will stop working but may still be alive, and another threshold past which tissue is dead. This initiative is based on the theoretical work of radiology professor Dmitriy Yablonskiy, PhD, and performed in close collaboration with Weili Lin, PhD, and Hongyu An, DSc, at the University of North Carolina-Chapel Hill.

Initial results suggest this six-minute scan accurately highlights brain areas that may survive if successfully reperfused. Knowing this would allow stroke teams to more effectively determine the appropriate course of action — tPA, interventional radiology — or perhaps some treatment that hasn't yet been developed.

"It's all about providing the right care to the right patient at the right time," Lee said.

Seeing ways to save more brain

Advanced MR images indicating oxygen metabolism levels in the brain (red indicates the highest level) show promise for facilitating faster, better-informed and more precise stroke treatment decisions.



Nearly two hours after a stroke

A massive brain region (left) starves for oxygen; restoring blood flow could prevent severe permanent disability.

Six hours and counting

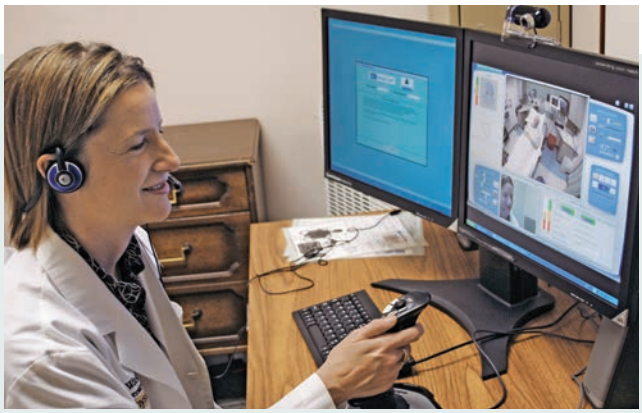
A clot-busting drug therapy successfully restores oxygenated blood to all but the encircled region.

One month afterward

The area of permanent damage corresponds to the high-risk region that was shown by the six-hour metabolism scan.

ROBERT BOSTON

SOME MATERIAL FOR THIS STORY PROVIDED BY ST. LOUIS FREELANCE WRITER JO SEITZER.



Renee B. Van Stavern, MD, above, and Peter Panagos, MD, lead the stroke center's telemedicine network with regional hospitals.

Reaching beyond the hospital

In 2013, Barnes-Jewish became the first comprehensive stroke center in Missouri and among the earliest in the country.

The Joint Commission and the American Heart Association/American Stroke Association established the advanced certification to recognize hospitals that achieve higher standards and meet criteria for resources, staff and training essential to treating the most complex stroke cases. Comprehensive stroke centers provide the full spectrum of care, from diagnosis to specialized rehabilitation. David A. Carpenter, MD, associate professor of neurology, directs Barnes-Jewish Hospital's comprehensive stroke center.

Missouri's Time-Critical Diagnosis statute dictates that, in the same way car crash victims must be taken to trauma centers, stroke patients now must be taken to certified stroke centers, sometimes bypassing closer hospitals. Time lost in transit might be made up with resources and expertise. Washington University faculty members were key in crafting this legislation; several sit on state review boards, traveling to various hospitals to evaluate their processes.

The team shares best practices and, through web-based communications, conducts real-time patient assessments with regional emergency departments, particularly those in rural counties that may have no immediate access to neurologists or other specialty physicians.

100

The stroke center's patients originate from 100 hospitals in 7 states.

Some hospitals are not equipped to administer tPA or make acute-care decisions; others can administer tPA and transfer patients to comprehensive stroke centers. Because of these collaborations, some hospitals previously bypassed by paramedics now are equipped to deliver care for milder strokes, while severe strokes still are best served at comprehensive centers.

"This is about how you can impact remote communities with a collective effort," Lee said. "This major push has made all the difference. Time-critical diagnosis has prompted us to rethink how we handle regional patient flow."

The next stage

ON MARCH 21, graduating medical students at Washington University opened envelopes revealing where they will spend the next years training in their chosen specialty. During Match Day, held annually in March, thousands of fourth-year medical students across the U.S. simultaneously learn their results from the National Resident Matching Program. School of Medicine graduates are highly successful in obtaining competitive training programs. The largest contingent will continue training locally: Twenty-eight at Barnes-Jewish Hospital and two at St. Louis Children's Hospital. The next largest group is headed to Harvard Medical School. Of the class, 31 graduates will train in internal medicine, followed by nine each in pediatrics and general surgery, eight in emergency medicine and seven each in anesthesiology and pathology.

