

# Outlook

SPRING 2019



Washington  
University in St. Louis

SCHOOL OF MEDICINE

## *Resilience* in trauma

Addressing refugee  
mental health

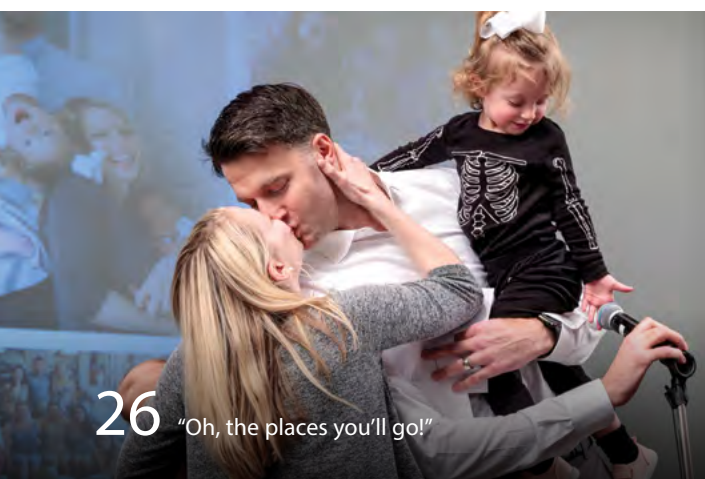




14 High-fives all around



20 On a mission



26 "Oh, the places you'll go!"

# Outlook

Washington University School of Medicine

OUTLOOK.WUSTL.EDU SPRING 2019

## FEATURES

### 6 Unending trauma

With scarce resources, doctors address mental health needs of 1 million refugees.

### 14 First paper

A photo essay follows the lab of Samantha Morris, PhD, tracking its path to discovery.

### 20 Right brain, left brain

A creative quest is priming the world for a neuroprosthetics revolution.

### 26 Match Day 2019

Graduating students learn their fates as they transition to residency.

## ALUMNI & DEVELOPMENT

28 Extending human life

30 Multiple myeloma seed funding

32 Classnotes

**ON THE COVER** Many Rohingya children who live in refugee camps in Bangladesh still manage to find joy amid great trauma. Some 1 million Rohingya fled persecution in Myanmar. About half of the camps' refugees are children. See page 6.

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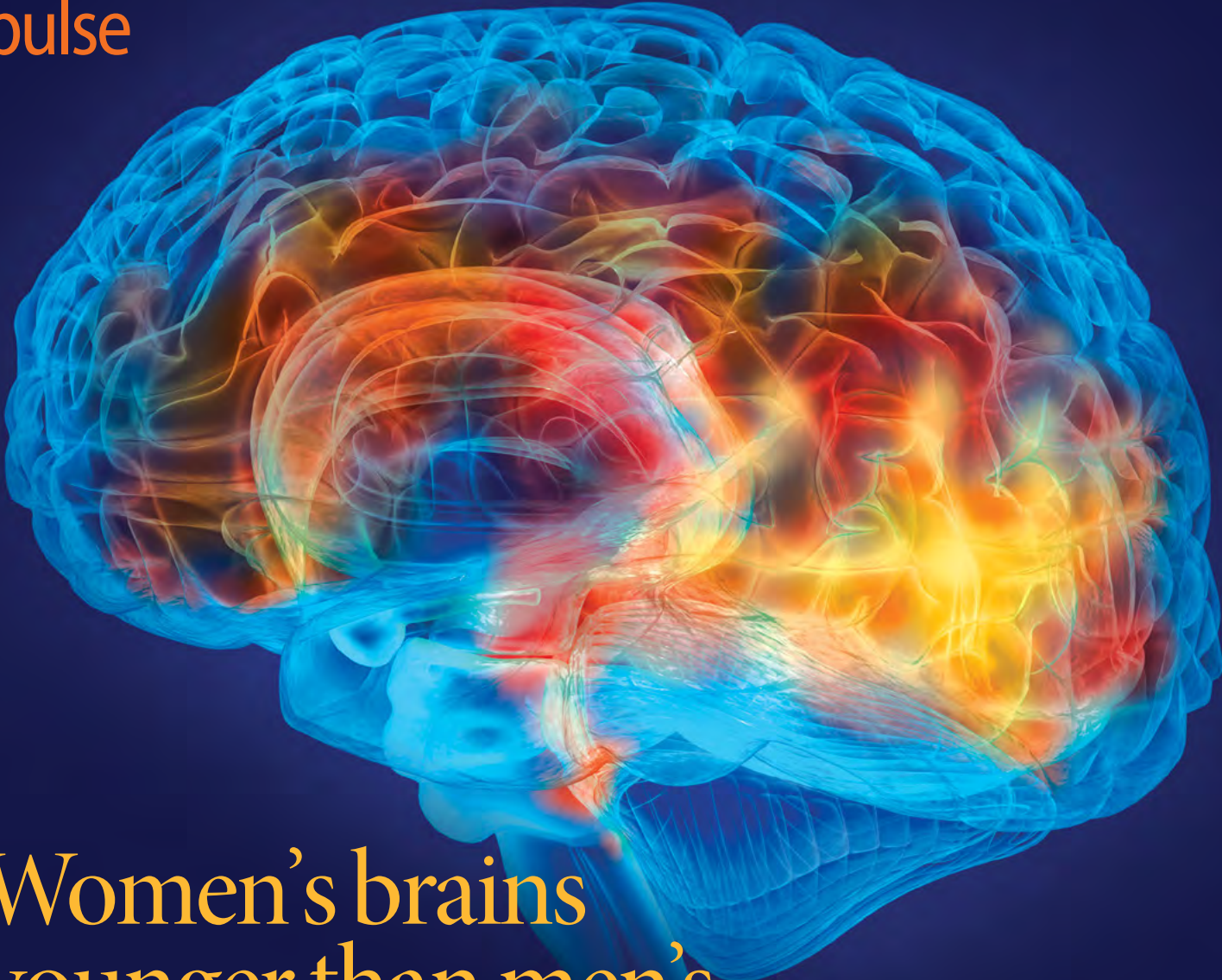
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# Women's brains younger than men's

**A** School of Medicine study finds that women's brains appear to be about three years younger than men's of the same chronological age, metabolically speaking. The findings, which appeared in Proceedings of the National Academy of Sciences, could be one clue to why women tend to stay mentally sharp longer than men.

The brain runs on sugar, but how the brain uses sugar changes as people grow and age. Babies and children use some of their brain fuel in a process called aerobic glycolysis that sustains brain development and maturation. The rest of the sugar is burned to power the day-to-day tasks of thinking and doing. In adolescents and young adults, a considerable portion of brain

sugar also is devoted to aerobic glycolysis, but the fraction drops steadily with age, leveling off at very low amounts by the time people are in their 60s.

The researchers — including senior author Manu Goyal, MD, an assistant professor of radiology at the university's Mallinckrodt Institute of Radiology, Marcus Raichle, MD, the Alan A. and Edith L. Wolff Distinguished Professor of Medicine and a professor of radiology, and Andrei Vlassenko, MD, PhD, an associate professor of radiology — studied 205 people to figure out how their brains use sugar.

