

# Outlook

AUTUMN 2018



Washington  
University in St. Louis

SCHOOL OF MEDICINE

Elevating  
performance



Atop the Karakoram Mountains, neurologist Marcus Raichle, MD, (center) displays a Mallinckrodt Institute of Radiology banner he created. In 1987, he and other members of a British expedition climbed 18,000 feet above sea level — and then injected radioactive xenon to see how it diffused through their brains. Raichle, 81, has been a central force for decades in the history and science of brain imaging. See page 7.



MATT MILLER

**COVER** Scott Brandon, who sustained a spinal cord injury 16 years ago, said he is grateful to the Program in Occupational Therapy for helping him build physical and mental strength. “There is life beyond the wheelchair,” said Brandon, who works in guest services for the St. Louis Cardinals and tries to set a positive example for new wheelchair users. See page 21.

## FEATURES

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Pioneering neurologist Marcus Raichle, MD, opened up the human brain to scientific investigation.

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The Washington University Transgender Center helps families navigate the complex world of gender identity.

### 21 Building independence

For 100 years, the Program in Occupational Therapy has helped people engage mind and body.

# Outlook

Washington University School of Medicine

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COURTESY OF MARCIUS BRANCHE



Karen Stokes (left) with her young daughter, who later would come out as a transgender male. See page 14.

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MATT MILLER

**David H. Perlmutter, MD, internationally recognized for his research on alpha-1 antitrypsin deficiency, is the inaugural holder of the George and Carol Bauer Deanship. See page 28.**

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# Detecting Alzheimer's in eye exams?



Gregory Van Stavern, MD, (seated) and Rajendra Apte, MD, PhD, examine Kathleen Eisterhold's eyes, using technology that one day may make it possible to screen patients for Alzheimer's disease during an eye exam.

## Noninvasive test may one day screen for disease before symptoms appear

**U**sing technology similar to what is found in many eye doctors' offices, School of Medicine researchers have detected evidence suggesting damage from Alzheimer's disease in asymptomatic older patients.

Their study, involving 30 patients, is published Aug. 23 in the journal *JAMA Ophthalmology*.

Significant brain damage from Alzheimer's disease can occur years before symptoms appear. Physicians use PET scans and lumbar punctures to help diagnose Alzheimer's, but they are expensive and invasive.

"This technique has great potential to become a screening tool that helps decide who should undergo more expensive and invasive testing for Alzheimer's disease prior to the appearance of clinical symptoms,"

said co-principal investigator Gregory P. Van Stavern, MD, a professor of ophthalmology and visual sciences. "In patients whose PET scans and cerebrospinal fluid showed preclinical Alzheimer's, the area at the center of the retina without blood vessels was significantly larger, suggesting less blood flow."

In previous studies, researchers examining the eyes of people who had died from Alzheimer's reported thinning in the center of the retina and degradation of the optic nerve.

In the new study, the researchers used a noninvasive technique commonly available in ophthalmologists' offices — called optical coherence tomography — to examine the retinas of asymptomatic participants. The researchers added an angiography component to distinguish red blood cells from other retinal tissue.

The participants, with an average age in the mid 70s, are patients in The Memory and Aging Project at the Knight Alzheimer's Disease Research Center. About half had elevated levels of the Alzheimer's proteins amyloid or tau as revealed by PET scans or cerebrospinal fluid, suggesting they likely would develop Alzheimer's. In the other subjects, PET scans and cerebrospinal fluid analyses were normal.

"In patients with elevated amyloid or tau, we detected significant thinning in the center of the retina," said co-principal investigator Rajendra S. Apte, MD, PhD, the Paul A. Cibis Distinguished Professor of Ophthalmology and Visual Sciences. "The retina and central nervous system are so interconnected that it's possible changes in the brain could be reflected in cells in the retina."

# Inducing labor at 39 weeks reduces C-sections

Inducing labor in healthy first-time mothers in the 39th week of pregnancy results in lower rates of cesarean sections compared with waiting for labor to begin naturally at full term, according to a multicenter study funded by the National Institutes of Health (NIH).

Additionally, infants born to women induced at 39 weeks did not experience more stillbirths, newborn deaths or other major health complications.

“This study is a potential game changer and will have a significant impact on the practice of obstetrics,” said senior author George Macones, MD, head of the Department of Obstetrics and Gynecology. The study was conducted



GETTY IMAGES

through the Maternal-Fetal Medicine Units Network, which is supported by the NIH’s Eunice Kennedy Shriver National Institute of Child Health and Human Development. Macones chairs the network.

“The concern has been that inducing labor — even at 39 weeks —

would increase the cesarean section rate and health problems in newborns,” said Macones, the Mitchell and Elaine Yanow Professor. “We found inductions at 39 weeks lowered, not raised, the number of deliveries by cesarean section.”

The findings were published Aug. 9 in *The New England Journal of Medicine*.

Delivering by cesarean section generally is considered safe for mother and baby. However, the procedure involves major surgery and, therefore, poses increased complication risks and longer recovery times for mothers compared with women who deliver vaginally.

Previous studies have shown that inducing labor without medical reason before pregnancies are full-term at 39 weeks poses health risks for newborns, primarily because the lungs, brain and other organs haven’t fully developed. But inductions at 39 weeks — one week before a woman’s due date — has become more common in recent years, and the researchers wanted a better understanding of the risks and benefits to mother and baby.

The study enrolled about 6,100 healthy, first-time mothers-to-be at 41 hospitals belonging to the Maternal-Fetal Medicine Units Network.



BK HEALTHCARE

**SERVICE EXPANSION** Siteman Cancer Center, based at Barnes-Jewish Hospital and Washington University School of Medicine, began construction in north St. Louis County on its newest outpatient facility. Completion of the \$26.3 million project on Christian Hospital’s Northwest HealthCare campus in Florissant, Missouri, is planned for December 2019. The facility will feature state-of-the-art technology, including a new linear accelerator to deliver radiation therapy, and an inviting, patient-centered design, with a cozy fireplace and healing garden.

## New leader for diversity and inclusion

Sherree Wilson, PhD, a highly regarded administrator at the University of Iowa (UI) Carver College of Medicine, has been named associate vice chancellor and associate dean for diversity and inclusion at the School of Medicine, effective Oct. 1.

Wilson will join senior leaders in bringing direction to diversity, equity and inclusion initiatives. She also will identify best practices among medical school peers, outside industries and other sources.

In her role at the Carver College of Medicine, Wilson developed and implemented a strategic diversity plan, which led to a 24 percent increase among faculty in school-identified diversity categories and incorporation of implicit bias training. Additionally, she co-led a National Institutes of Health (NIH)-funded program offering intensive instruction and research experience to underrepresented individuals with bachelor’s degrees, enhancing their qualifications for top-tier biomedical sciences graduate programs.

Wilson also developed a training plan geared toward medical professionals, helping them provide care that is responsive to patients from varying backgrounds. The plan was a factor in *Forbes* magazine naming UI Health Care as the No. 1 employer for diversity in the health-care industry in 2018.



SUSAN MCCLELLAN/UNIVERSITY OF IOWA HEALTH CARE



**PRESERVING HISTORY** Buildings that once housed St. Louis' first Shriners Hospital for Children and the old Central Institute for the Deaf opened Aug. 1 as the newly renovated Core Apartment Residences. The buildings, at the corner of Euclid and Clayton avenues, contain 160 studio, one- and two-bedroom apartments. The project is part of a master campus plan integrating education, housing, pedestrian paths and common spaces for students. The apartments, which replace Olin Residence Hall, feature a library, courtyards, a fitness room and music and study spaces, among other amenities.

## Martin succeeds Chancellor Wrighton



Andrew D. Martin

Andrew D. Martin, dean of the College of Literature, Science, and the Arts at the University of Michigan, has been appointed Washington University chancellor, effective June 1, 2019.

He will succeed Mark S. Wrighton, who has served as chancellor since 1995 and announced last year his intention to conclude his term in 2019.

"After a comprehensive global search that produced a slate of highly qualified final candidates, I can say with confidence that we have found the ideal person to pick up the mantle of leadership at Washington University," said Craig D. Schnuck, chair of the university's Board of Trustees and chairman emeritus of Schnuck Markets Inc. Schnuck also chaired the 20-member chancellor search committee.

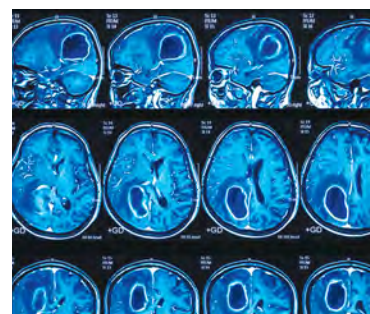
Martin, 45, earned a doctorate in political science from Washington University in 1998, and was a member of the university's faculty for 14 years, serving as the Charles Nagel Chair of Constitutional Law and Political Science, as founding director of the Center for Empirical Research in the Law, as chair of the Department of Political Science in Arts & Sciences and as vice dean in the School of Law.

# Brain cancer vaccine effective in some cases

Most people with the brain cancer glioblastoma die less than 18 months after diagnosis. But a multicenter clinical trial of a personalized vaccine that targets the aggressive cancer has indicated improved survival rates for such patients.

The vaccine, specific to each patient, was engineered by taking a small amount of the patient's tumor tissue and exposing it to his or her immune cells. The study appeared May 29 in the *Journal of Translational Medicine*.

The phase III clinical trial included 331 patients at over 80 sites in four countries. Among the trial participants was Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine, which recruited



MRI scans show a patient with a brain tumor.

one of the largest groups of patients. The patients were randomized to receive standard therapy plus the personalized vaccine, called DCVax-L, or standard therapy plus a placebo.

According to the trial design, the vaccine group had twice the number of patients as the placebo group. Further, any patient in the trial was allowed to receive the vaccine if cancer recurred or progressed after initial treatment. As such, almost 90 percent of all participants received the vaccine.

All 331 patients in the trial (including those who did and did not receive the vaccine) had a median survival of just over 23 months. One-hundred patients had an average overall survival of 40.5 months — more than three years — and were designated as "extended survivors."

Investigators are particularly interested in the latter group's response to the vaccine, though they don't yet know whether everyone in this group received the vaccine since the trial is ongoing and remains blinded. But since the researchers reported that almost 90 percent of all participants received the vaccine at some point, the chances that the extended survivors are getting the vaccine, rather than placebo, are high.

"The surprising part was that the 100 'extended survivors' don't appear to have the usual characteristics associated with a good prognosis. We are continuing to study these patients to understand why they have done so well," said oncologist Jian L. Campian, MD, PhD, one of the study's authors.

Vaccine maker Northwest Biotherapeutics Inc. funded the trial.

# ALS therapy in clinical trials

About 20,000 people in the U.S. are living with amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's disease. The invariably fatal disease kills the nerve cells that control walking, eating and breathing. Few people survive more than three years after diagnosis. Treatment only modestly slows the course of the disease.

New research led by the School of Medicine indicates an investigational therapy for an inherited form of ALS extends survival and reverses signs of neuromuscular damage in mice and rats. The findings, published July 16 in *The Journal of Clinical Investigation*, have led to a phase I/II clinical trial to investigate whether the drug could benefit people with ALS whose disease is caused by mutations in a gene called SOD1.

"This drug had an impressive effect in mice and rats with just one or two doses," said

Timothy Miller, MD, PhD, the David Clayton Professor of Neurology. "We don't know yet if this works in people, but we're very hopeful. We've completed the first phase of safety testing, and now we're working on finding the right dose."

About 10 percent of ALS cases are inherited. Of those, about a fifth are caused by mutations in SOD1. Such mutations cause the SOD1 protein to be overly active, which suggests that reducing protein levels might help ALS patients with SOD1 mutations.