ALABAMA

Birmingham

University of Alabama Medical Center

INTERNAL MEDICINE
Lauren Kelly Shea

ARIZONA

Phoenix

St. Joseph's Hospital/ Barrow Neurological Institute

NEUROLOGICAL SURGERY
Jakub Godzik

CALIFORNIA

Camp Pendleton

Naval Hospital Camp Pendleton

FAMILY MEDICINE
Jennifer Mae Jupitz

Irvine

University of California–Irvine Medical Center

INTERNAL MEDICINE
Miriam Shugufa Nojan

Los Angeles

Harbor–UCLA Medical Center

INTERNAL MEDICINE
Nichelle Megowan

San Diego

Scripps Mercy Hospital

INTERNAL MEDICINE
Nilika Chaudhary

San Francisco

University of California–San Francisco

GENERAL SURGERY
Jhoanne Lynne Bautista

INTERNAL MEDICINE–PRIMARY
Elisabeth Thames Boehme Askin
Elaine Ching-Feng Khoong

OTOLARYNGOLOGY
Philip Laurence Perez

PATHOLOGY
Gregory Richard Bean

Stanford

Stanford University Program

ANESTHESIOLOGY
Francesca Betti

PATHOLOGY
Ansuman Satpathy

COLORADO

Denver

Denver Health Medical Center

EMERGENCY MEDICINE
Robert Jared Klemisch

CONNECTICUT

New Haven

Yale–New Haven Hospital

GENERAL SURGERY
Raymond Alexander Jean

OPHTHALMOLOGY
Jenna May Kim

FLORIDA

Miami

Jackson Memorial Hospital

ANESTHESIOLOGY
Paul Scott McNair

INTERNAL MEDICINE
Nhi Hoai Nguyen

GEORGIA

Atlanta

Emory University School of Medicine

EMERGENCY MEDICINE
Akshay Ganju

PSYCHIATRY
Georgina Elizabeth Hartzell

Morehouse School of Medicine

GENERAL SURGERY–PRELIMINARY
Michael Brandon Williams

ILLINOIS

Chicago

Rush University Medical Center

OPHTHALMOLOGY
Afua Helen Annor

Schwab Rehabilitation Hospital

PHYSICAL MEDICINE AND REHABILITATION
Vovanti Tivoli Jones

University of Chicago Medical Center

INTERNAL MEDICINE
Mary Clare Masters

PEDIATRICS
Leena Vikas Padhye

RADIATION ONCOLOGY
Sandeep Ramesh Bhave

University of Illinois College of Medicine

GENERAL SURGERY
Braden Noah Juengel

LOUISIANA

Shreveport

Louisiana State University Health Sciences Center

OTOLARYNGOLOGY
Zao Yang

MASSACHUSETTS

Boston

Beth Israel Deaconess Medical Center

INTERNAL MEDICINE
Philip Scott Kemp
Lauren Margaret Yang

OBSTETRICS AND GYNECOLOGY
Jennifer Chu

Brigham & Women's Hospital

EMERGENCY MEDICINE
Rittik Chaudhuri

INTERNAL MEDICINE
David Morton Rubins

INTERNAL MEDICINE–PRIMARY
Ryan Everett Anderson

NEUROLOGY
Illya Tolokh

PATHOLOGY
Kristine Shannon Wong

Boston Children's Hospital

PEDIATRICS
Alexandra Hathaway Baker

Harvard Longwood Psychiatry

PSYCHIATRY
Elizabeth Fenstermacher

Massachusetts General Hospital

ANESTHESIOLOGY
Albert Mao

DIAGNOSTIC RADIOLOGY
Ravi Gottumukkala
Gary Xiaoshi Wang

GENERAL SURGERY
Charles Gerard Rickert

INTERNAL MEDICINE–PRIMARY
Christopher Tsung-jer Chen

PATHOLOGY
Athena Lee Chen

PSYCHIATRY
Erin Elizabeth Dowd

Tufts Medical Center

ORTHOPAEDIC SURGERY
Geoffrey Evan Stoker

MARYLAND

Bethesda

National Institute of Mental Health

POSTDOCTORAL FELLOWSHIP
Jonathan David Power

MICHIGAN

Ann Arbor

University of Michigan Hospitals

EMERGENCY MEDICINE
Arun Ganti

PATHOLOGY
Stephanie Lynn Skala

Royal Oak

Beaumont Health System

OBSTETRICS AND GYNECOLOGY
Lauren Elizabeth Perlin

MISSOURI

St. Louis

Barnes-Jewish Hospital

ANESTHESIOLOGY
Jacob Martin Basak
Kyle Glenn Jacobsen
Nisha Jain

DERMATOLOGY
Lu Chen
Rachel Lea Kyllo
May Meishu Zhang

DIAGNOSTIC RADIOLOGY
Marina Igorevna Mityul
Ryan P. Rimer

EMERGENCY MEDICINE
Stephanie Kae Charshafian

GENERAL SURGERY
Linda Xiaobo Jin
Jared Michael McAllister

MD/PhD student Radhika Jagannathan learned she will be going to New York Presbyterian Hospital–Weill Cornell Medical Center. Moments later, she received a surprise marriage proposal from her longtime boyfriend, Tom Wilson.

Competitive Bhangra dancer Ravi Gottumukkala celebrates; he is headed to Massachusetts General Hospital.

ROBERT BOSTON

Jacqueline Chen, left, and Linda Jin are staying in St. Louis: Both will train at Barnes-Jewish Hospital in internal medicine and general surgery, respectively.

INTERNAL MEDICINE
Amit Indra Bery
Jacqueline Wenjia Chen
Raymond Bamvi Fohtung
Catherine Teresa Jordan
Niall Prendergast
Samuel Wayne Reinhardt
Joshua Michael Saef
Michael Edward Tang
Peter Hou Yu Yen
Kevin Zheng Yuan