The study participants — 121 women and 84 men, ranging in age from 20 to 82 years — underwent PET scans to measure the flow of oxygen and glucose in their

brains. For each person, the researchers determined the fraction of sugar committed to aerobic glycolysis in various brain regions.

With the help of machine-learning algorithms, the researchers determined that women's brains were an average of 3.8 years younger than the women's chronological ages and that the men's brains were 2.4 years older than their true ages.

The relative youthfulness of women's brains was detectable even among the youngest participants, who were in their 20s.

"It's not that men's brains age faster — they start adulthood about three years older than women, and that persists throughout life," Goyal said.



MATT MILLER

**WOMEN IN MEDICINE** Five female medical students launched 500 Women in Medicine, an initiative supporting equal advancement in the profession. The group works to unite and empower female physicians worldwide. Operating as a satellite organization of 500 Women Scientists, this new group is integrating medical disciplines into the “Request a Woman Scientist” database. This tool helps conference organizers, journalists, researchers and others connect with female physicians and scientists. From left, Maren Loe, Iris Kuo, Kate Gerull, Jane Hayes and Tamara Sanchez Ortiz.

## Connor succeeds Baum as head of occupational therapy program

Lisa Tabor Connor, PhD, noted for her extensive research into stroke recovery, will be the next executive director of the Program in Occupational Therapy (OT), effective July 1. She succeeds Carolyn Baum, PhD, the Elias Michael Director of the Program in Occupational Therapy. Baum, who has headed the program for 31 years, is stepping down to focus on research.



Lisa Tabor Connor, PhD

Connor is chair of the Department of Occupational Therapy and associate director of research programs at Massachusetts General Hospital Institute of Health Professions. There, she built a new department and an OT doctoral program.

Connor previously served on the Washington University faculty from 2001 to 2014. In addition, she earned a doctorate in experimental psychology and a master’s degree in occupational therapy from the university.

“I am thrilled to be returning to my hometown to take the helm of the finest OT program in the country,” Connor said. “I look forward to building further on the program’s excellence at the dawn of its second century.”

Connor studies the neural, behavioral and social determinants of stroke recovery, with a particular focus on people who lose the ability to speak and understand language, a condition called aphasia.

# Stem cell approach to treating diabetes

Scientists working to develop more effective diabetes treatments are turning to stem cells. Such cells can be transformed into cells that produce insulin, the hormone that controls blood sugar.

But there’s a major challenge: the amount of insulin produced by these cells is difficult to control.

Now, by tweaking the recipe for coaxing human stem cells into insulin-secreting beta cells, researchers have shown that the resulting cells are more responsive to fluctuating blood glucose levels.

When they transplanted the beta cells into mice that could not make insulin, the new cells began secreting insulin within a few days, and they continued to control blood sugar in the animals for months.

The study was published Jan. 17 in the journal *Stem Cell Reports*.

“We’ve been able to overcome a major weakness in the way these cells previously had been developed,” said principal investigator Jeffrey R. Millman, PhD, an assistant professor of medicine and of biomedical engineering.

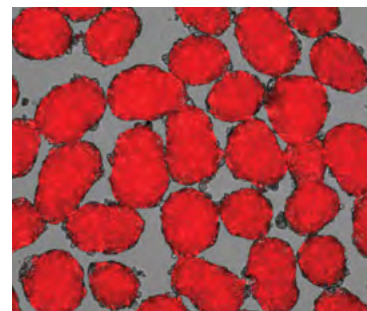
The researchers now believe it may be time to evaluate whether the same stem-cell approach could produce insulin and effectively control blood sugar in people.

Millman was a part of a research team at Harvard that, in 2014, converted skin cells into stem cells and, in 2016, did the same thing with skin cells from a patient with diabetes. Each time, the stem cells were then treated with various growth factors to coax them into insulin-secreting beta cells.

“Previously, the beta cells we manufactured could secrete insulin in response to glucose, but they were more like fire hydrants, either making a lot of insulin or none at all,” he said. “The new cells are more sensitive and secrete insulin that better corresponds to the glucose levels.”

For this study, Millman’s lab treated the cells with different factors at different times as they grew to help the cells mature and function more effectively.

As a researcher rather than a clinician, Millman said he can’t predict exactly when such cells may be ready for human trials, but believes there are several ways that stem cell-derived beta cells could be tested. Millman said that if the cells are proven safe and effective, his method of manufacturing the cells quickly could be ramped up to an industrial scale.



New beta cells appear red as they secrete insulin in response to glucose.

MILLMAN LAB

# Head of pathology and immunology named



Richard Cote, MD

Richard J. Cote, MD, an innovative physician-scientist and entrepreneur specializing in cancer, has been named head of the Department of Pathology and Immunology. Cote

succeeds interim head Charles Eby, MD, and former head Herbert "Skip" Virgin IV, MD, PhD, who is now executive vice president of

research and chief scientific officer at Vir Biotechnology in San Francisco.

Cote comes from the University of Miami Miller School of Medicine, where he is the Joseph R. Coulter Jr. Professor of Pathology and a professor of biochemistry and molecular biology. Cote, a founding director of the Dr. John T. Macdonald Foundation Biomedical Nanotechnology Institute at the University of Miami, is well-known for his research on tumor progression and response to therapy. He led three of the largest clinical trials in breast, lung and bladder cancer, which were based on research from his laboratory.

He has shown that the accumulation of mutations in tumor-suppressor genes can predict the outcomes of bladder cancer. These findings led to an international multicenter trial to treat bladder cancer by targeting the tumor-suppressor pathway. In seminal breast cancer trials, he has shown that hidden lymph node and bone metastases, undetected by conventional testing, have a major impact on patient outcomes.

Cote continues to maintain an active clinical practice focused on the diagnosis of breast and genitourinary cancers.

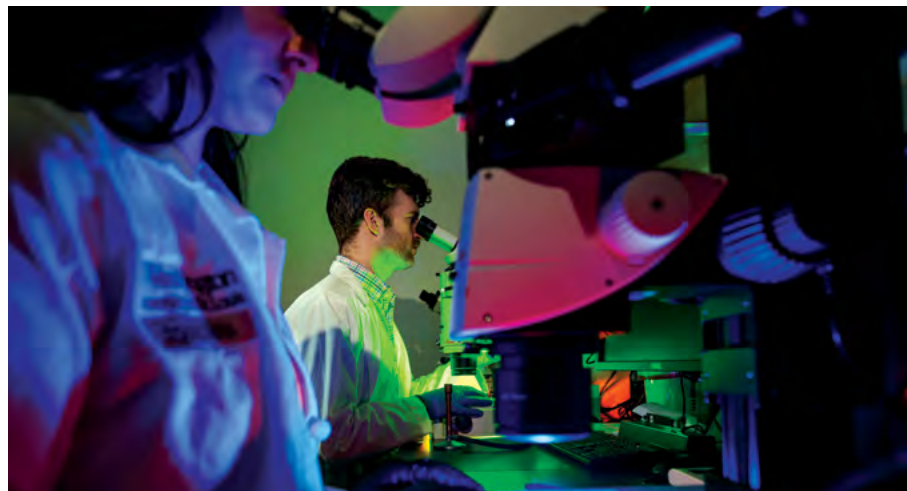
# Centene commits \$100 million to fight disease

**C**entene Corp. and the School of Medicine announced an agreement to transform and accelerate research into treatments for Alzheimer's disease, breast cancer, diabetes and obesity.