Collaborating with Ionis Pharmaceuticals, Miller and colleagues tested two DNA-based compounds — known as antisense oligonucleotides, or oligos — that block the body from making SOD1 protein.



Robert Bucelli, MD, PhD, measures Gregory Easter's neuromuscular function. Easter is taking part in a clinical trial to evaluate an experimental drug.

Miller's colleague at the School of Medicine, Robert Bucelli, MD, PhD, an associate professor of neurology, leads a phase I/II clinical trial based on Miller's research. More information about the trial (number NCT02623699) can be found at [clinicaltrials.gov](http://clinicaltrials.gov).

# Milestone: Identifying cancers' genetic roots

Researchers nationwide have reached a major milestone in describing the genetic landscape of cancer. Scientists at the School of Medicine and other institutions have completed the genetic sequencing and analyses of more than 11,000 tumors from patients, spanning 33 types of cancer — all part of The Cancer Genome Atlas (TCGA) project, funded by the National Cancer Institute and National Human Genome Research Institute, both of the National Institutes of Health (NIH).

Altogether, the researchers identified about 300 genes that drive tumor growth. And, remarkably, just over half of all tumors analyzed carry genetic mutations that could be targeted by therapies already approved for use in patients.

TCGA was launched in 2005 to pursue the genetic basis of cancer. The results appear in a series of studies published in *Cell Press* journals.

"For the 10,000 tumors we analyzed, we now know — in detail — the inherited mutations driving cancer and the genetic errors that accumulate as people age, increasing the risk of cancer," said leading TCGA scientist Li Ding, PhD, an associate professor of medicine and

Li Ding, PhD, led a team that analyzed DNA from more than 11,000 tumors across 33 cancer types. The project is part of The Cancer Genome Atlas, a national program aimed at understanding the genetic roots of cancer.

director of computational biology in the Division of Oncology.

Genomic studies over the past decade have demonstrated that cancer is a disease of errors in genes rather than particular organs. Ding said the new analyses have revealed that the genetic errors of cancer result in specific molecular signatures that could guide treatment.

"Rather than the organ of origin, we can now use molecular features to identify the cancer's cell of origin," Ding said. "We are looking at what genes are turned on in the tumor, and that brings us to a particular cell type. For example, squamous cell cancers can arise in the lung, bladder, cervix and some tumors of the head and neck. We traditionally have treated cancers in these areas as completely different diseases. But studying their molecular features, we now know such cancers are closely related. Cancers originating in, for example, epithelial cells that line various organs are similarly closely related, regardless of their location."

Ding said she is particularly excited about the prospect of using these analyses to re-examine data from past clinical trials.





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## Air pollution poses global diabetes risk

New research links outdoor air pollution to an increased risk of diabetes globally, according to a study from the School of Medicine and the Veterans Affairs (VA) St. Louis Health Care System.

“We found an increased risk, even at low levels of air pollution currently considered safe by the U.S. Environmental Protection Agency and the World Health Organization,” said Ziyad Al-Aly, MD, the study’s senior author and an assistant professor of medicine. “This is important because many industry lobbying groups argue that current levels are too stringent and should be relaxed.”

The findings were published June 29 in *The Lancet Planetary Health*.

To evaluate outdoor air pollution, the researchers looked at particulate matter, airborne microscopic pieces of dust, dirt, smoke, soot and liquid droplets. Previous studies have found that such particles can enter the lungs and invade the bloodstream, contributing to major health conditions such as heart disease, stroke, cancer and kidney disease. In diabetes, pollution is thought to reduce insulin production and trigger inflammation, preventing the body from converting blood glucose into energy that the body needs to maintain health.

The researchers estimate that pollution contributed to 3.2 million new diabetes cases globally in 2016, representing about 14 percent of all new diabetes cases globally that year. They also estimated that 8.2 million years of healthy life were lost in 2016 due to pollution-linked diabetes.

In October 2017, *The Lancet Commission on pollution and health* published a report outlining knowledge gaps on pollution’s harmful health effects. “The team in St. Louis is doing important research to firm up links between pollution and health conditions such as diabetes,” said commission member Philip J. Landrigan, MD, dean for global health at Mount Sinai School of Medicine in New York. “I believe their research will have a significant global impact.”

## Study: Can fasting improve MS symptoms?

People with multiple sclerosis (MS) can find an abundance of conflicting advice suggesting that special diets — everything from avoiding processed foods to going low-carb — will ease their symptoms. But the evidence is scanty that dietary changes can improve fatigue or other MS symptoms.

That’s why Laura Piccio, MD, an associate professor of neurology, is putting one dietary intervention to the test. She has launched a trial to evaluate whether drastically cutting calories twice a week can change the body’s immune environment and the gut microbiome,



TIM PARKER

Laura Piccio, MD, talks with DeAnna Clark during a checkup. Clark, who has MS, is participating in a study led by Piccio to evaluate whether partial fasting can benefit people with MS.

and potentially change the course of the disease. The study is rooted in her own research that shows that fasting can reduce MS-like symptoms in mice.

MS is a betrayal: A person’s own immune system turns against his or her nervous system. Signs and symptoms vary greatly but can include fatigue, numbness or weakness in the limbs, dizziness, vision problems, tingling and pain. Patients with relapsing-remitting MS — the most common form — can be stable for months or years between bouts of illness.

Piccio and colleagues are recruiting 40 to 60 patients with relapsing-remitting MS for a 12-week study. Half will stay on their usual Western-style diet seven days a week, while the other half will maintain such a diet five days a week but limit themselves to 500 calories of vegetables the remaining two days.

The trial is based on findings from a mouse study Piccio and Yanjiao Zhou, MD, PhD — an assistant professor at the University of Connecticut who studies microbiome-based therapeutics — published in June in the journal *Cell Metabolism*. The study showed that intermittent fasting reduces MS-like symptoms.

A pilot study with 16 people limiting their calories every other day for two weeks found immune and microbiome changes that echo the ones seen in mice. To learn more about the study, email [picciol@wustl.edu](mailto:picciol@wustl.edu), [vtosti@wustl.edu](mailto:vtosti@wustl.edu) or [dulac@wustl.edu](mailto:dulac@wustl.edu).



Neurologist Marcus Raichle, MD, and other members of a British scientific expedition ascend the Karakoram Mountains in 1987.

# Mysteries explored

**Opening up the human brain to scientific investigation**

BY TAMARA BHANDARI

In a 1987 expedition, neurologist Marcus Raichle, MD, climbed 18,000 feet above sea level, scaling the icy Karakoram Mountains of Pakistan. There, amidst heavy snow and high winds, Raichle and 18 researchers injected themselves with radioactive xenon.

A crude scanner measured the gas as it diffused through their bodies, accurately recording blood flow in the mountaineers' brains. Their objective was to better understand acute mountain sickness, a syndrome affecting climbers that causes headaches, vomiting, cerebral and pulmonary edema and, occasionally, death.

The British expeditionists' earlier treks already had linked the syndrome to the brain's uptake of oxygen. On this journey, they invited Raichle, an experienced mountaineer and physician highly regarded for his expertise in mapping brain blood flow.

**T**hirty years later, Raichle is still unraveling clues to the brain by studying its blood flow and oxygen use. This blood flow — laden with oxygen and nutrients — fuels the brain, with the busiest areas burning through fuel the fastest.

Raichle, now 81, the Edith L. Wolff Distinguished Professor of medicine and a professor of radiology, neurology, neurobiology and biomedical engineering, is a central figure in the history and science of brain imaging. He is noted for developing positron emission tomography (PET) techniques, explaining principles underlying functional magnetic resonance imaging (fMRI) and capturing some of the first snapshots of the brain at work.

He tells a thrilling tale of scientific mysteries and their startling solutions, which have transformed how we understand ourselves.

## New imaging techniques

“If you were to write a history of brain imaging, there’d be a pop-out box about Marc Raichle at multiple spots,” said Steven Petersen, PhD, the James S. McDonnell Professor of Cognitive

Neuroscience in Neurology and longtime collaborator. “Every five or 10 years, he’s done something seminal.”

Raichle joined the School of Medicine faculty in 1971, just before the science of brain imaging took off. Michel Ter-Pogossian, PhD — a physicist who would develop the PET scan a few years later — recruited him. They met at a scientific conference in London. Raichle had studied brain blood flow as a postdoctoral researcher, and a clerical error had resulted in a conference invitation being issued to him instead of his adviser.

At the time, Raichle was serving as a major and flight surgeon at the U.S. Air Force School of Aerospace Medicine in Texas, pursuing his interest in brain blood flow and screening pilots who had experienced medical problems impairing their ability to fly. Never one to turn down an opportunity, he hopped a military plane and attended the conference.

“There was no imaging at the time, but Ter-Pogossian had a detecting system to measure the regional oxygen metabolism of the brain, and he said he’d build me an even bigger, better one if I came to WashU after I finished my military

Using a specially designed field-use scanner, Marcus Raichle, MD, measures blood flow to his brain after injecting radioactive xenon at high altitude.



COURTESY OF MARCUS RAICHLÉ

*“Every five or 10 years, he’s (Raichle) done something seminal.”*

— Steven Petersen, PhD

service,” Raichle said. “So I said to my wife, Mary, ‘Let’s do this. This could be fun. We’ll stay for a couple years and then go on home to Seattle.’”

Soon after Raichle arrived in St. Louis, Ter-Pogossian and others at the medical school designed and built the first PET scanner and used short-lived radioactive materials called radiotracers to map organ function in living animals including humans. Raichle’s job was to develop protocols and algorithms to apply the new imaging technique to the human brain. Over time, he figured out how to separate important activity in the brain from background noise, and how to align images of different people’s brains so corresponding areas could be matched up and studied.

Today, PET scanning is widely used to detect tumors and metastases in cancer patients, evaluate the effects of a heart attack, measure brain activity and for many other purposes.

In 1988, an editor at the prestigious journal *Nature* called to ask about a project that Raichle, Petersen, cognitive psychologist Michael Posner, PhD, and others were working on: visualizing language processing in the brain. “In my long career, it is the only time *Nature* has ever called me up and said, ‘We hear that you’re doing X and we’d be interested in publishing it,’” Raichle said.

Using PET, the team monitored patterns in people’s brains as they read a word — hammer, for example — spoke the word, heard the word, and finally associated it with another word — such as nail.

By comparing the images, the researchers zeroed in on the brain areas that were active at each step. Put boldly, they took snapshots of the brain thinking.

“Marc opened up the human brain to scientific analysis,” Posner said. “It used to be that most of the understanding of brain physiology was based on nonhuman animals or on people with brain injuries. The idea that you could analyze human

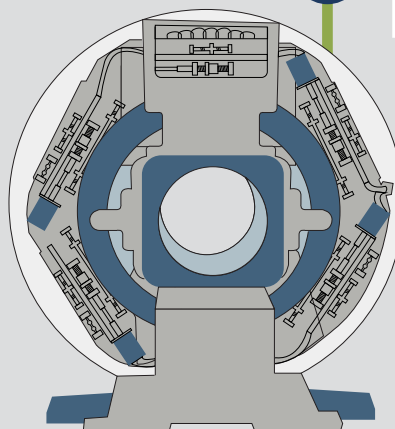


Marcus Raichle in 1979.

BERNARD BECKER MEDICAL LIBRARY

## A history of firsts

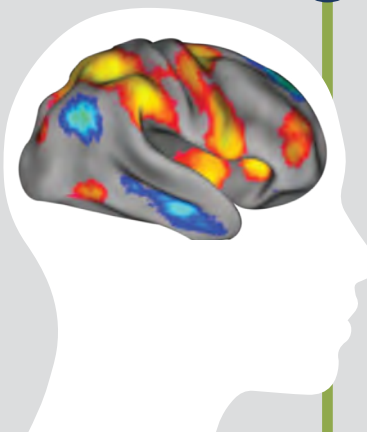
Marcus Raichle, MD, has been a central figure in the history and science of brain imaging for many decades. His discoveries about the brain — its specialized networks, resting state and “dark energy” — have transformed how we understand ourselves.