NEUROLOGY
Osvaldo Jose Laurido-Soto

OBSTETRICS AND GYNECOLOGY
Lucy Liu

ORTHOPAEDIC SURGERY
Melissa Anderson Wright

PSYCHIATRY
Sarah Elizabeth Jeann Donaldson

RADIATION ONCOLOGY
Lauren Elizabeth Henke

UROLOGY
Joseph B. Song

St. Louis Children's Hospital

PEDIATRICS
Stephen Charles Gradwohl II
Hallie Faryn Morris

Washington University School of Medicine

OPHTHALMOLOGY
Cynthia Lee Montana

NEW HAMPSHIRE

Lebanon

Dartmouth-Hitchcock Medical Center

DIAGNOSTIC RADIOLOGY
Ellen Yulin Chang

NEW MEXICO

Albuquerque

University of New Mexico School of Medicine

EMERGENCY MEDICINE
Heather Nicole Orth

PATHOLOGY
Andrew Warren Judd

NEW YORK

New York

Hospital for Special Surgery

ORTHOPAEDIC SURGERY
Jeffrey Gei-Hun Stepan

Icahn School of Medicine/ Mount Sinai

OTOLARYNGOLOGY
Katelyn Andrea Ostendorf

New York Presbyterian Hospital–Columbia

INTERNAL MEDICINE
Nicholas A. Hoerter

New York Presbyterian Hospital–Weill Cornell Medical Center

INTERNAL MEDICINE–RESEARCH
Agata Agnieszka Bielska

NEUROLOGY
Radhika Jagannathan

New York University School of Medicine

GENERAL SURGERY
Charles Robert Hong

INTERNAL MEDICINE
Aram Kim

OHIO

Cincinnati

Cincinnati Children's Hospital

PEDIATRICS
Mahil Rao

Cleveland

Case Western/Metro Health Medical Center

OBSTETRICS AND GYNECOLOGY
Stephanie Rose Thomas

Case Western/University Hospitals

PLASTIC SURGERY
Yuewei Wu-Feinberg

Columbus

Ohio State University Medical Center

EMERGENCY MEDICINE
David Christopher Harris

OREGON

Portland

Oregon Health and Science University

OPHTHALMOLOGY
Iris Lee
Brigid Kathleen Marshall

PENNSYLVANIA

Philadelphia

Hospital of the University of Pennsylvania

FAMILY MEDICINE
Michael J. Scott

GENERAL SURGERY
Victoria Merrill Gershuni

INTERNAL MEDICINE
Allison Jan Steinmetz

NEUROLOGY
Laura Esther Mainardi Villarino

UROLOGY
Marshall Channing Strother

Scheie Eye Institute

OPHTHALMOLOGY
Iga Natalia Wegorzewska

Pittsburgh

University of Pittsburgh Medical Center

ANESTHESIOLOGY
Diana Souza DeAndrade

PATHOLOGY
Thomas Michael Pearce

PEDIATRICS
Michael C. Verre

POSTDOCTORAL POSITION
Jordan John Williams

SOUTH CAROLINA

Charleston

Medical University of South Carolina

PSYCHIATRY
Alton Cleotha Williams III

TENNESSEE

Nashville

Vanderbilt University Medical Center

PEDIATRICS
Andrea Nicole Lambert

TEXAS

Dallas

University of Texas Southwestern Medical School

INTERNAL MEDICINE
Rabia Salman Akhtar
Usman Akhtar

PEDIATRICS
Rachael Celeste Johnston

Houston

Baylor College of Medicine

CHILD NEUROLOGY
Ariel Maia Lyons-Warren

EMERGENCY MEDICINE
Matthew Terrence Humbert

INTERNAL MEDICINE
Sara Xu Chen

San Antonio

University of Texas Health Science Center

OBSTETRICS AND GYNECOLOGY
Brittanie Broersma

UTAH

Salt Lake City

University of Utah Affiliated Hospitals

PEDIATRICS
Sarah Nicole Cilvik

WASHINGTON

Seattle

University of Washington Affiliated Hospitals

INTERNAL MEDICINE–PRIMARY
Phillip Andrew McGuiness

NORWAY

Oslo

University of Oslo

OBSTETRICS AND GYNECOLOGY
Heidi Elisabeth Fjeldstad

classnotes

1940s

James Read, MD 43, HS 44, is retired and living in New Jersey. His hobbies include sketching and drawing classes, swimming and croquet. Read is a member of the health-care committee for the retirement community where he resides. He has been honored for philanthropic initiatives and helping oversee conditions and issues of the retirement community.

1950s

John Denman, MD 52, is retired from active practice, but still spends time in the medical community as a medical school volunteer and as president of a retired physicians' group. He plays clarinet in a local band; other hobbies include tennis and golf. Denman loves spending time with his children and grandchildren.

Paul DeBruine, MD 59, is a retired anesthesiologist and a trustee emeritus of the Elmhurst College Board of Trustees. Elmhurst College, DeBruine's undergraduate institution, awarded him an honorary Doctor of Science at its 142nd commencement exercises in June 2013.

1960s

Lynn Rosenstock, MD 63, is retired, but stays active as a voluntary clinical professor of anesthesiology at Stanford University School of Medicine. She volunteers weekly at a free clinic for the working poor, at her local library and on the board of the local League of Women Voters.

Charles Shaeffer, MD 64, a cardiologist at Eisenhower Medical Center in California, was invited to participate in a White House briefing on behalf of the American Heart Association. With more than three decades of service to the AHA, Shaeffer has made contributions toward tobacco control, obesity prevention and heart disease and stroke research funding. He has been awarded the AHA Gold Heart Award, Volunteer Advocate of the Year Award and the Jefferson Award Certificate.

Gary Ratkin, MD 67, retired from hematology-oncology practice in June 2012 but continues to provide leadership to the Palliative Care Program at Missouri Baptist Medical Center. He also is a volunteer physician and medical director at Casa de Salud, a low-cost primary care clinic serving immigrants in the St. Louis area.

1970s

Patricia Penkoske, MD 74, was presented with Lindenwood University's Alumni Merit Award. She was one of its first graduates to become a physician.

Mark Frisse, MD 78, EMBA 97, is the Accenture Professor of Biomedical Informatics and director of regional informatics for Vanderbilt University. He was elected to the Institute of Medicine in 2013. Frisse focuses on the intersection between health-care informatics, economics, policy and health-care transformation.

1980s

Carol North, MD 83, is serving as president of the North Texas Society of Psychiatric Physicians and will serve as president of the American Psychopathological Association in 2015.

Wilson Compton, MD 86, was appointed deputy director of the National Institute on Drug Abuse, part of the National Institutes of Health. Since 2002, he has served as director of NIDA's Division of Epidemiology, Services and Prevention Research. In 2013, he was one of 10 to receive the Health and Human Services Secretary's Meritorious Service Award.

William Powderly, HS 87, the J. William Campbell Professor of Medicine, was appointed with tenure at Washington University School of Medicine. He also directs the Institute for Public Health.

1990s

David Hunstad, MD 95, was promoted with tenure to associate professor of pediatrics at the School of Medicine.

2000s

Betsy Peterson, MD 02, opened a solo pediatric practice after residency in 2005. Community Pediatrics in Wisconsin now has two locations, three pediatricians, two pediatric nurse practitioners and 12 other staff. She also is involved with the Wisconsin chapter of the American Academy of Pediatrics and was elected to the board of directors in 2012. Peterson reports that the puppy she got during her first year of medical school just turned 15!