Centene will fund up to \$100 million over 10 years in research at Washington University. The funding will galvanize the School of Medicine's Personalized Medicine Initiative, which aims to develop customized disease treatment and prevention for patients. Innovations that arise from the initiative will be commercialized through the ARCH Personalized Medicine Initiative, a joint venture between the School of Medicine and Centene.

"We share the goal of helping to improve the health of our communities through research, education and customized treatment for people suffering from chronic illnesses," said Michael F. Neidorff, chairman and CEO for Centene. "We believe personalized medicine is the path to ensure patients get the targeted health care they need to fight disease, and we look forward to partnering with such a renowned medical school to initially focus on four diseases that impact millions of Americans, including many of our health plan members."

The investment will leverage the university's research and biomedical capabilities, including advanced technologies



MATT MILLER

such as CRISPR, and internationally known scientists in the areas of the microbiome, immunomodulatory therapies, cancer genomics, neurodegeneration, cellular reprogramming, chemical biology, informatics and others.

The funds will strengthen resources at many centers and institutes, including the Edison Family Center for Genome Sciences & Systems Biology; the Andrew M. and Jane M. Bursky Center for Human Immunology and Immunotherapy Programs; Siteman Cancer Center; the Elizabeth H. and James S. McDonnell III Genome Institute; the Institute for Informatics; and the Center of Regenerative Medicine.

**Centene will fund up to \$100 million over 10 years in research at Washington University, helping to accelerate treatments for Alzheimer's disease, breast cancer, diabetes and obesity.**

"We will be bringing together world-class resources and intellectual horsepower from every basic and clinical scientific discipline to urgently accelerate the timeline for developing therapies that are more precisely targeted, with aspirations to do so within the next five to seven years," said David H. Perlmutter, MD, executive vice chancellor for medical affairs, the George and Carol Bauer Dean, and the Spencer T. and Ann W. Olin Distinguished Professor at the School of Medicine.



BUC HEALTHCARE

**SERVICE GROWTH** Siteman Cancer Center, the region's only National Cancer Institute-designated Comprehensive Cancer Center, will open a facility at Memorial Hospital East in Shiloh, Ill., in early 2020. The \$38 million, 70,650-square-foot medical office building will house Siteman's sixth location and replace its temporary space at 4000 N. Illinois Lane in Swansea. Washington University Physicians in Illinois Inc. will provide specialty cancer care to patients at the location.

## 'Tireless' physician-scientist to lead newborn medicine division



Barbara Warner, MD

Barbara B. Warner, MD, a physician-scientist noted for her commitment to critically ill infants, has been named director of the Division of Newborn Medicine.

"Dr. Warner is steady, skilled and compassionate in her care of, perhaps, the most fragile of patients — infants struggling for life in the neonatal intensive care unit (NICU)," said

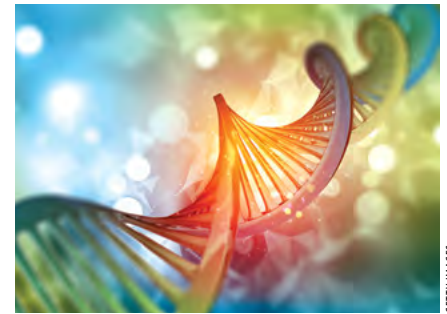
Gary A. Silverman, MD, PhD, the Harriet B. Spoehrer Professor and head of the Department of Pediatrics. "She is tireless in her efforts. She is highly respected by her peers and beloved and trusted by parents."

Warner, a professor of pediatrics, is known nationally for studies — many funded by the National Institutes of Health (NIH) — on the role of the gut microbiome in infant health and disease. As a co-investigator for the Human Microbiome Project, she also researches the preterm microbiome in infants with necrotizing enterocolitis, an intestinal illness that can cause death.

Warner succeeds F. Sessions Cole, MD, the Park J. White MD Professor of Pediatrics, who served as the division's director since 1986. Cole is the assistant vice chancellor for children's health and the executive vice chair of pediatrics, among other roles.

# Genome Institute gets ready for new era

The McDonnell Genome Institute is expanding its capacities beyond genome sequencing and adding a vital focus on understanding how genetics influences health and disease, said new executive director Jeffrey Milbrandt, MD, PhD.



GETTY IMAGES

Over decades, genome sequencing has uncovered thousands of genetic variants, but most are of unknown significance.

"The role that I think the Genome Institute will play over the next decade will be to devise rapid and efficient ways to separate the genomic wheat from the chaff, so to speak," said Milbrandt, also the James S. McDonnell Professor and head of the Department of Genetics. "We want to identify those DNA variations that are crucial to the disease process, so we can develop better treatments."

Large-scale sequencing activities will continue, but the institute will shift from its concentration on "reading" the genome to one focused on interpreting genome variation associated with disease. Following closely will be an era of "writing" the genome, where researchers alter the genome to prevent or treat disease.

Milbrandt envisions the institute adding cutting-edge functional studies, melding high-throughput imaging capabilities with the ability to analyze the genomics of a single cell.

"We want the Genome Institute to be an important resource for all investigators at Washington University and throughout the Midwest," he said.



Jeffrey Milbrandt, MD, PhD

Current centers providing genome sequencing and genome engineering established by the Department of Genetics will be brought under the institute umbrella, including the Genome Engineering and iPSC Center and the Genome Technology Access Center.

The institute will leverage the expertise of scientists who dissect disease causes, physicians who treat patients, and informatics specialists analyzing enormous genomic and clinical datasets.

A steering committee will help guide the institute's transition period.

## Light drinking ups death risk

Drinking a daily glass of wine for health reasons may not be so healthy after all, suggests a new study.

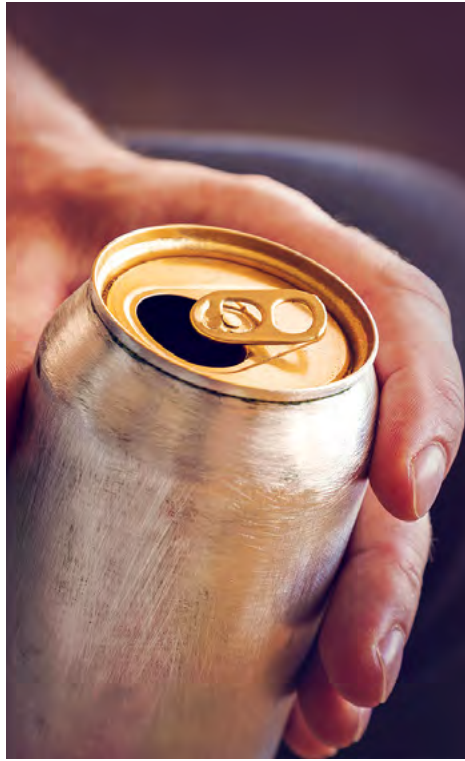
Analyzing data from more than 400,000 people ages 18 to 85, the researchers found that consuming one to two drinks four or more times per week — an amount deemed healthy by current guidelines — increases the risk of premature death by 20 percent, compared with drinking three times a week or less. The increased risk of death was consistent across age groups.