PET III

1975  
PET

The first modern PET scanner was built at Washington University to image organs in living animals and people. Raichle developed the algorithms and protocols to use PET to study the brain. Today, PET brain scans help doctors detect tumors, diagnose dementia and identify early signs of many neurological diseases.



1986  
Oxygen metabolism

Raichle and colleagues set off a scientific furor when they overturned a century of physiological wisdom and showed that oxygen use does not track with changes in blood flow in the brain. When functional MRI was developed just a few years later, their findings explained the biological underpinnings of the powerful imaging tool.

brain networks in normal, living people? That was just a dream. It wasn't possible. Marc more than anyone else made it possible."

Raichle built his own lab near the Ter-Pogossian lab. Eventually, their two labs at Washington University's Mallinckrodt Institute of Radiology (MIR) merged into the NeuroImaging Laboratories, now consisting of 33 faculty and over 100 trainees and staff.

A powerful cyclotron in MIR's basement produces the radioactive materials researchers use for PET-based studies on topics as diverse as human cognitive and clinical neuroscience, human aging and neurodevelopment and brain physiology.

"When I came here 47 years ago, Michel had this vision that radioactive materials would be valuable in biology and medicine," Raichle said. "The work we do here is quite sophisticated and technically challenging, but we take it for granted because, after all, it's been going on at Washington University for nearly 50 years."

## A scientific firestorm

Raichle's next major accomplishment was providing the data that explains how fMRI (functional magnetic resonance imaging) detects brain activity. And he was roundly castigated for it at the time.

For more than a century, physiologists had believed that blood flow and oxygen use rose and fell together. In other organs, they do. But the assumption had never been properly tested in the brain.

**Raichle, now 81, in his office at NeuroImaging Laboratories, part of Mallinckrodt Institute of Radiology.**



In 1986, Raichle and Peter Fox, MD, used PET scanning to show that when a part of the brain increases its activity, blood flow to that area increases but oxygen usage does not. This results in an increase in the amount of oxygen in active areas. It's a case of supply increasing more than demand.

A few years later, Japanese researcher Seiji Ogawa discovered that changes in oxygenation are readily detected by MRI. In a sudden flurry of insight in the early 1990s, neuroimaging scientists put the puzzle pieces together — brain activity causes a change in blood oxygen concentrations, changing oxygen levels alter the magnetism of the blood, shifts in magnetism can be detected by magnetic resonance imaging — and fMRI was born.

Ogawa is rightly credited with founding fMRI, and Raichle and Fox had provided a key piece to the puzzle. But just a few years before, when their research was published, it had threatened to derail their careers.

"Prominent neuroscientists told Dr. Raichle that his ideas couldn't be right and that he'd better correct the error or his career would go down the tubes," said Avi Snyder, MD, PhD, a professor of radiology who has worked with Raichle for many years.

"People were almost throwing eggs at them," Petersen said.

"But," Snyder added, "the existence of fMRI proves that Marc was right and they were wrong."

A noninvasive technique that does not require radiation, fMRI is now the most powerful tool



PETE SOUZA/THE WHITE HOUSE

President Barack Obama meets with the 2014 Kavli Prize recipients, including Marcus Raichle, MD, (far right) in the Oval Office. The prize is awarded to scientists who have made seminal advances in the fields of astrophysics, nanoscience and neuroscience.

we have to understand how the brain behaves. Researchers use fMRI to gain new insights into language, learning, emotion and memory — and to figure out how the brains of people with disorders such as schizophrenia or dementia differ from those of healthy people.

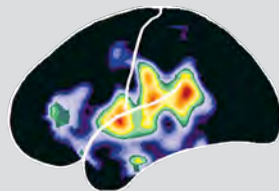
## Hidden architecture

As the science of brain scanning progressed, researchers noted that the brain never quiets down. As a person lies quietly in a scanner, daydreaming, waves of activity pulse through his or her brain.

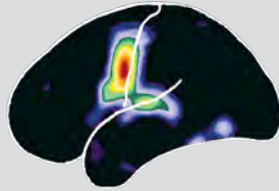
“Marc wasn’t the first to observe resting state activity, but he was the first to really understand that it’s not just noise,” Snyder said.

Philosophers and psychologists long have argued that the subconscious mind dwarfs the conscious one, but it wasn’t until researchers such as Raichle started measuring the brain’s energy use that there was hard data to back up their intuition.

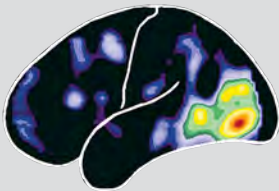
It turns out that consciously performing a task only increases the brain’s energy usage by about 5 percent. Somewhere between 60 and 80 percent of all energy used by the brain goes toward



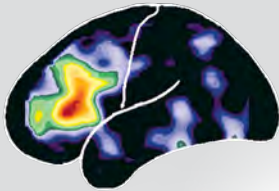
HEARING WORDS



SPEAKING WORDS



SEEING WORDS



GENERATING WORDS

## 1988 Complex cognitive process

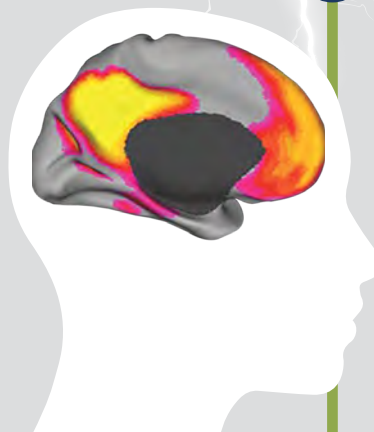
Raichle and colleagues used PET scans to take snapshots of the brain’s active areas as people considered how to link related words together. He opened up the human brain to scientific inquiry by creating the first view of the human brain performing a complex cognitive process.

## 1990s Dark energy

The brain uses almost as much energy idling as performing tasks. In a nod to the universe’s “dark energy” described by cosmologists, Raichle coined the phrase “the brain’s dark energy” to refer to the copious amounts of fuel burned in the “resting” state. These mysterious processes may be the basis of the subconscious mind.

## 2001 Default mode network

Raichle described the default mode network, a constellation of brain areas that keeps the brain running. The network is active when people let their minds wander and inactive when they focus on tasks. Subsequent research has shown that the default mode network is disrupted in some neurological diseases.





**With Manu Goyal, MD, (above, right) Raichle is studying how the default mode network and glycolysis relates to aging and Alzheimer's disease.**

activity seemingly unconnected to external events. Raichle dubbed this energy “the brain’s dark energy” and argued that it represented complex processes we are only beginning to understand.

“Most of what the brain is doing is nonconscious,” Raichle said. “So often people say something ‘feels right’ to them and conclude that it must be true. But your brain just made that judgment for you, and the reason it did so is probably totally opaque to you.”

As he scrutinized the images of the areas that decrease their activity when people shift their attention to a task, Raichle realized something else: The areas weren’t random. The same collection of regions always seemed to be involved — in the middle of the top of the brain, just above the eyes and on either side near the back.

In a seminal 2001 paper, Raichle and colleagues showed that these discrete brain regions formed a functional network — the default mode network — that plays a critical role orchestrating the background activity of the brain. Disruptions to this system have been noted in people with Alzheimer’s disease and autism spectrum disorder.

Other researchers found that similar networks control all the major brain functions, including movement, vision and attention. Moreover, these linkages can be found even when they do not seem to be in use. If you undergo a functional

MRI scan, a computer algorithm can analyze your brain activity and find the motor network, for example, even if you haven’t moved or even thought about moving during the scan.

The technique of identifying functional networks while at rest is known as resting state functional MRI, and it is used in neurosurgical planning. Doctors need to pinpoint precisely where critical brain functions such as language and motor function are located so they can plan a surgical route to spare them, as each person’s brain is slightly different. With resting state fMRI, patients need only spend a few minutes in a scanner to give surgeons the information they need.

“Without Marc’s foundational efforts there’s no way I would be taking resting state fMRI and applying it to brain tumor patients and epilepsy patients,” said neurosurgeon Eric Leuthardt, MD, PhD, who is working on incorporating personalized brain maps into neurosurgical guidance software.

Raichle was awarded the prestigious Kavli prize for neuroscience in 2014, which garnered him a trip to the White House to meet President Barack Obama. In a half-century of work, Raichle has unearthed a hidden substructure of the brain, quantified the subconscious and brought the human brain into focus.

And he isn’t done yet.

## Sugar: the next frontier

Raichle handed over management of the NeuroImaging Laboratories to Tamara Hershey, PhD, a professor of psychiatry and radiology, more than a year ago. But he still directs research projects from a corner lab office. Wooden shelves filled with books on every aspect of the brain line one wall, many of them written by friends and colleagues. To one side hangs a picture of Raichle on a Pakistani mountainside, bundled against the cold, triumphantly holding a homemade banner emblazoned with “Mallinckrodt Institute of Radiology.” In the midst of all this, Raichle — tall, slim and energetic — sits casually on the edge of a desk and talks about sugar.

“We’ve traditionally thought of glucose like coal: It arrives in cars to the brain and gets shoveled into the furnace to produce energy,” Raichle said. “But that’s only part of what happens to glucose in the brain. It’s also deeply involved in biosynthesis, neuroprotection and plasticity — the ability to form new connections between neurons as you learn new things.”

With Andrei Vlassenko, MD, PhD, and Manu Goyal, MD, Raichle is studying how the default mode network and glycolysis — the breakdown of glucose molecules — relates to aging and Alzheimer’s disease. The default mode network, which uses a lot of glucose, maps neatly onto the areas that degenerate most quickly in Alzheimer’s disease. With Hershey and others, Raichle is studying what effect high blood glucose levels have on glycolysis, and why diabetes is linked to Alzheimer’s disease.

“Marc has a unique ability to notice things other people overlook and then think deeply about what they really mean,” Hershey said. “He’s made revolutionary contributions to science already. His work with glycolysis is at a relatively early stage, but it may turn out to be his next major contribution.”

In addition to his research, Raichle travels frequently to the Washington coast where he and his wife both grew up. They own two houses there, with room to host their four children and 12 grandchildren. He thinks often of the promise he made to his wife 47 years ago to move back.

When he does retire, he will be missed.

“Marc’s stature in the field and scientific creativity draw people to him, but his kindness and generosity keep them there,” Hershey said. “I think we get all tied up in celebrating accomplishments, but to also be a wonderful person is really remarkable.” □

## 2003 Brain architecture



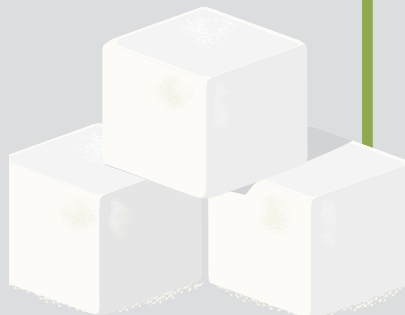
Researchers unveiled distinct networks of brain areas devoted to specific functions, including movement, vision and attention. Raichle was among the first to recognize the importance of this hidden brain architecture. These networks shift and grow during normal development and aging, and some neurological diseases are linked to changes in these networks.

## Present The aging brain



Sugar is more than just fuel for the brain: It is also involved in building new biomolecules and forming new connections between neurons — a necessary step in memory and learning. Raichle is exploring how the brain’s use of sugar changes with normal aging and why the areas that burn the most sugar are the first to degenerate in Alzheimer’s disease.