Erica Roger, MD 04, HS 08, is a St. Louis dermatologist and was the American Academy of Dermatology's Shade Structure Grant Program recipient in 2013.

In Memory

Joseph Pollock, MD 38, LA 38

Pollock died Saturday, June 22, 2013, in Santa Barbara, Calif., at age 99. After earning a medical degree, Pollock specialized in abdominal surgery, serving as chief of surgery at several hospitals, including Cedars of Lebanon. He taught at the University of Southern California Medical School and served as a deputy coroner. Besides practicing medicine for almost 50 years, Pollock ran Triangle Steel and Supply and founded, along with his wife, Helene, the Music Center of Los Angeles. He was active in the Los Angeles County Museum of Art and the Mark Taper Forum and served as chairman of the Santa Barbara International Film Festival. Through the Joseph and Helene Pollock Foundation, he helped create the Pollock Theater at the University of California, Santa Barbara.

Marian Green, NU 48

Green died Saturday, June 22, 2013, in Columbia, Mo., at age 85. Green was an American Airlines stewardess in the late 1940s before becoming a registered nurse at Barnes Hospital during the 1970s and early 1980s. After retirement, she was an active member of the Kiwi Club and the Kings' Daughters in Columbia.

David Kipnis, MD

Kipnis died Wednesday, Feb. 5, 2014, at 86. He began his career at WUSM in 1955 as a research fellow and later was named director of the Clinical Research Center and Adolphus Busch professor and head of the Department of Medicine. During his tenure, he established critical links between research and patient care, building collaborations among the Department of Medicine and the school's basic science departments. His many achievements include overseeing construction of the Clinical Sciences Research Building and establishing a diabetes and endocrinology center at WUSM. Washington University honored Kipnis with Second Century and Distinguished Service awards. He also received honors from the Association of American Physicians, American Diabetes Association, Endocrine Society, Institute of Medicine, American Academy of Arts and Sciences, National Academy of Sciences and American College of Physicians.

Ervin Lipschitz, MD 49, LA 49

Lipschitz died March 14, 2013. He earned undergraduate and medical degrees from Washington University, completed an internship in internal medicine at Barnes Hospital and served as an assistant resident in medicine at Jewish Hospital. Lipschitz completed a psychiatry residency at The Menninger Clinic in Topeka, Kan. He practiced medicine from 1949-2010. He worked in private practice and as a staff psychiatrist at VA Medical Centers in St. Louis, as a consulting psychiatrist for St. Louis Community College and Maryville University and as director of the psychiatric services section at Washington University Student Health Services. He was on the faculty of Saint Louis University and Washington University.

Robert Paine, HS 49

Paine died Sunday, June 16, 2013. At age 16, he attended Harvard University, earning bachelor's and medical degrees before moving to St. Louis to complete his residency. Paine served in the U.S. Army Air Corps during World War II. Afterward, he received a Rockefeller fellowship in cardiology at the School of Medicine. He served as founder and chief of cardiology for more than 40 years at St. Luke's Hospital, clinical professor of medicine at the School of Medicine, fellow of the American College of Physicians and fellow of the American College of Cardiology.

James Adams, MD 55

Adams died Thursday, May 9, 2013, at the age of 83. After training at the School of Medicine and serving as a U.S. Army captain, Adams taught on the University of Rochester faculty for nearly 51 years. As a professor of surgery, he cared for many patients and trained hundreds of residents and medical students.

Richard A. Lattner, DE 56

Lattner died Saturday, April 20, 2013, at age 83. He practiced dentistry in St. Louis for more than 30 years and taught at Washington University School of Dentistry until his retirement in 1989. Lattner, a commander in the U.S. Naval Reserve, was buried with full military honors at Ft. Jackson National Cemetery in South Carolina.

Robert Christie Wray Jr., MD 63

Wray died Monday, Nov. 18, 2013. After completing medical school, Wray was on the faculty at Washington University, the University of Rochester School of Medicine and the Medical College of Georgia, where he was chief of plastic surgery. Wray served on the American Board of Plastic Surgery, the Western Trauma Association, the Association of Academic Chairmen in Plastic Surgery and the American Association of Plastic Surgeons, holding a number of leadership positions.

David Hussey, MD 64

Hussey died Wednesday, April 17, 2013. After earning a bachelor's degree from Beloit College, he attended Washington University School of Medicine. He completed a residency at the University of Iowa and a fellowship in radiation oncology at the University of Texas M.D. Anderson Hospital and Tumor Institute, where he was a faculty member until 1983. He also taught at the University of Iowa and the University of Texas Health Science Center. Hussey was active in several national organizations, including the American College of Surgeons and the American Board of Radiology.

Isaac Boniuk, HS

Boniuk died Thursday, Aug. 1, 2013. After attending Dalhousie University for undergraduate and medical degrees, Boniuk completed an ophthalmology residency at the University of California, San Francisco, and a retinal fellowship at Barnes Hospital. He served as a captain in the U.S. Army Medical Corps in Okinawa for two years. For 38 years, he practiced at Retinal Consultants in St. Louis, in addition to publishing many articles on clinical ophthalmology research.

Susan Kennedy, MD 72, HS 76

Kennedy died Tuesday, July 9, 2013, at the age of 65. She earned a bachelor's degree from the University of Oklahoma, before attending medical school at Washington University. Kennedy owned and operated several dermatology clinics in Arizona. She was a successful golfer and qualified for the USGA Women's Amateur Golf Tournament in 1964 and 1984.

Robert Burgerman, EN 79, MD 84, HS 85

Burgerman died Friday, July 12, 2013, at age 54. He earned degrees in electrical engineering and medicine from Washington University, completed a neurology residency and EEG fellowship at the University of Maryland, followed by an epilepsy fellowship at the University of Pennsylvania. Burgerman practiced medicine for 21 years in Sacramento, Calif., was founder and medical director of the Sutter Comprehensive Epilepsy Program and medical director of Sutter Neurodiagnostic Laboratories. He was on the medical staff at Mercy General Hospital and UC Davis Medical Center.