“It used to seem like having one or two drinks per day was no big deal, and there even have been some studies suggesting it can improve health,” said first author Sarah M. Hartz, MD, PhD, an assistant professor of psychiatry. “But now we know that

even the lightest daily drinkers have an increased mortality risk.”

Although earlier studies have linked light drinking to improvements in cardiovascular health, Hartz said the new study shows that those potential gains are outweighed by other risks. Her team evaluated heart disease risk and cancer risk and found that, although in some cases drinking alcohol may reduce risk of heart-related problems, daily drinking increased cancer risk and, as a result, mortality risk.

The new study comes on the heels of research published in *The Lancet*, which reviewed data from more than 700 studies around the world and concluded that the safest level of drinking is none.



GETTY IMAGES

## Decreased deep sleep, Alzheimer's linked

Older people who have less slow-wave sleep — the deep sleep you need to consolidate memories and wake up feeling refreshed — have higher levels of the brain protein tau, researchers have found. Elevated tau is a sign of Alzheimer's disease and has been linked to brain damage and cognitive decline.

The findings, published Jan. 9 in *Science Translational Medicine*, suggest that poor-quality sleep in later life could be a red flag for deteriorating brain health.

“What's interesting is that we saw this inverse relationship between decreased slow-wave sleep and more tau protein in people who were either cognitively normal or very mildly impaired, meaning that reduced slow-wave activity may be a marker for the transition between normal and impaired,” said first author Brendan Lucey, MD, an assistant professor of neurology and director of the Washington University Sleep Medicine Center.

Lucey, along with David Holtzman, MD, the Andrew B. and Gretchen P. Jones Professor and head of the Department of Neurology, and colleagues studied 119

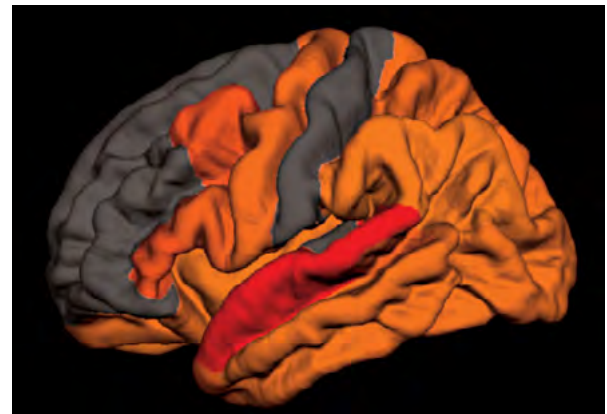
people 60 years of age or older. Most — 80 percent — were cognitively normal, and the remainder were very mildly impaired.

The researchers monitored the participants' sleep at home over the course of a week via an EEG monitor that strapped to their foreheads, a wristwatch-like sensor and and sleep logs.

The researchers also measured levels of amyloid beta and tau in the brain and in the cerebrospinal fluid that bathes the brain and spinal cord. Thirty-eight people underwent PET brain scans, and 104 people underwent spinal taps. Twenty-seven did both.

Decreased slow-wave sleep coincided with higher tau levels in the brain and a higher tau-to-amyloid ratio in the cerebrospinal fluid.

“The people with increased tau pathology were actually sleeping more at night and napping more in the day, but they weren't getting as good quality sleep,” Lucey said.



BRENDAN LUCEY

Reduced amounts of slow brain waves are associated with high tau levels. This computer-generated image maps the areas where the link is strongest, in shades of red and orange.

If future research bears out their findings, sleep monitoring may be an easy, affordable way to screen earlier for Alzheimer's disease. Daytime napping was significantly associated with high levels of tau, meaning that asking a simple question — How much do you nap during the day? — might help doctors identify people who could benefit from further testing.



Today, more than 900,000 Rohingya who fled violence in their home country of Myanmar live in overcrowded refugee camps in southeastern Bangladesh, not far from the Bangladesh-Myanmar border. They began arriving in desperate waves in August 2017. Many are deeply traumatized. Their future remains uncertain.





# Unending trauma

With scarce resources, doctors address mental health needs of 1 million refugees

BY ELIZABETHE HOLLAND DURANDO

COX'S BAZAR DISTRICT, Bangladesh — From high atop barren hills and the crests of skinny, rutted roads, the views of the vast camps that serve as makeshift homes to more than 900,000 Rohingya refugees are staggering.

In every direction, stretches of hastily built, criss-crossed bamboo walls and roofs hold in place dirty orange, blue, black and white tarps that offer scant protection from monsoon rains and the blazing sun. The tiny huts — thousands of them — stand crooked, as if dropped into place by a cyclone, or upright, in crammed rows backed into hillsides stripped of vegetation.

Within each of those thousands of shelters is a story — many too hard to tell, all immersed in pain and loss.

Rupa Patel and Anne Glowinski, colleagues at the School of Medicine, want to hear the stories and want the Rohingya to know they're being heard.

E. HOLLAND DURANDO



E. HOLLAND DURANDO

From left, Tanzila Tasnim, a clinical psychologist who works for the government of Bangladesh, talks to psychologist Mohammed Majed Islam, Rupa Patel, MD, MPH, interpreter Shamim Pal and Anne Glowinski, MD, MPE, about the challenges of delivering mental health care in the refugee camps. Tasnim bases her efforts out of a bamboo hut.

**P**atel, MD, MPH, a public health specialist, and Glowinski, MD, MPE, a child and adolescent psychiatrist, visit the camps as part of their work with a Bangladeshi organization to help provide refugees access to mental health care. Bangladesh, United Nations (U.N.) agencies and an international network of aid organizations have responded to the ongoing crisis with food, shelter and medical care. Still, the refugees desperately need mental health care.

Many of the Rohingya lost everything in their home country of Myanmar. Survivors tell of rape, murder and villages burned to the ground by military forces. They tell Glowinski and Patel their culture doesn't have a word for mental health, but that they know what it looks like when someone's mental health is in trouble. It's when their neighbors can't stop crying. When men and women repeat the same horrific stories over and over. And when they and their children have nightmares that don't go away.

And there are so many nightmares.



The Rohingya population has faced decades of repression by Myanmar's Buddhist majority and security forces. Despite Bangladesh's own struggles with poverty, it has opened its borders

to several waves of fleeing Rohingya, beginning in 1978. But an especially brutal campaign that began Aug. 25, 2017, sparked the largest, most desperate exodus.

Following deadly attacks on Burmese police checkpoints by a group of insurgent Rohingya, Myanmar's military and Buddhist extremists reportedly killed an estimated 10,000 Rohingya. The campaign, which Myanmar's military denies, resulted in some 740,000 Rohingya — mostly Muslim but some Hindu — fleeing for Bangladesh through miles of thick forests and aboard overloaded, rickety boats. More than 2,200 drowned or starved along the way, according to news accounts.

U.N. investigators and human rights groups want Myanmar's army commander and other generals to face trial in an international court for genocide and crimes against humanity.

Many Rohingya want this, too.

But for now, and likely years to come, they are in limbo. Now home to the world's largest refugee camp, Bangladesh has welcomed its persecuted neighbors but is not offering a path to citizenship. And while Myanmar and Bangladesh have negotiated "repatriation" of the Rohingya, returning to Myanmar isn't a viable choice, the refugees assert — not without a guarantee of safety.