## Present Diabetes



Diabetes causes high blood sugar, and it is also a major risk factor for Alzheimer’s disease. Raichle is studying what effect too much sugar has on the brain to find out why these two common and serious illnesses are linked.

# Growing up transgender

Navigating the complex world of gender identity

BY GAIA REMEROWSKI

One day, while Karen Stokes and her 5-year-old daughter were watching TV, a Victoria's Secret commercial came on. Stokes was unprepared for the reaction.

"My daughter said if she had breasts, she would want to cut them off," Stokes explained. "I remember thinking, 'Wow, that's a drastic thing for this very young child to say.'"

"Why would you say that?" I asked.

"They just draw so much attention."

Years later, it all made sense. In high school, Stokes' daughter came out as a transgender male — someone who is assigned female at birth but identifies as male — and legally changed names to Chase.

Two years ago, the family moved from Nebraska to St. Louis when Chase's dad, Jeffrey Stokes, MD, became a professor of pediatrics at the School of Medicine. Chase's older brother, Carl, also is a third-year medical student here. Chase, now 18, is a sophomore at Northwestern University.

On July 10, following years of comprehensive medical and mental health support, Chase underwent a double mastectomy to align his body with his gender identity. Washington University Transgender Center specialists helped in the transition.

Nationally, the medical field has begun to recognize the needs of this underserved population. School of Medicine doctors say thoughtful medical management and integrated mental health support from an early age can help ensure optimal patient outcomes. Reversible, non-surgical approaches are the first intervention.

The center's mission: Bring the full range of Washington University's expertise to the rapidly evolving area of transgender medicine.







Karen Stokes kisses her transgender son, Chase, 18, as he prepares to undergo a double mastectomy. The surgery culminates a long journey that began when Chase was very young. Prior to the procedure, Chase took part in comprehensive medical assessments, beginning in his Nebraska hometown, and continuing with School of Medicine specialists.

## Birth of a center

Since opening in August 2017, the Washington University Transgender Center has grown tremendously, with more than 300 patients coming from a multi-state area. It is one of about 40 clinics nationwide serving transgender youth and their families. Most of those clinics are on the east and west coasts.

The transgender center provides a safe and welcoming environment for children and adolescents who identify as a gender different from the sex they were assigned at birth.

Prior to the center's launch, specialists in pediatric endocrinology and adolescent medicine — including Abby Hollander, MD, Christopher Lewis, MD, and Sarah Garwood, MD — already had been treating a large number of transgender patients and saw a need for more comprehensive care. Ana Maria Arbelaez, MD, chief of the Division of Pediatric Endocrinology and Metabolism, further championed the center, which gained quick support from the Department of Pediatrics and St. Louis Children's Hospital.

Transgender youth experience increased harassment and discrimination — even within the medical community. They have a higher risk of

**Christopher Lewis, MD, an endocrinologist and director of the transgender center, meets with Chase.**

substance abuse and are nine times more likely to attempt suicide than the general population.

Nationally, many physicians are not equipped to deal with the unique needs of transgender youth. The center provides specialized medical assistance and mental health counseling to youth who may suffer from gender dysphoria, a condition that results when people experience distress related to the mismatch between their biological sex and gender identity. Transgender patients and their family often grapple with a range of emotions and make decisions that will affect well-being throughout their lives.

The center takes a multidisciplinary approach to patient care and brings the shared wisdom of medical peers to a largely uncharted area of practice — one that differs significantly by patient. Weekly team meetings involve specialists from pediatric endocrinology, adolescent medicine, child and adolescent psychiatry, psychology, primary pediatrics and social work.

“We've put a lot of thought into the development and implementation of the center to make sure we are not missing any key pieces,” Arbelaez said. “We are the only multidisciplinary program for transgender youth in a 250-mile radius. And we take a very comprehensive approach to patients that is unique.”

## Treating transgender patients

Treating transgender adolescents remains controversial. However, growing numbers of U.S. teens are rejecting “boy” or “girl” gender identities and identifying themselves with nontraditional terms, such as transgender or gender-fluid. Some gender specialists estimate that 1 in 500 children is gender non-conforming or transgender. According to federal data, about 1.4 million U.S. adults now identify as transgender, doubling the previous decade's estimates.

Though still in its infancy, brain imaging research and other studies are starting to point toward a biological basis for gender dysphoria. Some scientists hypothesize that, in utero, sexual differentiation of the genitals occurs separately from sexual differentiation of the brain. Thus, the body and mind can veer in different directions.

Garwood, center co-director and an associate professor of pediatrics and adolescent medicine, said society's struggle to accept transgender people often stems from a failure to understand that gender identity may not line up with biological sex.



MATT MILLER



# Understanding Sex & Gender Diversity

“Sex” and “gender” once were separate terms, but increasingly exist on a spectrum. Sex is assigned at birth and refers to a biological state, while gender is more self-perceived and may not match one’s sex. As “male” and “female” labels change, a new language is emerging.

**Androgynous:** Partly masculine and partly feminine in appearance.

**Bi/pansexual:** A person who experiences sexual and/or emotional attraction to more than one gender.

**Cisgender/cis:** A person who identifies as their sex assigned at birth.

**Gender binary:** The classification of sex and gender into two distinct, opposite and disconnected forms of masculine and feminine.

**Gender dysphoria:** Anxiety and/or discomfort regarding one’s sex assigned at birth. This term replaced the previously used medical term “gender identity disorder.”

**Gender-fluid:** A person whose gender identity is not fixed.

**Gender non-binary:** A person whose gender identity falls outside of the traditional gender binary structure.

**Gender non-conforming:** A person whose behavior or appearance does not conform to conventional expectations of masculinity and femininity.

**Intersex:** A person who is born with an ambiguous biological sex, who may have both male and female characteristics.

**Queer:** Once considered a derogatory term, now it is often used to represent individuals who identify outside of categories of sexual and gender identity.

**Transgender/trans:** A person whose gender identity differs from their sex assigned at birth.

**Transsexual:** An older medical term for people who have changed or seek to change their bodies through medical interventions such as hormones and/or surgeries.

## BIOLOGICAL SEX

A label assigned at birth based on medical factors, including hormones, chromosomes and genitalia.



Female Intersex Male

## GENDER IDENTITY

A person’s internal sense of being male, female, neither of these, both or other gender(s).



Woman Gender-fluid/non-binary Man

## GENDER EXPRESSION

Physical manifestation of one’s gender identity through clothing, hairstyle, voice, body shape, etc.



Feminine Androgynous Masculine

## ATTRACTION

Physical, spiritual and emotional attraction to another person.



Heterosexual Bi/Pansexual Homosexual

“This is something that happens,” Garwood said. “Identity is something that is probably fixed in your brain, just as you’re born with other characteristics. We can’t stop it from happening, but we can change the way we include people in our culture in a more compassionate way.”

Many people also are uncomfortable with the idea that gender can be fluid, added Lewis, center director. “Every other aspect of humanity such as IQ, cancer risk, height or skin tone are on a spectrum. So why wouldn’t gender identity and sexual orientation be as well?”

Adolescents often disclose their gender identity during their teenage years. There is some evidence that social and medical transition is a protective factor against suicide, Garwood said.

The center’s goal is not to sway anyone to move from one gender identity to another. It is to ensure that these marginalized patients

get equal access to informed health care. The providers listen, ask and answer questions and offer information and support.

“My job is not to tell people what they should or shouldn’t do — everyone’s journey is their own to make,” said Lewis, also an instructor in the Division of Pediatric Endocrinology and Metabolism. “My job is to assist them on the path that they deem the most appropriate for themselves and educate them to make informed decisions.”

Such access to LGBTQIA (lesbian, gay, bisexual, transgender, queer, intersex, asexual) health-care resources did not exist for Lewis, who grew up as a gay male in Texas.

Later, as a pediatric resident at Washington University, he completed an advocacy rotation led by Garwood. She suggested Lewis attend a meeting of TransParent, a support group for parents of transgender children, to see if it might be a good way for other residents to learn about transgender health in the community.

The parents at the meeting said they did not know a single provider who could answer their many questions on gender identity and transition. They also were fearful about issues facing their children, such as bullying and discrimination.

Others were experiencing feelings of loss: the child they had known since birth had to go away, so that a new one could emerge.

“He (Lewis) went to the meeting and had this epiphany that set him on a course for his career,” Garwood said.

Lewis already was planning to specialize in pediatric endocrinology — a medical field concerned with hormones. Because many transgender health issues revolve around hormones, he decided to become competent in transgender health care. He attended conferences, read publications and sought out his eventual mentor Stephen Rosenthal, MD, an expert in transgender health at the University of California, San Francisco (UCSF).

“It’s been really exciting for me to see what Dr. Lewis has accomplished at a relatively junior point in his career,” said Rosenthal, the medical director of the Child and Adolescent Gender Center at UCSF and past president of the Pediatric Endocrine Society. Rosenthal helped write the 2017 Endocrine Society transgender health guidelines, which are followed internationally by transgender centers, including the one at Washington University.

The Human Rights Campaign, the largest civil rights organization working to achieve equality for LGBTQIA Americans, honored Lewis with the 2017 Equality Award for his work with the transgender community.

## Beginning the journey

The center sees new patients ranging in age from 3 to 21 years old, who present with concerns related to gender. The initial visit begins with a thorough work-up, including the patient’s medical history and gender “journey” (when gender identity was established, experience of coming out and social transitioning, family and school support, mental health concerns and other key factors).

While some patients, like Chase, come to the center for help with medical treatment, others seek mental health support. Garwood treats patients with anxiety, depression, eating disorders and other teen-related concerns.

Her interest in the transgender population grew as she worked closely with patients engaging in self-harming behaviors. “They were depressed, they struggled with eating disorders, they even attempted suicide, in some cases, and were really in a lot of distress,” Garwood said. “Ultimately,

MATT MILLER



**Sarah Garwood, MD, a specialist in adolescent medicine and co-director of the center, treats patients with anxiety, depression and other mental health issues associated with a mismatch between assigned sex and gender identity.**



what I learned after working with them was that at the core of the distress was gender dysphoria.

“I saw hope in that when their authentic gender identity was accepted and disclosed, they were able to heal.”

The clinic staff is continuing to expand. Now, the most complicated mental health and trauma diagnoses are referred to team newcomer Andrea Giedinghagen, MD, an attending physician in the Eliot Division of Child & Adolescent Psychiatry.

For children who are in puberty and are struggling to determine their gender identity, Lewis may prescribe puberty blockers. These hormones delay puberty and suppress unwanted irreversible secondary sexual characteristics, such as breasts, Adam’s apple development and voice deepening.

Blockers, which also are given to children who experience early puberty, are fully reversible and once stopped, allow puberty to resume normally. “Blockers give these children the chance to continue to process their gender identity with their parents and mental health providers and decide options for future lifestyle,” Lewis said.

The center also administers gender-affirming hormones, such as testosterone and estrogen, that help a person’s physical body match their gender identity. Lewis talks extensively with parents, who often have concerns about the effects and risks of hormone therapy.

Among other services, the center refers to surgical subspecialists, reproductive endocrinologists, mental health providers, speech therapists and community resources.

Some patients, like Chase, ultimately elect to have surgical interventions.

## Chase’s story

Growing up as a girl with two older brothers, Chase dressed in hand-me-downs, played mostly with boys, hated dresses and often cut his hair short. When puberty hit, he noticed boys and girls tended to go their separate ways. “I didn’t really understand why this was a big deal. I’d hung out with boys my whole life,” he said.