Harvey Saligman

Saligman died Friday, Nov. 15, 2013, at age 75. He was a longtime friend of Washington University and served on its Board of Trustees for more than 25 years. During this tenure, Saligman raised and donated millions of dollars for scholarships, new facilities and research at Washington University. In 2009, Saligman and his wife, Linda, established the Harvey and Linda Saligman Multiple Myeloma Research Fund, which, in less than five years, began yielding results, including clinical trials for two new drugs and a large myeloma tissue bank for ongoing research.

Together.

Together, we learn.

Together, we discover.

Together, we create.

Together, we heal.

Together, we innovate.

Together, we lead.

A REPORT FROM THE SCHOOL OF MEDICINE CAMPAIGN CO-CHAIRS

Making progress through *Leading Together: The Campaign for Washington University.*

It is a pleasure to report to you on the success to date of *Leading Together: The Campaign for Washington University*. We are at the midpoint of the campaign and more than halfway to achieving our goal. The response to the campaign reflects a tremendous confidence in the School of Medicine, and it positions us well for the remainder of the campaign. We are grateful for your generosity.

There is no question that every gift matters. Funds directed toward research can be strategically applied to leverage additional funding from other sources. Seed funding for pilot projects that result in proof of concept for scientific ideas can position researchers to obtain substantial funding from government agencies and corporate sponsors. Financial support through endowed professorships, as well as endowed fellowships and scholarships, is critical to retaining and recruiting the most important resource of the School of Medicine: the extraordinary people who lead the field in teaching and research.

Progress toward the campaign goal of $1.1 billion*

$713,911,763

Time elapsed during the 112-month campaign

58 MONTHS

** Totals as of Dec. 31, 2013*

We look forward to the second half of the campaign and to establishing a new record level of support. Please consider participating if you have not done so already, as together, we ensure the future success of the School of Medicine and its myriad efforts to improve human health.

George W. Couch III • David C. Farrell • Gordon W. Philpott, MD

A LETTER FROM THE DEAN OF THE SCHOOL OF MEDICINE

LARRY J. SHAPIRO, MD
Executive Vice Chancellor for Medical Affairs
and Dean, School of Medicine

Washington University School of Medicine has an enviable record of achievement. We excel in each of our areas of endeavor. We have enormous assets in people, facilities and reputation. We have a tradition and a culture that places a high value on excellence in everything that we do. All of this requires significant financial resources beyond those currently available. This campaign and your participation can tip the balance toward achieving even greater success.

Eighteen Nobel Laureates have been associated with Washington University School of Medicine. We are world leaders in genetics and genomics and their application in the development of personalized medicine, specifically with regard to improving outcomes in cancer care and prevention. We have long been leaders in neuroscience and have conducted pioneering research in the area of Alzheimer's disease. We are one of the world's preeminent institutions in the development and application of imaging techniques and annually rank among the top medical schools in the U.S. in the amount of competitively awarded funding that we secure from the National Institutes of Health.

However, today there is a confluence of external and internal factors that require focused attention, strategic planning and action. An aging population in America — and a growing underserved population worldwide — have pushed traditional health-care delivery to a breaking point. We must be prepared to succeed in new models for the delivery of patient care. As well, funding from the National Institutes of Health has declined over the past decade. As a result, important work by our physician-scientists to alleviate suffering and disease is being delayed or deferred. Our response to the challenges that we face today will determine how successful we will be in the future.

The continued support from our alumni and friends has never been more important, and I am confident that together we will continue to flourish, even in a dramatically changing world.

ROBERT BOSTON

Susie and Gordon Philpott, MD, with annual scholarship recipients, left to right: Kelsey Rebehn, Jacob Witt, Taleef Khan, Lucas Dvoracek, Ross Vyhmeister, James VandenBerg and Miles Bichanich.

Supporting a dream

Together,
we learn.

Scholarships allow students to pursue career paths based on passion, not on income.

Meeting the growing need for scholarships is an important challenge for the future and is a priority of the *Leading Together* campaign.

Gordon W. Philpott, MD '61, emeritus professor of surgery, is co-chairing the School of Medicine's scholarship initiative committee. This initiative has secured nearly $22 million in endowed support toward a campaign goal of $40 million for endowed student support. Moreover, very significant annual funds for scholarships have been received.

Gordon and his wife, Susie, have supported their own annual and endowed scholarships. As Gordon explains, "We made a decision to add to the endowed scholarship started by my mother. In addition, my sister, Ann Augustin, and I wanted to make it a major scholarship to provide full support for a student."

Tom Shane, MD '06, was the first recipient of the Philpott Family Scholarship, and Kavitha Rajeswari Sivaraman, MD '10, was the second. Fourth-year student Marshall Strother now holds the scholarship. "We get to know the endowed scholarship students over a period of years, have dinner with them and meet their friends," Gordon said. "They even have invited us to their weddings, so they really become part of the family."

"It is fun to get to meet the new annual scholarship students each year and it keeps us in touch with the school," Susie added.

Scholarship support reduces debt upon graduation and has an immediate impact on students' lives. According to the Association of American Medical Colleges, medical students graduating in 2013 had an average of nearly $170,000 of education debt. The average indebtedness of Washington University School of Medicine Class of 2013 graduates was just under $100,000 — more than 40 percent less than the national average.

Scholarships also are key to allowing future generations of students to pursue career paths based on passion, not on potential income.

"When applying to medical schools, I braced myself for the possibility that I would be forced to choose between a school I wanted to attend and a school I could afford to attend," said second-year student Ross Vyhmeister. "Scholarship funds made it possible for me to have the best of both worlds, enabling me to attend my first-choice school without excessive debt. I am grateful to be part of such a supportive community and look forward to the day when I can donate to a scholarship fund."

ROBERT BOSTON

John Morris, MD, and others at the Charles F. Knight Alzheimer's Disease Research Center, are looking at treatment methods that may help prevent the disease. He and Randall Bateman, MD, have enlisted volunteers worldwide to participate in a trial.