Patel — an assistant professor of medicine and director of a program that helps people at risk of contracting human immunodeficiency virus — has long felt a deep affinity for Bangladesh and a calling to help people pushed to society’s margins.

She first immersed herself in the South Asian country in 2007, when she worked with the International Medical Corps in its response to Cyclone Sidr, one of the nation’s worst natural disasters. A master at connecting the many dots required to implement health-care services, she has since become senior health adviser for a Bangladeshi nongovernmental organization (NGO) — called Friendship in Village Development Bangladesh (FIVDB) — that asked for her help as the flood of Rohingya refugees overwhelmed the country’s safety nets in 2017. She began advising FIVDB on which services were most needed — from sanitation to medication to shelter — and how best to deliver them to a displaced population.

Glowinski, associate director of the university’s Division of Child and Adolescent Psychiatry, found herself in Bangladesh for much the same reason she found herself in psychiatry. During World War II, her great-grandparents died in the Warsaw Ghetto in German-occupied Poland, and several great uncles and great aunts died in Nazi concentration camps. Glowinski’s father was a “hidden child” during the war — a Jewish child taken in by a family of Catholic bakers who saved him by pretending he was theirs.

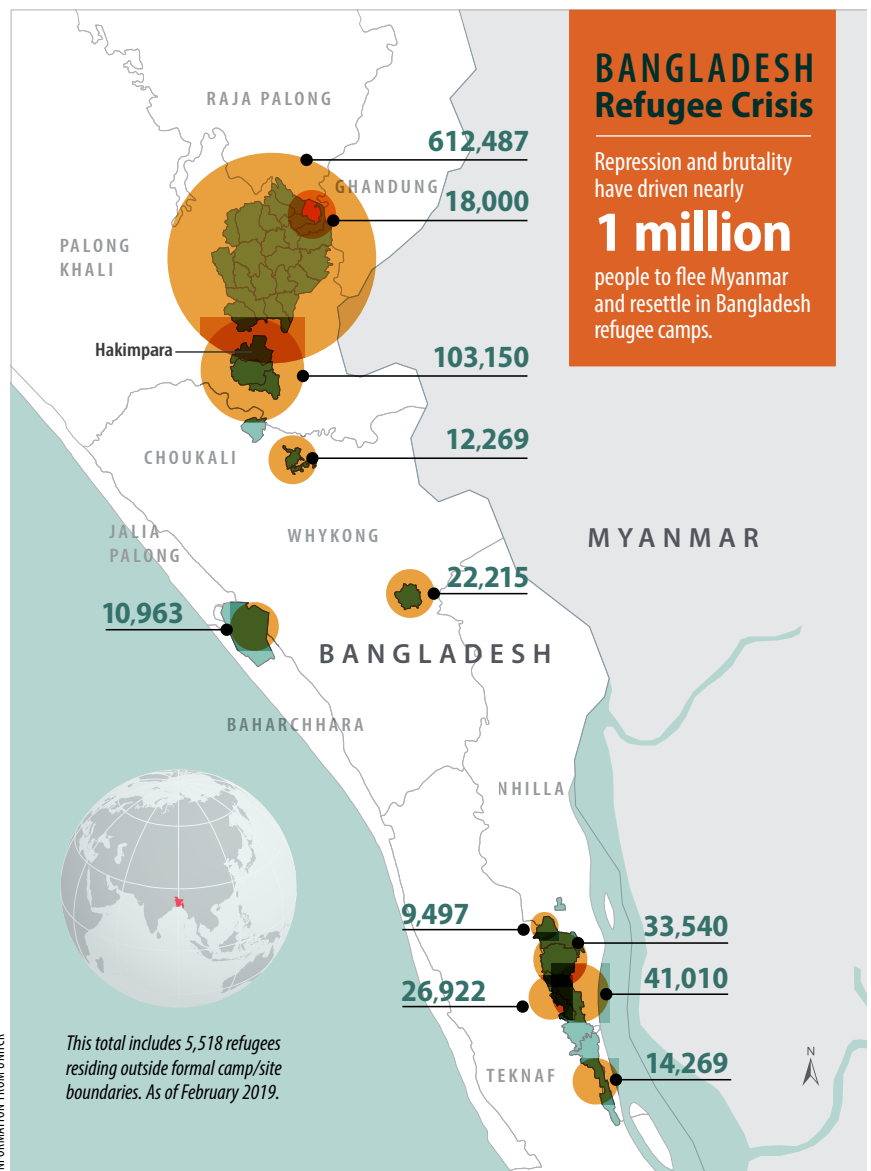
“I grew up very early understanding how history and trauma could shape a person’s entire life,” she says. “Something I thought about often as a child was that every child in the concentration camps must have been thinking, ‘Where is the world? Where are good people to save me from this horrible situation?’”

When FIVDB sought help from Patel, she quickly realized that mental health care was at a minimum in the camps and that refugees were suffering from post-traumatic stress disorder (PTSD), anxiety and depression. She contacted Glowinski, and — with support from the Global Health Center of the Institute for Public Health — their partnership formed.

Last spring and fall, Glowinski began training the NGO’s employees and community workers on what mental health is and in the basics of screening for and responding to mental health problems. Recognizing the camps’ absence of psychiatrists and scarcity of psychologists and therapists, Patel and Glowinski are zeroing in on

other means to help, building on existing efforts. At face value, some of those efforts have nothing to do with mental health, but offer entry to refugees’ homes and mindsets.

“It’s very evident that we need to integrate mental health into every type of interaction we and FIVDB have with this community, whether it’s when we’re giving them blankets, or food relief, or helping women with pregnancy, or giving them stoves that decrease the amount of pollution and smoke in their tents,” says Patel, who has made several trips to the camps. “I’ve given you a stove, but now let me help you with healing mentally and physically. And let me help your family.”





A 10-year-old girl sits quietly on the tarp-covered floor of a bamboo hut, listening as her mother describes the horrifying day they lost four family members and barely escaped with their own lives.

The men who attacked their village of Tula Toli near the Myanmar-Bangladesh border on Aug. 30, 2017, killed the girl’s father, 2-year-old sister, and 4-year-old and infant brothers — stabbing the baby while in his mother’s arms. They raped her mother. They gashed her and her mother’s heads with machetes. Then they set the family’s home on fire with the mother and daughter inside.

With military outside their door, the two escaped from the rear of the house and hid in the forest for days before they were able to begin their trek to Bangladesh.

Her mother, 30, winces as she races through the story, but she wants the world to hear it.

“Ask her if it’s hard when she hears her mom tell the story,” Glowinski gently asks an interpreter, himself a Rohingya refugee. “Ask her how often she thinks about what happened that day.”

The girl responds in a small, clear voice. “I often remember all of those things,” she says. When she sees babies, she cries. They remind her of her baby brother, she says.

The girl’s mother begins to weep.

Glowinski pauses, then softly continues. “Ask her if she worries about her mom.”

The little girl nods, and tears well in the corners of her eyes.

**Rupa Patel, MD, MPH, visits with Rohingya children who have come to watch an educational play. The plays touch on a range of topics. Patel and Anne Glowinski, MD, MPE, are working to add mental health themes.**



MUHAMMAD MOSTAFIGUR RAHMAN



Glowinski and Patel meet with refugees to better understand what they have gone through and lost in the most recent exodus and in the years of repression preceding it. The more they understand the culture and what life was like in Myanmar for the Rohingya — considered one of the world’s most persecuted minorities — the more effective they can be at helping them.