Chase had his first appointment with Lewis in February 2017. “I think the center is a great resource for trans kids to have,” he said. “And I personally think Dr. Lewis is one of the nicest people I’ve ever interacted with. He has the ability to really put people at ease.”

Once established as Lewis’ patient, Chase began taking testosterone. He decided to have a double mastectomy so that others’ perceptions would match his self-perception.

Transgender care guidelines require letters from therapists before a patient may undergo surgery. Lewis said none of his patients have



**Above, Jeffrey Stokes, MD, a professor of pediatrics at Washington University, said he has made the adjustment of having two sons and a daughter to having three sons. Here, he shares special moments with Chase (both as his young daughter and as his adult son).**



The Stokes family (left to right): Jeffrey, Karen (with dog, Minerva), Chase and older brothers, Carl (a third-year medical student at Washington University) and Curtis.

regretted undergoing hormone therapy or surgery, although some have regretted not moving forward with such interventions.

Because of the surgery, Chase no longer binds his chest, a common way transgender males hide their breasts. The practice can make it hard to breathe and may distort the ribs.

“Top” surgeries (chest reconstruction) are performed by Kamlesh Patel, MD, associate professor of surgery, and Alison Snyder-Warwick, MD, assistant professor of plastic and reconstructive surgery. Snyder-Warwick and Gino Vricella, MD, assistant professor of urologic surgery, perform “bottom” surgeries (genital reconstruction) in adult patients.

“My patients have been happy to have the top surgery,” said Patel, who performed Chase’s surgery. “They no longer have to hide who they are.”

## Support is key

Both Garwood and Lewis noted that family support is the number one factor that can improve quality of life for transgender people. Additionally, the medical community plays a key role.

Clinicians across all fields can expect to treat transgender patients in increasing numbers. As a doctor and a parent of a trans teen, Chase’s father, Jeffrey Stokes, has a unique perspective.

“This is not stuff that you’re taught in medical school,” he said. Stokes treats children with asthma, allergies and pulmonary conditions and said, in his field, a patient’s gender doesn’t matter as much. But he added that it is important that all patients feel comfortable. This may include using respectful language, such as patients’ preferred names and pronouns, and changing intake forms to include Sexual Orientation/Gender Identity, or SO/GI, data.

Lewis and Garwood now lead educational outreach in clinical and community settings. At her daughter’s school, Garwood organized a Washington University physician panel to answer questions about transgender identity and health

issues when parents objected to adding those topics to sex education classes.

Lewis, Garwood and others, including Ina Amarillo, PhD, assistant professor of pathology and immunology, are interested in doing research to inform transgender care. They are building a database to collect anonymized patient data and are planning to study outcomes, such as the effects of hormone use on growth and bone health, cardiovascular disease, cancer risk, depression and suicidality.

The providers meet with local transgender community members to make sure they have a voice in any planned research projects. As Arbelaez said: “We’re really here for the community and to provide the best patient care possible.”

An adult transgender center will open at the Center for Advanced Medicine by the end of 2018, Arbelaez said, which could ease the burden on the current center. The new center will enable the teams to look at more long-term patient outcomes and improve the continuum of care. □

## Addressing differences of sex development

More than 150 medical conditions can cause individuals to differ from the traditional definition of a male or female. These can range from difference in sex chromosomes and ambiguous genitalia to hormonal or other genetic changes that are not typical of either a male or female. These conditions, known as intersex or differences of sex development

(DSD), may lead to medical professionals delaying gender assignment at birth. Best practices allow such children to choose their own gender at their own pace with the assistance of mental health and other providers. Pediatric endocrinologist Christopher Lewis, MD, leads Washington University’s interdisciplinary DSD clinic, which also houses providers from fields such as urology, gynecology, clinical genetics and psychiatry. For more information, visit [dsd.wustl.edu](http://dsd.wustl.edu).



# Building independence

For 100 years, the occupational therapy program  
has helped people engage mind and body

BY CANDACE O'CONNOR

Handwork was viewed  
as a means to speed  
healing in the early days  
of occupational therapy.



Scott Brandon participates in research to help finetune wheelchair propulsion techniques and to calibrate cameras that track his motion. The Program in Occupational Therapy, he said, has helped him maintain his daily independence.

**I**n 1995, Washington University’s new chancellor, Mark S. Wrighton, paid his first visit to the Program in Occupational Therapy, which is part of the School of Medicine.

Carolyn Baum, PhD, the program director, gave Wrighton a tour and asked her lean but energetic 12-member faculty to take turns describing their clinical and teaching activities.

He wasn’t as impressed as she’d hoped.

“I’ll never forget it,” Baum said. “Afterward, he took me out to the hall and said, ‘Carolyn, you’re doing good things, but I really don’t support a program that just trains occupational therapists.’ And I replied, ‘We’re building an academic department. It’s going to take time — but wait and see.’”

Twenty-three years later, Baum, the Elias Michael Director and professor of occupational therapy, of neurology and of social work, and her colleagues have created a rigorous, graduate-level program aimed at advancing human health through evidence-based practice and innovative research.



“If you teach students not only what they need to know and how to apply it, but also how to take the knowledge we’ve gained through research and grow with that knowledge, that makes you a discipline,” Baum said.

Today, Wrighton holds the program in high regard. “I am very proud of our occupational therapy program and the leadership of Carolyn Baum,” he said. “The program has met and exceeded our expectations and risen to become a true leader in its profession and a model for other programs nationwide.”

This year, the occupational therapy (OT) program is celebrating its 100th anniversary. A Centennial Gala Weekend is planned for Oct. 5 and 6, and the program has commissioned a history book, “The Rise of a Program and a Profession, Occupational Therapy at Washington University: The First 100 Years,” by St. Louis writer Cynthia Georges.

Spearheaded by St. Louis civic leader Rachel Stix Michael, the program opened in 1918 to train “reconstruction aides” — civilian women who could help injured World War I soldiers. These aides led soldiers in handwork such as basketry, weaving and wood-carving, as it was believed that such diversions would speed healing by keeping the mind and body engaged. Program admission was open to women at least 23 years old, “native or allied born,” with a college education and a “suitable personality.”

U.S. News & World Report now ranks the program No. 1 in the country. Baum credits this achievement, in part, to the program’s affiliation with the School of Medicine. It is one of only three OT programs nationwide with a medical school base. The relationship allows faculty to build collaborations with top researchers in neurology, pediatrics, medicine, orthopedics, plastic surgery, cancer and psychiatry. These research ties also extend to the Danforth Campus — in social work, psychology and engineering — and into the community, with some 100 agencies, such as Paraquad and the St. Louis Area Agency on Aging.

As direct experience is an important educational requirement, the program maintains fieldwork contracts with more than 500 locations throughout the U.S. and some abroad. In these many settings, the program’s students serve people across the lifespan.

“This is the richest environment in the world for an OT program — to have access to resources, ask important questions, and give our students these incredible opportunities,” she said.

Baum acknowledges that some people don’t understand exactly what OT professionals do or what kind of research they undertake. The field strives to enhance “occupational performance,” she said, which translates to “engagement with life”: that is, giving clients with disabilities, developmental challenges or chronic health conditions the environmental supports they need to do everyday things that are important to them. “If you look at the three major rehabilitation fields — speech, physical therapy and OT — each one is based on a different concept,” Baum said. “Speech is communication, physical therapy is movement and OT is performance.”

## Science behind service

Each year, about 90 new students — seeking an array of master’s and doctoral degrees including the clinical doctorate, launched in 2001 — arrive with eager idealism, hoping to break down barriers so that people can lead better lives.

“A lot come to us because, in their families, there has been a personal experience — like their grandmother had a stroke or their brother has autism,” said Baum, who has directed the program since 1988. “Our students have made wonderful contributions to society already.”

Learn more about the program’s history

[ot100.wustl.edu](http://ot100.wustl.edu)

**Carolyn Baum, PhD, the Elias Michael Director of the Program in Occupational Therapy, interacts with students. Baum is considered one of the 100 most influential people in the field.**



WASHINGTON UNIVERSITY



They have done lots of volunteer work, assisting the elderly or helping kids with disabilities. So, they are attracted to putting science behind how they can serve.”

Unlike studies in the hard sciences, OT research does not involve microscopes, pipettes or mouse models. “Our laboratories are the ordinary lives of people,” Baum said. “We look at the cognitive, psychological, physiological, sensory, motor and environmental issues that are limiting their daily life performance. How do we build better approaches to parent education in supporting children with cancer? Or create a safe environment for older adults who want to live independently at home and need to learn self-management skills?”

## Leveraging biomedical data

OT professionals use a wide array of tools and assessments to help patients self-report their levels of participation and mastery in major life activities. A number of assessments developed by the program’s faculty are internationally recognized and are available to practitioners free of charge.

Two PhD students, Nathan Baune and Pin-Wei Benny Chen, both with backgrounds in cognitive neuroscience and rehabilitation science, are developing an activity recognition system called Proprio that uses ambient and wearable sensors to unobtrusively monitor the quality of a patient’s post-hospitalization life at home: their success in cooking, eating and caring for themselves.

To make the project a reality, the students are partnering with PlatformSTL, a St. Louis-based software development company focused on university technologies, and BioSTL — the nonprofit arm of BioGenerator. Working with Assistant Professor Alex Wong, PhD, DPhil, the students and PlatformSTL also just received a Small Business Innovation Research Program grant from the National Institute on Disability, Independent Living and Rehabilitation Research.

“I believe strongly that we are the bridge between biomedical data and population health. It’s a kind of precision medicine, if you think about it,” Baum said. “You are a different

**Susy Stark, PhD, conducts research to promote successful aging in place. One way she does this is by observing patients in their homes and suggesting modifications to reduce risks and improve daily performance.**

TIM PARKER

*“Occupational therapy makes it possible for individuals to do what they need and want to do every day.” — Carolyn Baum, PhD*

person than I am; even though we may have the same health condition, we do different things. Occupational therapy makes it possible for individuals to do what they need and want to do every day.”

Making it possible for people to do what they need to do every day requires entry into many environments, whether they be someone’s home, a school playground, a homeless shelter, a construction site or a coal mine.

## Tackling societal challenges

Among their productive, 22-member faculty are eight members on the investigator track, who collectively are participating in 39 funded research projects:

- **Allison King, MD, PhD**, focuses on children with chronic illness, such as sickle cell anemia and cancer.
- **Erin Foster, PhD, OTD**, develops rehabilitation programs for people with Parkinson’s disease.
- **Susy Stark, PhD**, does translational research to support aging in place.
- **Kerri Morgan, PhD**, an American Paralympian wheelchair racer, improves mobility in patients with spinal cord injury, multiple sclerosis and cerebral palsy.
- **Benjamin Philip, PhD**, studies the brain’s control of movement and uses that knowledge in rehabilitation.
- **Alex Wong, PhD, DPhil**, develops assessments and interventions for patients with neurological conditions, especially stroke.
- **Bobbi Pineda, PhD**, works with premature infants, bridging the gap between the Neonatal Intensive Care Unit and home.
- **Carolyn Baum, PhD**, designs and studies interventions that support the cognitive needs of older adults and improve quality of life.

Other faculty members are on the clinical track, working with children who are hearing-impaired or who have Tourette’s syndrome, adolescents with substance abuse issues and patients of all ages who are cancer survivors.

Monica Perlmutter, OTD, specializes in assisting older adults with vision loss. In 2017, Perlmutter began helping a new client, Sharon Anders, who experienced significant vision loss due to myopic macular degeneration. Anders had difficulty reading, using a computer, operating appliances and watching TV, had given up driving, and was in the process of planning for early retirement from her job as an assistant accountant. Now she needed to learn how to navigate her house and community and live with her disability.