Effective treatments

Up until now drug trials to treat Alzheimer's disease after dementia onset have been ineffective; such discouraging results are not new to the long-fought Alzheimer's disease field. However, at Washington University School of Medicine, a recently launched drug trial — in those who do not yet have outward symptoms — may offer the possibility of success.

Together, we discover.

Recently launched drug trials — in those who do not have outward symptoms of Alzheimer's —may offer the chance of success.

Ten years ago, Olga Mohan, a California pediatrician in the prime of her career, found difficulty expressing her thoughts in words and was diagnosed with Alzheimer's in her early 50s. "It is a horrible disease," said her husband, Fred Simmons. "We want others who experience it through their family to have the best chance to avoid it."

In learning about John C. Morris, MD, and his leading-edge Alzheimer's research, the couple decided to make a gift. Morris, the Harvey A. and Dorismae Hacker Friedman Distinguished Professor in Neurology, directs the university's Charles F. Knight Alzheimer's Disease Research Center.

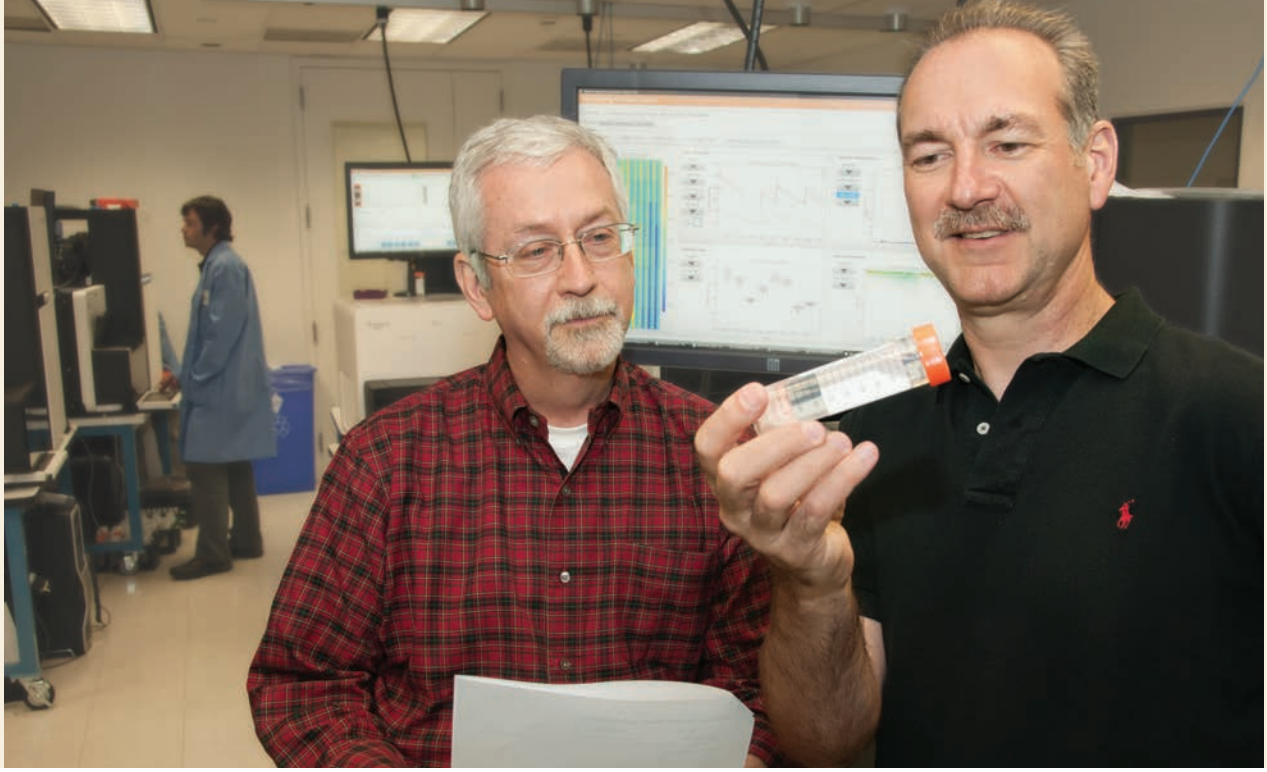
"I believe John Morris is of the highest integrity and intelligence," Simmons said. "I learned exactly what John was doing, research-wise, and realized that it could have far-reaching implications."

Olga Mohan, MD, and Fred Simmons

Through generous support provided by Olga Mohan, Fred Simmons and many others, new approaches are being pioneered at Washington University. Morris and colleague Randall J. Bateman, MD, the Charles F. and Joanne Knight Distinguished Professor of Neurology, have enlisted volunteers worldwide who have a rare, inherited form of Alzheimer's disease that strikes much earlier in life.

As a result, the new study, called the Dominantly Inherited Alzheimer's Network Trials Unit (DIAN-TU), is focused on testing drugs that may provide a therapeutic benefit at the disease's earliest stages before symptoms begin. Prevention, the research suggests, has a better chance of succeeding than treatment after cognitive impairment.

"If the study demonstrates efficacy, it will provide much needed hope that one day truly effective therapies for Alzheimer's will be available," Morris said.



ROBERT BOSTON

Timothy Ley, MD, left, and Richard Wilson, PhD, and their Washington University colleagues have identified virtually all of the major mutations driving acute myeloid leukemia.

Continuing the vision

When Joel Siner, MD '53, names his heroes, it is a "Who's Who" of School of Medicine educators and visionaries: Barry Wood Jr., Carl V. Moore, Neal S. Bricker, Oliver Lowry, Tom Hunter and many others. These are the individuals who inspired him as a student and taught him what it means to be a physician and a scientist.

He continues to find inspiration and take pride in the physicians and researchers at Washington University, including when he recently read a New England Journal of Medicine article outlining a landmark study on the acute myeloid leukemia (AML) genome. Written by members of the university's Cancer Genome Atlas Research Network — including leaders from The Genome Institute — the article prompted Siner to make a significant gift to the institute for cancer genomic research.