“It seems the Rohingya find a way of carrying a lot on their backs without breaking,” Glowinski says in a meeting with nine Rohingya men in their 50s to 70s. “They keep going.”

The older men describe a happy, peaceful time their grandparents used to speak of. That changed in 1948, when Myanmar gained its independence from Britain. In the years since, the Rohingya Muslims have felt increasingly unwanted and targeted.

“What we remember is just violence, violence, violence,” one of the men says.

Myanmar, formerly Burma, stripped them of their citizenship in 1982. Many Burmese refer to the Rohingya as immigrants from Bangladesh, even though they have lived in Myanmar for generations.

“If we are in Burma, they call us Bengali,” one man says. “And when we come here, they (the Bengali) call us Rohingya.”

The men feel cheated out of what should be theirs: their homes, livelihoods, freedom of religion and movement, citizenship. They see their history and their cultural identity slipping away.

The Rohingya aren’t even allowed their name, one man says. He offers the example of a family with many cows. “All of the cows have a name — red cow, black cow, white cow — but we Rohingya have no name. Without our name, how can we go back? Without our rights, how can we go back?”



Patel, Glowinski and program leaders zip from place to place in Hakimpara, the camp where FIVDB does most of its outreach. Because the NGO so appreciates Patel’s and Glowinski’s expertise, Washington University’s name and logo have a prominent place on a community center sign in the camp.

The group visits a one-room, government-run mental health center. It’s a simple bamboo hut, but it has a welcoming feel, with construction-paper hearts and origami birds dangling from the ceiling and children’s artwork displayed on the walls. Most importantly, it’s staffed by a clinical psychologist, Tanzila Tasnim.



E. HOLLAND DURANDO

This woman and her daughter, shown in the hut where they live, are the only surviving members of their family. The rest were slain in the family's village in Myanmar. Despite serious injuries, the two escaped to Bangladesh.

Glowinski and Patel are pleased to know Bangladesh recognizes the need for mental health care in the settlements. Tasnim says she is one of 10 government-funded clinical psychologists in the camps, and that she and the others are assisted by 20 volunteer psychosocial counselors.

Still, with close to 1 million refugees, the need is immense while the number of providers is small. A recent report from the Office of the United Nations High Commissioner for Refugees says that since September 2017, several U.N. agencies and NGOs have gotten involved in addressing mental health, but that the response remains significantly under-resourced and in need of better coordination. The report notes a high prevalence of mental health concerns, including frequent thoughts of suicide linked to hopelessness, the refugees' lack of prospects for the future, and loss of identity.

Tasnim, Glowinski and Patel discuss how they can help each other. They decide that a psychologist newly hired by FIVDB will observe Tasnim during counseling sessions and participate in training programs she leads or is otherwise involved in.

And during Glowinski's next visit to Bangladesh, she will offer training for physicians on how to diagnose and prescribe medication for anxiety, depression and PTSD. Better access to such medications not only will help adults suffering from mental illness, but their children, Glowinski says.

"Kids suffer when their parents suffer," she says.



The camps will never have enough professionally trained mental health providers. So Patel and Glowinski visit Hakimpara's obstetrician-gynecologist and talk to her about identifying and helping patients coping with trauma.

The two doctors watch a skit about the benefits of having small families as opposed to having many children, the latter of which is common for the Rohingya. FIVDB's interactive theater program, which draws throngs of captivated Rohingya children, produces plays with educational messages. Previous plays extolled vaccinations and infection prevention, and discouraged child marriage. Patel and Glowinski are suggesting ways to weave in mental health-related messages.



E. HOLLAND DURANDO

Rohingya men carry sacks of grain up steep steps in Hakimpara camp. Workers have attempted to fortify the landscape in the camps to help prevent landslides and other damage that monsoon season brings.

They visit a refugee's home to see how an NGO employee or volunteer might be able to help with mental health while, for example, delivering a stove. Of the conduits to mental health care, the NGO's representatives — including refugees who volunteer for the group — are the most promising. Glowinski trains them on how to respond to refugees' mental health concerns while also being mindful of their own health; it's easy to burn out in such high-stress settings.

During a training session led by Glowinski, a soft-spoken Bengali man confesses the distress he feels when refugees talk about the violence they experienced in Myanmar. It makes him think of his own daughters. It hurts, he acknowledges, to listen to their stories.

"We experience vicarious trauma," Glowinski responds, giving name to the pain many in the room have experienced, and will again. "Listening can be a trauma for us, and sometimes we want it to stop. But if we're not careful, when we want to stop our pain, we hurt the victims by distancing ourselves.

"It is better to be emotional because of what people tell you than to be cold because you're trying to keep it together. It is better to use your emotion to say, 'I am so sorry. I am so sorry that this happened to you.'"

Patel's and Glowinski's conversations rarely cease. They talk with FIVDB's project coordinator about teaching refugees life skills, and applying for grants to help with funding. They talk about helping the Rohingya document their eroded history, and helping widows find work in the camps so they can buy their children clothing and work toward financial independence.

They discuss programs they plan to pursue, including one aimed at preventing gender-based violence and human trafficking. Domestic and sexual violence are issues in the camps, and there are reports of Rohingya women and girls being trafficked and then sexually exploited elsewhere.

Patel — a member of a team that helped document crimes against the Rohingya for a recent report by the group Physicians for Human Rights — updates Glowinski on a budding refugee-focused collaboration with Washington University's School of Law. Their ultimate goal: justice for the Rohingya.

"The Rohingya, as we found out, are living in a world where they would be really horrified to think that the world doesn't care," Glowinski says. "We need to show them that the world cares." □



A Rohingya refugee shops for produce in a small stall in the Hakimpara camp in Bangladesh. While the camps are overcrowded, many refugees grow and sell produce to fellow residents of the camps. Many came from rural areas in Myanmar, where they worked as farmers.




A girl bringing water to her hut wears yellow paste on her face that Rohingya girls use as makeup and to protect against insects and sun.



From left, these three brothers and an older brother not shown are the only survivors of an extended family of 56 Rohingya Muslims. The brothers, who escaped to a refugee camp in Bangladesh, say soldiers in Myanmar killed their family members.

PHOTOS BY E. HOLLAND DURANDO



Samantha Morris, PhD, trains a student to prepare single-cell libraries. "In a new lab, the principal investigator has to get on the bench to do the experiments," Morris said. "For a while, you are the only person in your lab. Even when people begin to join the lab, you are the only person to train them. Even though the lab is gaining expertise, I still like to do experiments."





# First paper

Tracking a young lab on its path to discovery

PHOTO ESSAY BY MATT MILLER

Samantha A. Morris, PhD, an assistant professor of developmental biology and genetics, joined the faculty in 2015. Since launching her lab, she has nurtured a highly collaborative culture involving research techs, students in the Medical Scientist Training Program (MSTP) and the Division of Biology and Biological Sciences (DBBS), and postdoctoral trainees.

For months, the young lab logged many hours, experiencing the ups and downs that go along with discovery and publication. On Dec. 5, 2018, the lab's first paper was published, in the major scientific journal *Nature*.