When Perlmutter first visited Anders’ house in Affton, she noted how dark it was — “like a cave.” Anders had assumed the dimness was due to her failing sight. Perlmutter began by using a lighting assessment tool she had developed and then made key improvements. She also outfitted Anders’ appliances with easier-to-read labels. She helped Anders maximize her remaining vision by training her to look obliquely at objects instead of straight on and in the use of a video magnifier. Perlmutter also gave her contact information for agencies such as St. Louis Society for the Blind and St. Louis County Corp and made homework assignments to ensure that Anders called.

As a result of Perlmutter’s visits, Anders gained confidence and independence. “If it wasn’t for her, I wouldn’t have known all these things,” Anders said. “Her help was off the charts!”

Perlmutter said that clients like Anders change her life, too. “I am inspired by their resilience, patience, determination and generosity. When you go into people’s homes, you have a window into their world.”

## Seeding the field

The program also takes care of its own students, strives to make sure they are exposed to the most rigorous instruction and involves them in the shaping of these endeavors. Steve Taff, PhD, OTR/L, leads five faculty and 30 students who are studying innovations in teaching methods, developing experiential learning clinics, exploring theoretical problems in education and designing supports for graduate student health and wellbeing.

The end result reaches far and wide: Today, OT faculty and alumni are improving the everyday lives of people across the globe. In the past 100 years, more than 2,700 alumni have graduated from the program. Many seed hospital-based programs or OT school faculties nationwide. Alumna Kristin Will, OT '14, is founding an OT clinic in eastern Uganda.

The spark for all this success has come from Baum, who joined the faculty in 1976 as director of occupational therapy clinical services at the Irene Walter Johnson Institute of Rehabilitation (IWJ). Under her guidance, IWJ eventually merged with other occupational therapy services at the medical school to create the formal program in 1987.

When she assumed leadership, the program had only three faculty and 18 students. Baum believed strongly in evidence-based research and hired faculty who would move the field forward. In 2017, the American Occupational Therapy Association named Baum as one of 100 influential people who have shaped the field.

Locally and nationally, the field has come a long way in 100 years and continues to gain momentum. Baum is excited about the projects yet to be undertaken and the patients yet to be served. "At our 100th anniversary, the future of occupational therapy has never looked brighter. Really, it's the best." □

Faculty, students and alumni of the Program in Occupational Therapy are having an everyday impact in a wide variety of settings: **1** Stimulating trigger points to reduce pain at the Air Force Academy clinic in Colorado Springs; **2** On a home visit designed to help parents engage with their children and understand developmental milestones; **3** Assessing sidewalk conditions for wheelchair users; **4** Conducting a neurobehavioral assessment on a preterm infant; **5** Teaching older adults how to properly adjust their vehicles to maximize safety; **6** Administering an arm test on a client in the student-run stroke clinic; **7** Showing a patient how to transport laundry to her home laundry room.

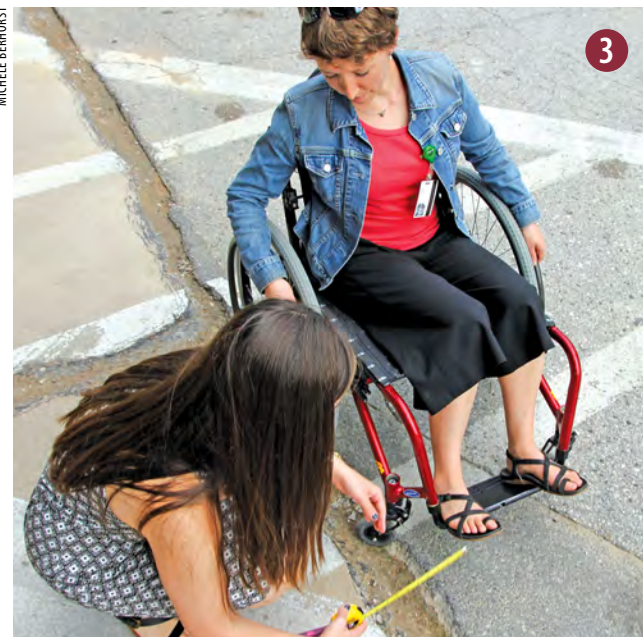
PHOTO COURTESY OF THE U.S. AIR FORCE



RAY MARKLIN



MICHELE BERHORST





4



5



6



7

David H. Perlmutter, MD, is internationally recognized for his research on the genetic disorder alpha-1 antitrypsin deficiency.

# First endowed deanship

**Honoring the contributions of past, present and future medical school deans**

**P**hilanthropists **George and Carol Bauer** have committed \$5 million to Washington University, establishing a named deanship for the School of Medicine. The deanship also recognizes the distinguished leadership of the school's previous deans. Their collective accomplishments are credited with the school's preeminent stature and with paving the way for future successes.

David H. Perlmutter, MD, dean of the School of Medicine since 2015, is the inaugural George and Carol Bauer Dean. He also is the Spencer T. and Ann W. Olin Distinguished Professor and executive vice chancellor for medical affairs.

“I am so grateful to the Bauers and the university for this endowment, which will support the School of Medicine’s most important priorities in the areas of scientific discovery, translating those discoveries into clinical treatments, and finding far-reaching ways to get effective therapies to those who need them, in St. Louis and around the world,” Perlmutter said.

Perlmutter is a national leader with more than 30 years of experience in academic medicine. His installation ceremony will include a lecture emphasizing the School of Medicine’s plans to transform the current health-care model to one that yields personalized therapies for patients battling challenging diseases, such as cancer and Alzheimer’s.

## Perlmutter’s work

Perlmutter is particularly interested in a promising new area of personalized medicine research that focuses on slowing age-dependent degeneration by targeting and enhancing autophagy. This normal physiological process is the body’s system of cleaning house — removing worn, abnormal or malfunctioning cellular components. Reduced autophagy has been associated with accelerated aging and disease. Ultimately, research in this area could have implications for diseases of aging and cognitive decline.

He’s also internationally recognized for his research on alpha-1 antitrypsin deficiency (ATD), a genetic disorder involving a misfolded protein that can cause severe liver damage. His work has led to a better understanding of how cells dispose of misfolded proteins that are toxic and cause cellular dysfunction.

He and colleagues have developed a pipeline of potential treatments that include one drug in phase II trials. The goal is to eliminate the need for liver transplantation in patients with ATD. Because these drugs target the autophagy process, they are being considered for treatment of age-dependent degenerative diseases. Perlmutter and his collaborators also recently discovered that a drug used for Type 2 diabetes may enhance autophagic degradation of misfolded proteins.

Prior to his appointment in 2015 as Washington University’s executive vice chancellor for medical affairs and dean, he was a distinguished professor and the Vira I. Heinz Endowed Chair of the Department of Pediatrics at the University of Pittsburgh, as well as physician-in-chief and scientific director of the Children’s Hospital of Pittsburgh of the University of Pittsburgh Medical Center.

*Information for this story provided by Julia Evangelou Strait, Mary Lee and Channing Suhl.*

## A continuing commitment

For George and Carol Bauer, the deanship is a continuation of their commitment to Washington University. They hope it will expand their impact on human health. “We are pleased to be able to extend our reach with this gift, which will help Dean Perlmutter and future deans develop talented young physicians and scientists and move research discoveries into the clinical realm,” George Bauer said.

George Bauer is an emeritus trustee and alumnus of Washington University. Originally from DeSoto, Missouri, he earned a bachelor’s degree in 1953 and a master’s degree in 1959 from the School of Engineering & Applied Science. He held numerous leadership positions with IBM before retiring in 1987 and founding an investment banking firm, the GPB Group Ltd.



**George and Carol Bauer**

The Bauers are longtime Washington University benefactors, providing scholarships for students and, in 2004, establishing an endowment to provide emergency financial aid to students experiencing unforeseen financial problems. The couple also funded the George and Carol Bauer Professorship in Organizational Ethics and Governance in 2007. Additional gifts from the Bauers have provided capital support for the Olin Business School’s Bauer Hall and helped establish the George and Carol Bauer Leadership Center at Olin.

The Bauers have a particular interest in health care and are deeply involved in their community of Norwalk, Connecticut. George Bauer has served as treasurer of the Norwalk Hospital board of trustees and is a member of the board of directors for the Norwalk Hospital Association and Western Connecticut Health Network.

Carol Bauer is a former chair of the hospital’s board of trustees, the founder and leader of its ER Reception Volunteers, and a hospital chaplain. She’s served for almost 20 years on the board of the AmeriCares Foundation, an international humanitarian/health-care organization.

“We see what’s going on in hospitals and health care in the U.S.,” Carol Bauer said. “We understand the importance of the deanship and all that Washington University School of Medicine is doing in its work as a leading research institution.”

# Supporting innovation

**Alumnus commits \$15 million for personalized cardiovascular research**

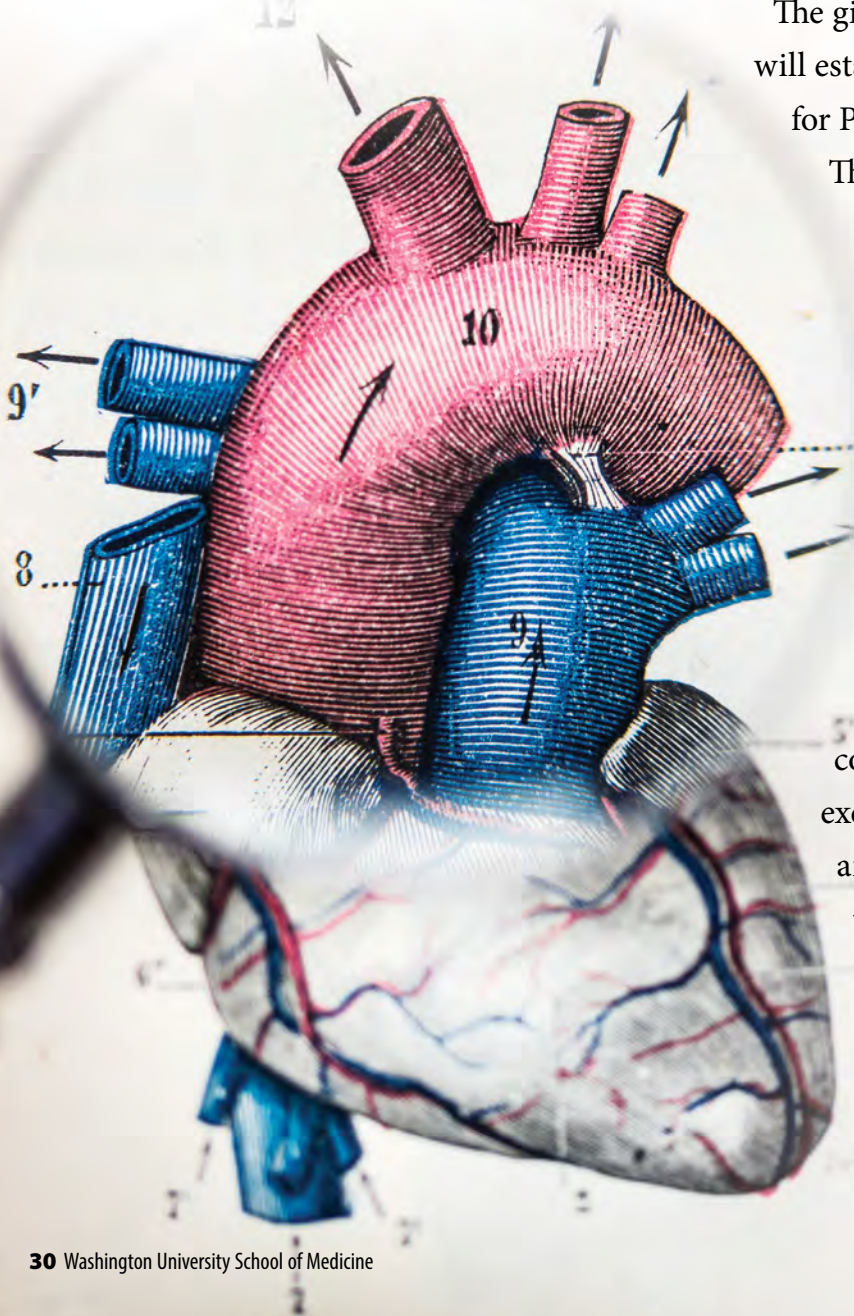
**A**lumnus **Kim D. Kuehner** has committed \$15 million through outright and planned gifts to support research that advances personalized approaches to fighting heart disease.