Together, we heal.

"We are at a crossroads in cancer genomics." — Timothy Ley, MD

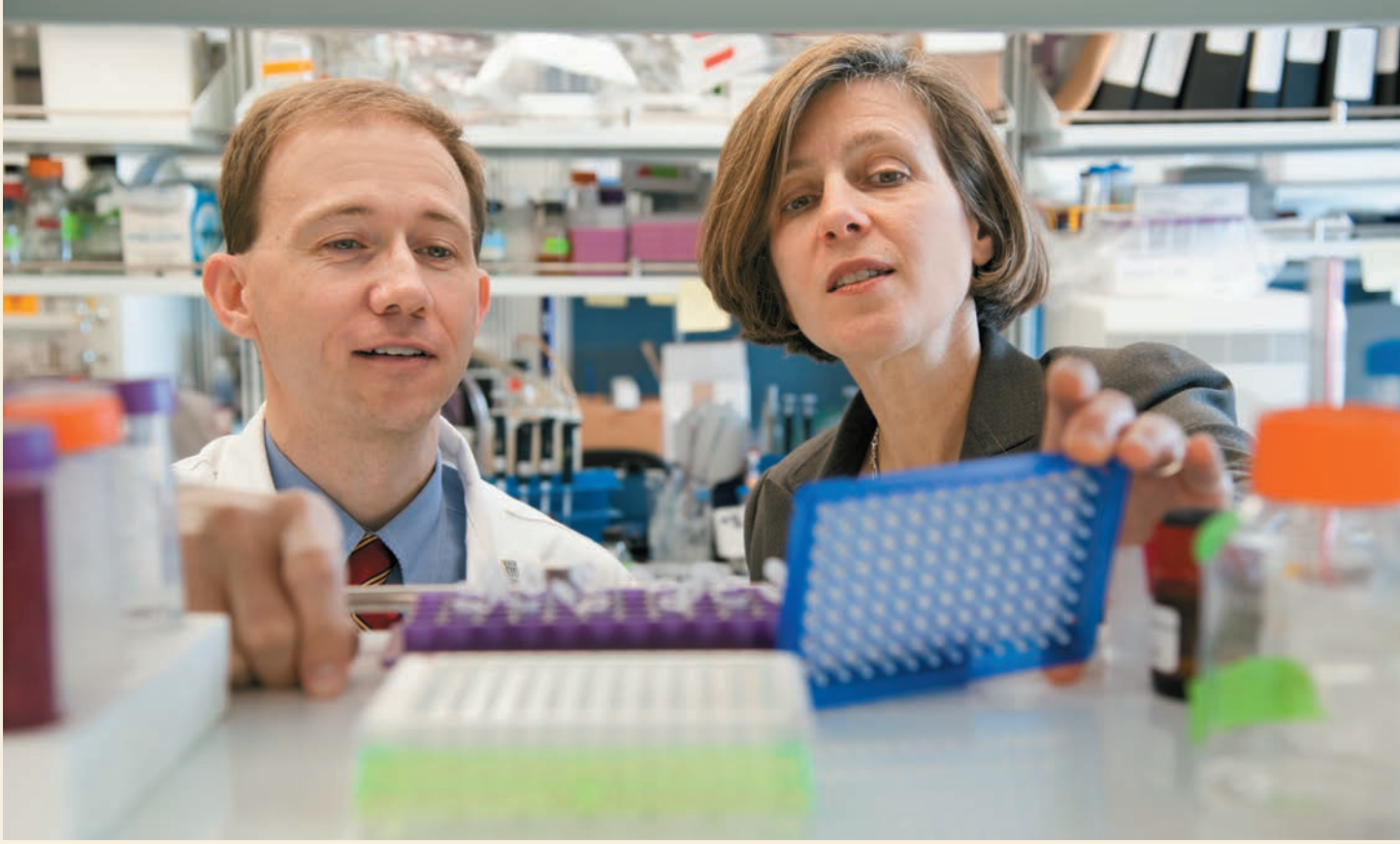
"We will use the gift to support our new effort to sequence every new AML patient who comes to the Siteman Cancer Center," explained study co-author and institute director Richard K. Wilson, PhD, the Alan A. and Edith L. Wolff Distinguished Professor of Medicine.

Joel Siner, MD

Lead author Timothy J. Ley, MD, the Lewis T. and Rosalind B. Apple Professor of Oncology and professor of medicine and of genetics, adds, "We are at a crossroads in cancer genomics. Although much of the work has been done to identify the key mutations that cause many types of cancer, the next daunting step is how to get this information into the clinic to help patients.

"The early work will have to be supported by visionary gifts like the one provided by Dr. Siner, since the major funding agencies need initial proof that the idea works before they will support the clinical application of genomics."

As an internist, Siner was on the staff of Mount Auburn Hospital, the regional teaching hospital of Harvard Medical School. He also served as the hospital's president and as a member of its board of Trustees from 1982-87. From 1996-2009, he served as a member of the internal review board at Harvard University. Retired from private practice since May 2000, Siner now lives in Cambridge, Mass., with his wife, Elinor, a retired psychiatrist.



As a postdoctoral fellow, Chris Holley, MD, PhD, left, worked alongside Jean Schaffer, MD, the Virginia Minnich Distinguished Professor of Medicine. Holley now is an instructor of medicine.

Enhance the career *of a budding medical scientist by establishing an endowed or annual fellowship. Your fellowship support can benefit medical scientists in the Medical Scientist Training Program, the Division of Biology and Biomedical Sciences and in academic departments. Endowed or annual fellowships may be named in honor of the donor, a friend, family member or mentor, or in memory of a loved one.*

The Shawn Hu and Angela Zeng Fellowships support three students for one year. The fellows will conduct research in the Division of Laboratory and Genomic Medicine. From left: Angela Zeng, PhD, with the fellowship recipients — Stephen Ferris, Lulu Sun, Benjamin Solomon — and Barry Sleckman, MD, PhD, the Conan Professor of Laboratory and Genomic Medicine and division director.