The Morris lab has designed a cellular tracking system that can give scientists a view of how cells develop. This "flight data recorder" for cells could one day help scientists guide cells along the right paths to regenerate tissues or organs.

*After spending 20 years as a photojournalist, Matt Miller became a School of Medicine photographer. "I wanted to apply some of the patience and planning that I've used in photojournalism to capturing special moments in a basic science lab," he said. "The biggest obstacles: finding a suitable lab and my lack of scientific knowledge. Everyone in the Morris lab was so welcoming." The result: this photo essay.*



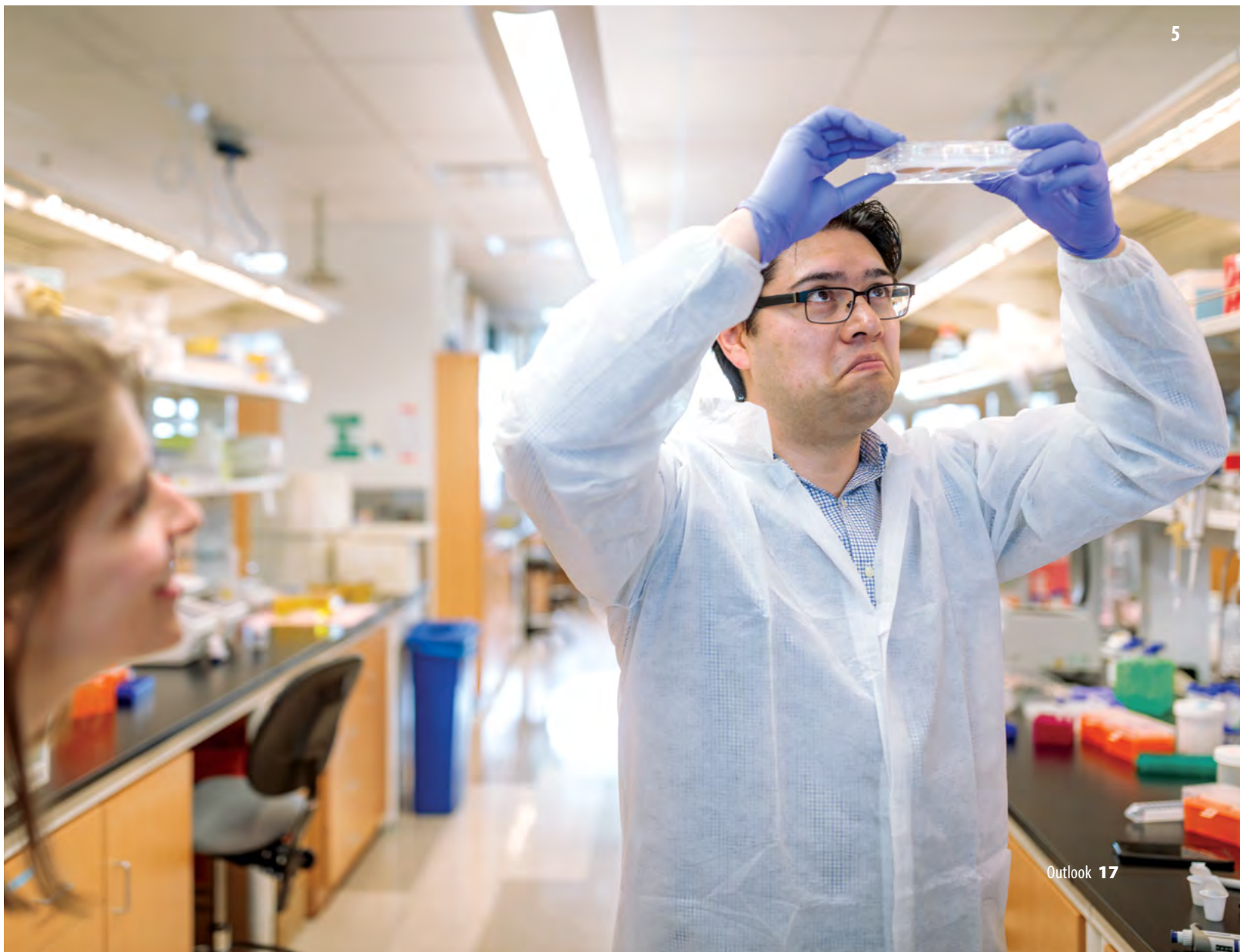


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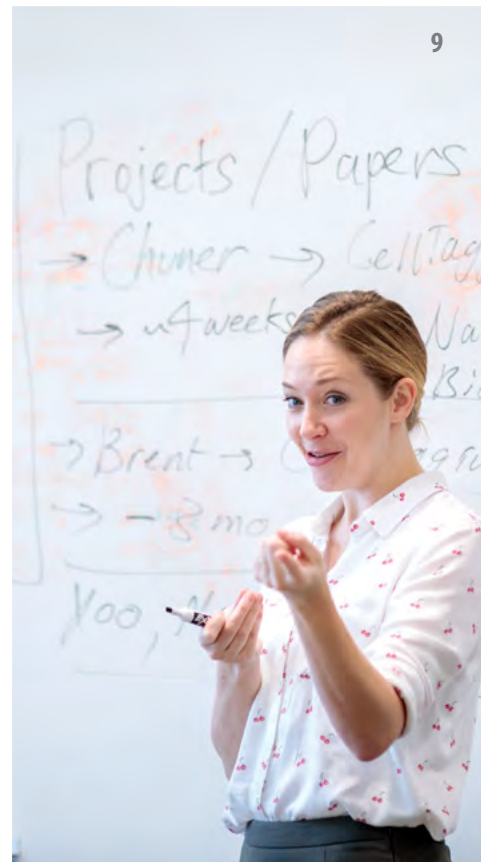
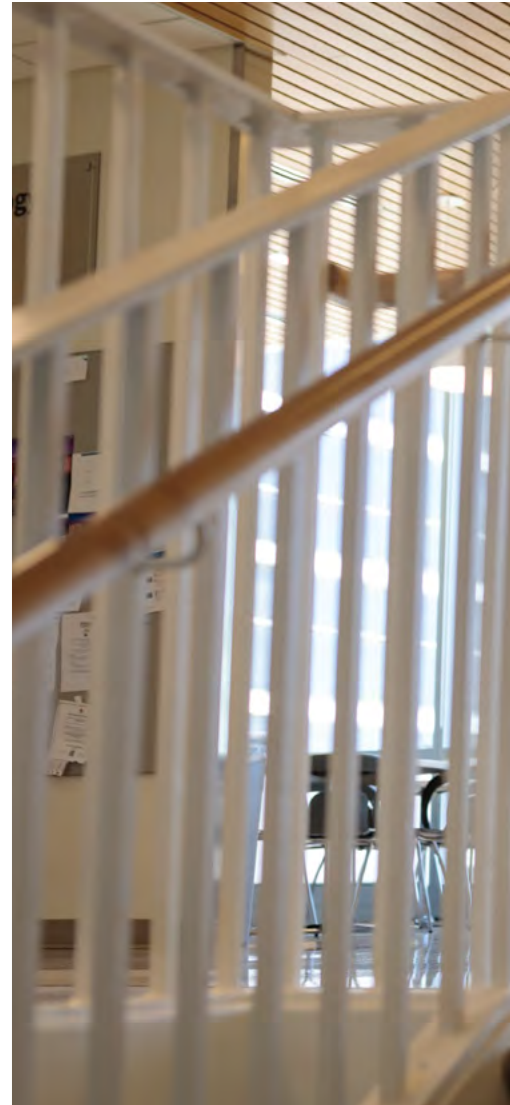
1. Samantha Morris, PhD, and Sarah Waye, a DBBS student, meet weekly to troubleshoot technical problems.
2. Waye gets images of the cells on a confocal microscope in the Center for Cellular Imaging. "I like doing imaging because the end product can be so beautiful," she said.
3. "By doing single-cell experiments, I got to think about science from a technology development perspective," said MSTP student Chuner Guo, "and I learned a whole lot about how to come up with new ways to better answer biological questions."
4. Postdoctoral fellow Guillermo Rivera Gonzalez, PhD, uses half and half to increase the contrast of the stained colonies in the dish. "It's quite common to use regular household items in our research," Morris said. "It's much easier and cheaper to pick up these simple items from the store!"
5. After staining the cells, Rivera Gonzalez holds them up to the light and likes what he sees: a noticeable difference between the control and the experiment. Research tech Catie Newsom-Stewart leans in to see.