Heart disease is the leading cause of death for men and women in the U.S. — accounting for more than 600,000 deaths (about one in every four) annually, according to the Centers for Disease Control and Prevention.

The gift, from Kim D. Kuehner, MBA '77, will establish the Kim D. Kuehner Program for Personalized Cardiovascular Medicine.

The program provides a permanent, endowed source of funding for innovative research aimed at improving the prevention, diagnosis and treatment of heart disease.

“This new program will allow us to leverage our leadership in personalized medicine to develop tailored approaches to cardiovascular disease that focus on patients’ individual genetic makeup or the biology of their condition,” said David H. Perlmutter, MD, executive vice chancellor for medical affairs and the George and Carol Bauer Dean of the School of Medicine. “Mr. Kuehner’s exceptional generosity and deep interest in addressing a significant health challenge will benefit patients around the globe.”





## Grant spurs competition

The Kuehner Program will fund research grants within the School of Medicine. Grants will be awarded to the most promising research in the emerging field of precision cardiovascular medicine. The intention is to promote early-stage research that, if successful, has the potential to attract additional funding from government agencies, foundations or corporations.

According to Perlmutter, the program comes at the perfect time, presenting the School of Medicine with an exciting opportunity to advance its personalized medicine initiative into the realm of patient care.

“We laid the groundwork by developing a network of collaborative research centers, many of them funded by dedicated benefactors like Mr. Kuehner, that provide specialized expertise in genomics, immunotherapy, gene editing and other critical areas to researchers through the medical school,” Perlmutter said.

“The Kuehner program marks the beginning of our efforts to couple these resources with disease-specific personalized medicine programs that advance groundbreaking therapies for specific patient populations.”

## Family ties

Kuehner said he is proud to continue his family’s long history of supporting Washington University, and hopes the Kuehner Program for Personalized Cardiovascular Medicine will broaden the impact of his own philanthropy by improving human health on a global scale.

“I am involved with several organizations that promote the arts and education in St. Louis,” Kuehner said. “When I began to explore opportunities to support cutting-edge medical research, I knew I wanted to work with Washington University. I have the utmost confidence in the medical school. I’m thrilled to be able to contribute to breakthroughs that will help so many patients and families.”

Kuehner graduated from Washington University with a master’s degree in business administration in 1977. He retired in 2016 after a nearly 40-year career as a men’s clothing retailer, first at Famous-Barr, and then at Kim



MATT MILLER

Kuehner Sportswear, a store in Ladue that he established and ran for 30 years.

His latest gift extends his support for *Leading Together: The Campaign for Washington University*. In 2017, he provided \$2 million to name the Kuehner Family Court in Anabeth and John Weil Hall, currently under construction at the Sam Fox School of Design & Visual Arts. A courtyard in Weil Hall will be named the Kuehner Family Court in memory of Kuehner’s parents, sister and grandparents.

The Kuehner family’s ties to the university began when Kim’s parents, Howard and Hortense “Horty” Kuehner, met while they were students in the late 1930s. Over the years, the elder Kuehners established an endowed professorship at Olin Business School and endowed scholarships in the business school and the Sam Fox School of Design & Visual Arts.

Kuehner remembers his father dedicating much of his personal time to encouraging friends and colleagues to join Washington University’s Annual Fund giving club, the William Greenleaf Eliot Society. “He was so proud to play a role in the university’s ascent from streetcar college to world-class university,” Kuehner said. “My parents’ commitment to the university really impressed me.”

*Information for this story provided by Julia Evangelou Strait, Mary Lee and Channing Suhl.*



**Top: Kim Kuehner. Bottom: Howard and Hortense “Horty” Kuehner.**

*“I’m thrilled to be able to contribute to breakthroughs that will help so many patients and families.”*

## Find your friends.

Classnotes are organized first by year of degree/training completion and then in alphabetical order.

## How about you?

Share your news via the online form at [wumcnews.org/classnotes](http://wumcnews.org/classnotes). Submissions will be printed in a subsequent issue of Outlook magazine as space allows. Photos are welcome.



Stanford Lamberg, MD '63, (left) and friends on a much deserved break after a bike ride in Tucson, Ariz., in February. Lamberg is president and founder of PCArchiver in Baltimore.

## 1950s

**George Oliver, LA '48, MD '52, HS '59**, was presented with the Joyce Buchheit Excellence in Health Care Award by the Parkland Health Center Foundation for his exemplary career as a surgeon at Medical Arts Clinic in Farmington, Mo., from 1959 to 2001. Oliver retired from surgical practice in 2001, but continues to assist with medical care at Southeast Missouri Mental Health Center. The celebration was held Oct. 5, 2017, in St. Louis.



After being honored with the Joyce Buchheit Excellence in Health Care Award, George Oliver (center) is surrounded by his four children.



**John Holt Jr., MD '58**, is professor of medicine at the University of Alabama at Birmingham teaching electrocardiography to fellows and fourth-year medical students. He is also a physician at the Veterans Administration Medical Center in Birmingham.

## 1960s

**Wallace Mendelson, MD '69**, recently published two books: "The Science of Sleep" (University of Chicago Press) and "Understanding Antidepressants" (Kindle/Amazon). He is retired, living in Scottsdale, Ariz., and San Diego.

## 1970s

**David Carlson, MD '73**, retired from surgical practice with Evansville Surgical Associates in Indiana after 39 years and served in Mosul, Iraq, in 2004, with the U.S. Army as a trauma surgeon.

**Kenneth M. Ludmerer, HS '76**, the Mabel Dorn-Reeder Distinguished Professor of the History of Medicine and professor of medicine at Washington University, received the Distinguished Educator

Award, Graduate Medical Education/Residents or Clinical Fellows, on Feb. 28 during a ceremony at the Eric P. Newman Education Center. He also provided a lecture during the 2018 School of Medicine Reunion, titled "A Discussion on the History and Present Status of Medical Education," to rave reviews.



**Henry Mustin, MD '78**, a retired family practice doctor, works to restore forest habitats and hikes to the Pacific Crest Trail in segments during the summer months, and has completed 1,800 miles so far.



Henry Mustin (left) and Bill Affolter rejoice at Mojave River Forks Regional Park near San Bernadino, Calif., after hiking 314 miles from the Mexican border.

**Philip Zazove, MD '78**, is the George A. Dean, M.D. Chair of Medicine, a top-five department in the specialty, at the University of Michigan Medical School. The department has expanded from 65 to 105 faculty, and residency has expanded to 13 trainees per year. At home, he and his wife, **Barbara Reed, MD '78**, enjoy time with their three grandchildren and two dogs. Barbara enjoyed 27 years on the faculty at the University of Michigan before retiring in 2016.

## 1980s

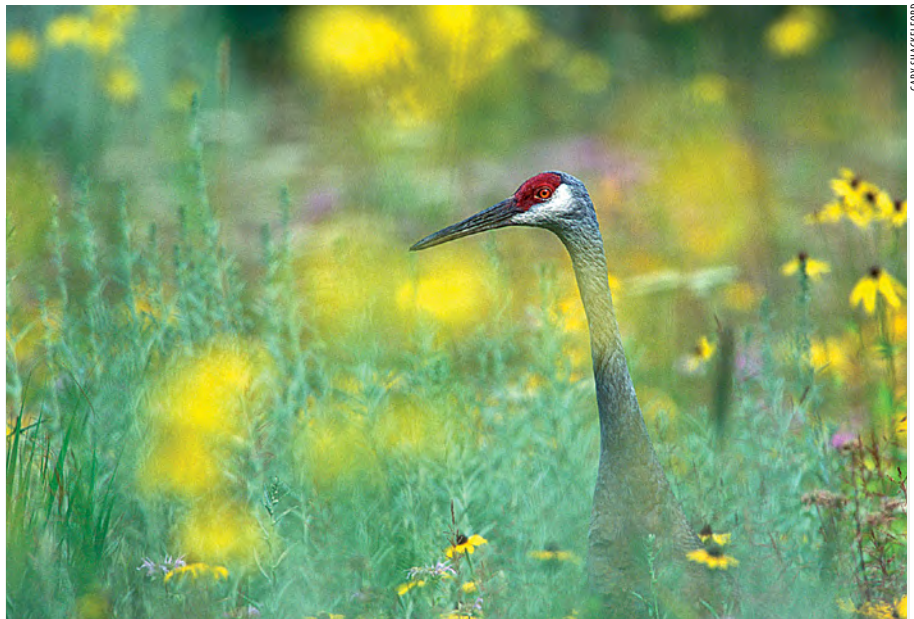
**Gina Musolino, PT '87**, was honored for her dedicated service in leadership as outgoing two-term elected president of the Academy of Physical Therapy Education (2014-2018) by the American Physical Therapy Association at its February 2018 meeting in New Orleans. She also would like to thank the Program in Physical Therapy at Washington University for the delightful 75th anniversary reunion last November — and said: “Remember to keep giving back to those who taught us!”

**Randall R. Odem, HS '87**, professor of obstetrics and gynecology, received the Distinguished Clinician Award on Feb. 28, 2018, during a ceremony at the Eric P. Newman Education Center.



**Margaret McKenzie, MD '88**, was named president of the Cleveland Clinic South Pointe Hospital, a 173-bed acute care, community teaching hospital in Warrensville

Heights, Ohio. She is also assistant professor of surgery at the Cleveland Clinic Lerner College of Medicine of Case Western Reserve University, and continues in patient care practice as an ob/gyn.



GARY SHACKELFORD

**G**ary Shackelford, MD '68, retired from medical practice in 2002. He and his wife, Penny Shackelford, MD '68, began their new careers as full-time stewards of 380 acres of rural property in southern Wisconsin. The property (above), which they have named Fair Meadows, was listed as a Wisconsin State Natural Area in 2005. Their close relationship with the land has given profound meaning to their lives. The two also spoke during the 2018 School of Medicine Reunion Awards Banquet, reflecting on the past 50 years since graduating from medical school as well as officially welcoming the newest graduates of WUSM to the alumni association.

## Leading at UC Davis

**D**avid A. Lubarsky, LA '80, MD '84, has been named vice chancellor of human health sciences and chief executive officer of UC Davis Health, which includes the School of Medicine, School of Nursing, UC Davis Medical Center and Primary Care Network.



Lubarsky previously served as chief medical and systems integration officer with the University of Miami Health System, a position he has held since 2012. He also served as the Emanuel M. Papper Professor and chair of the Department of Anesthesia since 2001, overseeing the largest anesthesia physician and certified registered nurse anesthetist training program in the U.S.

Lubarsky is an expert in health-care economics, informatics and OR management. He is one of the top 100 published practicing anesthesiologists in the U.S.

Lubarsky was the first graduate from Washington University's combined undergraduate–medical school curriculum, the Scholars Program in Medicine.



Back row: Krikor T. Dikranian, Mark E. Frisse, V. Michael Holers, Richard J. Auchus, C. Prakash Gyawali and Douglas M. Tollefsen. Front row: Stephanie A. Fritz, D. Michael Nelson, Linda J. Pike, Brad T. Cookson and Lisa M. Moscoso.