Andy Chan with John and Andrea Atkinson

ALAN RITTER

Ron and Hanna Evens

Philip and Sima K. Needleman

Fellowship support

Fellows from the School of Medicine have outperformed and exceeded expectations in their respective fields, leaving an impressive record of success. Fellowship support has helped many of these outstanding graduate students achieve their goals and aspirations.

Fellowship programs rely largely on government support, which has declined significantly. As a result, the door is open for private philanthropy to have a major impact.

Those who support fellowship programs help to advance science and make the Washington University experience affordable for bright students with limited means. Fellowships also are an opportunity to pay tribute to mentors or loved ones.

ROBERT BOSTON

Honoring a mentor Campaign committee member Andrew Chee-Yuen Chan, GM '86, MD '86, HS '89, and his wife Mary Finnorn Chan, HS '89, established the John P. Atkinson Fellowship to honor his mentor. Through the years, Atkinson, MD, the Samuel B. Grant Professor of Clinical Medicine and chief of the Division of Rheumatology, has helped launch the careers of many physician-scientists.

This fellowship, which also has been supported by others, will be used to recruit the very best pre-doctoral students to train in human immunology — the focus of Atkinson's long and remarkable research career.

"The institution, and most importantly, the people at the institution have had very positive impacts on my life and career. I would encourage others to reflect on the impact this institution has made in their life, and to think about what they can do to impact future trainees here," said Andrew Chan.

RAY MARKLIN

Advancing basic science Philip Needleman, GR '99, emeritus trustee of Washington University and campaign committee member, and his wife, Sima, MSW '74, have established two annual fellowships.

"We want to attract the most vibrant and promising pre-doctoral students. To do this, financial support is needed more than ever," said Philip Needleman, also former professor and head of the Department of Pharmacology.

The Philip and Sima K. Needleman Graduate Fellowships in Regenerative Medicine are under the direction of Lila Solnica-Krezel, PhD, chair of the Department of Developmental Biology (formerly the Department of Pharmacology).

"Regenerative medicine is a rapidly progressing discipline that develops treatments for a wide range of debilitating human diseases," said Solnica-Krezel. "The Philip and Sima K. Needleman Graduate Fellowships will help to attract the brightest talent into the Developmental, Regenerative & Stem Cell Biology Program and advance regenerative medicine research at Washington University. With these fellowships, I am also particularly excited about continuing the tradition of scientific excellence established during Dr. Needleman's tenure as the department chair."

Helping the next generation Research scholarships made it possible for Shawn Hu, MD, and his wife, Angela Zeng, PhD, MBA '05, to come to the U.S. and pursue careers. The couple wants to help others by creating medical research opportunities.

The Shawn Hu and Angela Zeng Fellowships will support three students for one year, helping to restore critical training needs.

"Although our graduate program support grant from the National Institutes of Health received the highest possible score, we still lost three training slots because of general government budget cuts," explained Barry Sleckman, MD, PhD, the Conan Professor of Laboratory and Genomic Medicine and chief of the division.

"We are very excited to see our donation make a positive impact on people to whom we can relate from our own experience a couple of decades ago," said Shawn Hu. "We have made a long-term commitment to contribute to the future success of the medical school."

Together, we lead.

"I would encourage others to reflect on the impact this institution has made in their life ... ."
— ANDREW CHAN

Showing gratitude The Ron and Hanna Evens Fellowship supports a postdoctoral fellowship in the Mallinckrodt Institute of Radiology (MIR).

"Hanna and I want to give back in appreciation for all that the School of Medicine, MIR and the entire Medical Campus has meant to us. Fellowships are fundamental to academic pursuit," said Ronald G. Evens, MD '64, formerly president of Barnes-Jewish Hospital and the Elizabeth Mallinckrodt Professor, head of the Department of Radiology and director of the Mallinckrodt Institute of Radiology.

"Endowments that are for younger, up-and-coming professionals are especially worthwhile to Washington University and our constant drive to offer the very best care and education."

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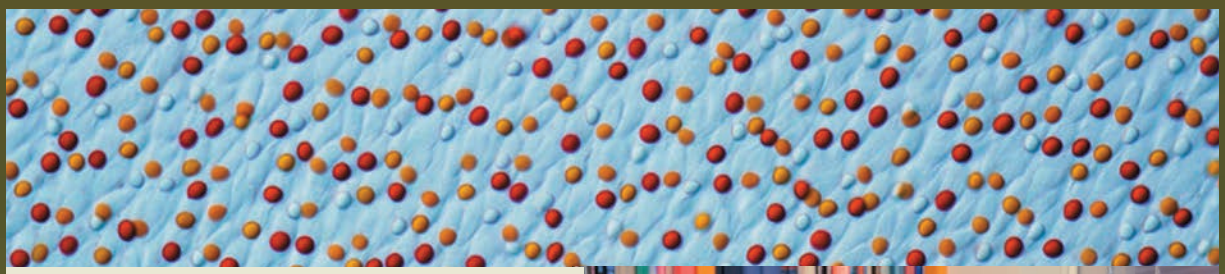

A world seldom seen

The visual systems of birds and reptiles are among the most sophisticated of any vertebrate. Turtles' eyes, for example, contain oil droplets (above), which act like tiny lenses that help to distinguish colors. Joseph Corbo, MD, PhD, associate professor of pathology and immunology, took this microscopic image of a painted turtle's retina — magnified 400 times — and captured second prize in the 2013 Nikon Small World Photomicroscopy Contest. Using a technique called differential interference contrast microscopy, he reveals the light-sensitive cells of the eye called photoreceptors that contain these colorful droplets.

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Second-year MD/PhD student Kelly Hill captured this poetic winter scene along her running path in Forest Park. Washington University Medical Center is just visible above the trees in this photo titled "Our Backyard."