## Alumni Association honors faculty, graduates, former house staff

Each year, the Washington University Medical Center Alumni Association honors a select group of alumni, faculty members and former residents and fellows whose professional achievements, service to community and dedication to the School of Medicine are noteworthy.

Alumni, both medical and house staff, and faculty are invited to nominate accomplished graduates, former house staff, or faculty of the medical school for one of four prestigious awards. Nominations for the 2019 awards are now being accepted at [wumcnews.org/2019awards](http://wumcnews.org/2019awards).

### The 2018 honorees

#### Alumni Achievement Award

**Richard J. Auchus**, MD/PhD '88

**Brad T. Cookson**, MD/PhD '91

(reunion year '88)

**Mark E. Frisse**, MD '78, HS '82, MBA '97

**V. Michael Holers**, MD '78, HS '85

**Lisa M. Moscoso**, MD/PhD '98, HS '02

(reunion year '93)

#### Faculty Achievement Awards

**Krikor T. Dikranian**, MD, PhD

**Douglas M. Tollefsen**, MD/PhD '77,

HS '79

#### Resident/Fellow Alumni

##### Achievement Awards

**Stephanie A. Fritz**, MD, HS '07, MSCI '08

**C. Prakash Gyawali**, MD, HS '99

##### Distinguished Service Award

**D. Michael Nelson**, MD/PhD '77, HS '81

**Linda J. Pike**, PhD

## Surgical leader



**Audrey R. Talley Rostov**, MD '88,

HS '92, is the global medical director for SightLife, a health organization whose mission is to eliminate corneal blindness worldwide by 2040.

She does surgeon training and curriculum development for cornea transplant surgeons, eyebank development and capacity-building and travels to India several times per year. Talley Rostov was the first surgeon to perform and teach femtosecond laser keratoplasty in New Delhi, India. She is working on developing a prevention and post-op cornea care delivery system with female community health-care workers in Nepal and India.

She is the recipient of a Spencer Thornton 2017 Humanitarian Award, a Senior Achievement Award from the American Academy of Ophthalmology (AAO), Millennial Eye Outstanding Female Ophthalmologist Award, and serves on several AAO and American Society of Cataract and Refractive Surgery committees. Talley Rostov is also a partner at Northwest Eye Surgeons, which has six offices and four outpatient surgical centers located throughout the Puget Sound region.

## 1990s



**Brad Racette**, HS '96,

the Robert Allan Finke Professor of Neurology and executive vice chair of clinical affairs in the Department of Neurology at the School of Medicine, received

a five-year, \$2.8 million grant from the National Institute of Environmental Health Sciences of the National Institutes of Health

## Bridging cultural divides

The Bach Society of Saint Louis recently honored Kenneth Smith Jr., MD '57, HS '63, and his wife, Marjorie, for their unwavering support of the arts in the local community. Leaders of many arts organizations — including the St. Louis Symphony, Opera Theatre St. Louis, The Arianna String Quartet, The Sheldon, and Missouri Chamber Music Festival, among others — praised the Smiths for their passion and dedication. The event was held April 2 at The Sheldon.

“Ken and Marjie believe in the importance of the arts, not only in society but also in bridging cultural divides,” said John Ferguson, founder and director of American Voices, a nonprofit organization that has been conducting cross-cultural engagement with audiences in over 110 nations worldwide since 1993.

“The investments that Ken and Marjie have made in American Voices have helped our students explore music, dance and the arts. They have helped these young adults grow in a way that helps them succeed in both school and in life.”

Kenneth Smith also serves as a Sheldon Arts Foundation board member. Paul Reuter, executive director of The Sheldon Arts Foundation, said the couple’s love of classical music is legendary, as demonstrated by their “enthusiastic attendance at concerts, their generous support of the arts, and their personal presentation of outstanding chamber music in their home.”



St. Louis Symphony Orchestra Concertmaster David Halen, added: “I have spent many evenings enjoying their company, whether by playing the violin for them at Powell Hall or having a wonderful dinner and dessert in their beautiful home. I have never seen them not celebrating with a calm smile. Life is precious when they are near.”

(NIH) for research titled “Manganese-induced Neurotoxic Effects Research in South Africa.”

**Rodney Newberry, LA '87, MD '91**, professor of medicine, received a four-year, \$1.65 million grant from the National Institute of Diabetes and Digestive and Kidney Diseases



of the National Institutes of Health (NIH) for research titled “Goblet Cells in Intestinal Immune Homeostasis.”



**Angela L. Brown, MD '92**, associate professor of medicine, received the Distinguished Community Service Award during a ceremony at Eric P. Newman Education Center.

**Frank Puc, PT '95**, is now CEO for Revolution Physical Therapy Weight Loss, a 10-center organization in the greater Chicago area.

**Rebecca Sippel, MD '99**, is the chief of endocrine surgery at the University of Wisconsin and recently completed her term as president of the Association for Academic Surgery at the 13th Annual Academic Surgical Congress in Jacksonville, Fla.



## 2000s



**Andwele Jolly, LA '02, PT '05**, a business director in the Department of Medicine, was named one of 11 mid-career professionals chosen from a national pool of candidates for a prestigious Eisenhower Fellowship. Jolly plans to study how non-physician providers improve health and well-being.

**Stacy Kruse, LA '03, MD '08**, returned to the U.S. after two and a half years living abroad in England. She and her family settled in the Washington, DC, area, where she works as an assistant professor of clinical medicine at MedStar Georgetown University Hospital.

## 2010s

**Katie Barnhouse, GM '10**, and her husband, Doug, recently welcomed their first child, a son, in November 2017. She is in her eighth year as a clinical audiologist at VA Puget Sound Health Care System.

**Jennifer Hranilovich, MD '13**, has been accepted for a fellowship at the Brigham and Women’s Faulkner Hospital at the John R. Graham Headache Center.



**James Lee**, the coordinator of international scholars and patients in the Department of Surgery, died April 7, 2018, in St. Louis following a brief illness. He was 59.

Lee began working for the university in 2006 as a liaison between the department and international scholars, fellows and patients' families. His duties included helping residents and fellows manage visas, translating for Spanish speakers and providing orientations and scheduling assistance. Lee also

served as a concierge for patients' families.

"James did the work of three or four individuals," said Timothy J. Eberlein, MD, the Bixby Professor and head of the Department of Surgery. "Despite his workload, he always made the time to offer a friendly hello in the hallway or support of a colleague. He also formed close friendships with the people he helped. His knowledge of government regulations regarding visas and immigration law was herculean. He was a real force for our department and our partner institutions in attracting international visitors to the medical school campus."

Lee's dedication led to him being honored in 2011 with the Dean's Distinguished Service Award. Previously, Lee worked in Barnes-Jewish Hospital's International Health Office. An Iowa native, he graduated from Central College in Pella, Iowa, in 1980.

Lee is survived by his spouse, Ednald Yves; his brother, Patrick Lee (Brenda Lee); sister, Melinda Williams; and several nieces, nephews and great nieces.



**Brian K. Suarez, PhD**, an emeritus professor of psychiatry, died Jan. 23, 2018, of renal failure and vascular disease at his home in St. Louis. He was 72.

Suarez came to the university in 1974 as an instructor in the Department of Anthropology. He joined the School of Medicine faculty as an assistant professor of genetics in psychiatry in 1977, rising to the rank of professor in 1987. He became an emeritus professor in 2014.

"Brian was a member of the Department of Psychiatry for more than 40 years," said Charles F. Zorumski, MD, the Samuel B. Guze Professor of Psychiatry and head of the department. "He was a well-respected human geneticist who made important contributions to our understanding of the genetics of complex illnesses, including psychiatric illnesses, substance-use disorders and prostate cancer. He also had strong, personal ties to the Midwestern Amish population and played a significant role in advancing the understanding of the genetics of medical disorders in that population."

Suarez earned a bachelor's degree in anthropology from San Fernando Valley State College in 1967, then went on to complete his master's and doctoral degrees in anthropology at UCLA, earning his PhD in 1974.

Suarez is survived by his wife of 50 years, Susan Suarez; his children, Marion and Gary Suarez; a brother, Murray Suarez; two sisters, Marion (Scott) Leland and Patricia (Wayne) Crouch; and two grandchildren.

*Correction: Carl A. Hirsch, MD '59, died in Sept. '16, not in Dec. '17, as published in the Summer 2018 Outlook issue.*

## 1930s

**Richard C. Baldwin**, DE '36; Dec. '17  
**Gladys F. Barker**, OT '39; May '18

## 1940s

**Stanley C. Becker**, HS '43, LA '48, GR '50, GR '51; Feb. '18  
**John C. Herweg**, MD '45; April '18  
**Irene S. Hood**, NU '44; Dec. '17  
**Gail Leeds**, OT '47; March '18  
**Clarabel Nelson**, NU '45; March '18  
**Robert K. Royce**, MD '42, HS '49; May '18

## 1950s

**Leo S. Bankhead**, DE '56; March '18  
**Gerard H. Berndsen**, MD '52; April '18  
**Jane B. Bollinger**, NU '55; Jan. '18  
**Francis J. Brennan**, DE '52; Feb. '18  
**Edwin E. Clizer**, MD '55; Dec. '17  
**John I. Davis**, MD '55; April '18  
**Joan Edwards**, NU '51; Sept. '17  
**Donald J. Emerson**, MD '55; May '17  
**Donald B. Flitman**, HS '55; March '18  
**Rose J. Flynn**, NU '51; Jan. '18  
**Gerald E. Hanks**, MD '59; Dec. '17  
**Ralph Kustoff**, HS '55; March '18  
**William Letsch**, HS '56; Dec. '17  
**Marie M. Lindberg**, NU '51; Jan. '18  
**Eloise Jeanette Maxey**, NU '51; Feb. '18

## 1960s

**Robert W. Edmonds**, MD '60; March '18  
**Rand Terrell Frederiksen**, MD '67; Feb. '18  
**David P. Krajcovic Sr.**, LA '65, MD '69; May '18  
**Raymond J. Lipicky**, HS '62; Feb. '18  
**Paul R. Schwarz**, MD '68; Feb. '18  
**Hans D. Sommer**, HS '65; April '18  
**Wallace Stuart**, HS '64; Feb. '18

## 1970s

**Carl A. Dickerson**, DE '73; March '18  
**Don Collison Gilbreth**, DE '77; April '18  
**Richard S. Graul**, LA '70, MD '74; March '18  
**Charles P. Hughes**, GM, HS '71; March '18  
**Jacquelyn Carter Kremer**, OT '97; Feb. '18  
**Paul I. Rubinfeld**, LA '71, MD '75; March '18

**For full obituaries, visit:**  
[wumcnews.org/obits](http://wumcnews.org/obits)



## Medical students honor body donors

First-year medical students released dove-shaped, environmentally friendly balloons during a ceremony honoring those who donated their bodies to the school. In years past, students have held private appreciation ceremonies. This spring, students decided to extend their gratitude to family and friends of the donors, as well as the general public. Hundreds of people gathered in the Ellen S. Clark Hope Plaza for the ceremony, which included musical performances, a moment of silence and the balloon release. The Department of Neuroscience coordinates the Body Donor Program, which has provided thousands of cadavers, enabling trainees to gain an in-depth understanding of human anatomy.

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## 100 years of service

The occupational therapy field has come a long way since its formational days when handwork, such as basketry, weaving and wood-carving, were used to speed convalescence. Above, circa 1922, a man in a wheelchair uses a small loom at an occupational therapy patient workshop. Today, the university's Program in Occupational Therapy, now preparing to celebrate its 100th anniversary, leads the profession with its research-driven approach. See page 21.