2



6. Wenjun Kong, a DBBS graduate student, troubleshoots people's computational experiments. The signature red bean bag has become a focal point for discussions and a place to take mental breaks.
7. Kenji Kamimoto, PhD, left, a postdoctoral fellow, and DBBS graduate student Brent Bidy in a shared space in the Couch Building. The Japanese Society for the Promotion of Science awarded Kamimoto an Overseas Research Fellowship to work in the U.S. "Kenji is arguably one of the top up-and-coming scientists from Japan," Bidy said. "As someone from a small rural town in Oklahoma, I would not have met him if it weren't for science. Science has brought not just Kenji and me closer together but everyone in the lab as well."





7



10

- 8–9. The lab's weekly meetings often are accompanied by food. Although Morris presented on this day, everyone takes turns.
10. The lab celebrates all major events — grants, paper acceptances, thesis proposals. "One minute I can get an email with good news that we've had a grant awarded, then shortly after there can be a disappointing paper rejection," Morris said. "It's the amplitude of the ups and downs that surprised me at first. I've gradually adapted to absorbing the pieces of bad news by knowing that there's good news just around the corner."



Eric Leuthardt, MD, homes in on a brain area that causes seizures in a patient with epilepsy. In the surgery, he precisely inserts a small laser probe with the assistance of an intraoperative robotic system. Laser ablation of the abnormal brain tissue occurs in an MRI scanner for real-time monitoring, and the probe is controlled by a second MRI-compatible robot. Leuthardt performed the first FDA-approved case using this system in 2010, which now also is being applied to difficult-to-treat brain tumors.



# Right brain, left brain

**A creative quest to prime the world for a  
neuroprosthetics revolution**

**BY ADAM LIEBENDORFER**

Shortly before 2 p.m. on a Monday, a group of writers, doctors and marketing gurus has convened in a North Building conference room to discuss putting on a play.

One of the production's star performers arrives. Eric C. Leuthardt, MD, sits down and guides the group through details about the play, a four-part theatrical production debuting this summer that will take audiences to the frontiers of neuroscience.

While he speaks with the fluidity of a theater veteran, Leuthardt is still wearing scrubs. Performing plays is one of the many hats that the Washington University neurosurgeon wears as he educates society about the transformative potential of the brain. By tapping into his creative side, he hopes he can prime the public for what he foresees are upcoming breakthroughs in how we view the mind.

Through his groundbreaking research in the brain's capacity to rewire itself, called neuroplasticity, it is his work in connecting brains to computers that guides his most ambitious goal: the one day widespread use of neural interfaces for anything from rehabilitating stroke patients to enhancing our own intelligence and memory.

With ample resources, he said he could make an implant as safe as LASIK eye surgery in as little as five years.

TIM PARKER

**T**he bigger question is whether the world would be ready for surgeons to tinker with what Leuthardt calls “our most precious asset.” As technology marches forward, the brain — and its abstract counterpart, the mind — continues to be a sacred black box housing the essence of who we are.

“There’s a very dual reaction that we have where on one hand we’re fascinated as we learn about how the parts and gears of our mind work,” said Leuthardt, a professor of neurological surgery and of biomedical engineering. “At the same time, there’s another part of us that’s reticent to give up that mystery, that majesty.”

Leuthardt believes that one day we will warm to the idea of such implantable devices, called neuroprosthetics, just as the world has embraced smartphones tracking our movements and interactions.

For the last 20 years, Leuthardt has helped lead the biggest advances in how we view the relationship between technology and the brain. His research has ranged from non-invasive computer-based therapies for rehabilitating stroke patients to mapping a brain in as little as 15 minutes to laser-based minimally invasive techniques for killing types of brain tumors. Thanks to his efforts, a first-of-its-kind laser ablation surgical suite is looking to go live at Barnes-Jewish Hospital sometime within the next two years.

As director of Washington University’s Center for Innovation in Neuroscience and Technology,

Leuthardt gathers neurosurgeons, engineers, mathematicians, physicists and computer scientists to collaborate and develop new technologies to improve neurosurgery.

“Even when he (Leuthardt) was a resident at Washington University, it was clear that he was a visionary and an excellent surgeon,” said Ralph Dacey Jr. MD, head of the Department of Neurosurgery. “He’s just surpassed all of our expectations in terms of his creativity, his inventions and the way he’s changed the care of our patients.”

Leuthardt couples his medical expertise with creative output to help the world see what can be achieved from the forefront of neuroscience. His work includes two science-fiction novels, a podcast entering its third year of production and an award-winning play. His next play provides a foundational understanding of the human brain — showing how adaptable it can be — and informs the public about treatment options today.

Leuthardt’s work probes the boundary where synapses end and the soul begins, sometimes posing uncomfortable questions about the role of the brain. Since his early days as a research intern, he continues to ponder its philosophical implications.

## Biology with perspective

Leuthardt’s belief in the power of the neuroplastic brain began in fifth grade, when he was told he wasn’t very smart. Perhaps brain surgery wasn’t for him.

In high school, he interned with Keith Crutcher’s lab at the University of Cincinnati. Crutcher tasked Leuthardt with removing sympathetic ganglia from chicken embryos. Seeing he had a knack for it, a chief resident invited Leuthardt to shadow in the operating room.

Working there offered a lens through which to examine bigger questions posed by neuroscience. Leuthardt remembers passing time in Crutcher’s office, connecting their work to philosophy and the meaning of life.

Inspired by the scope of these conversations, Leuthardt decided to study both biology and theology at Saint Louis University.

“Theology was a deep dive into understanding the meaning of things, whether it’s with a religious bent, a philosophical bent or a psychological bent,” he said. “I almost think, in some sense, that the theology training I got was the more important degree to train me to be a physician and scientist.”

As a way of engaging the public, longtime friends and neurosurgeons Eric Leuthardt, MD, and Albert Kim, MD, PhD, chat about neuroscience topics for their “Brain Coffee” podcast at a local donut shop.

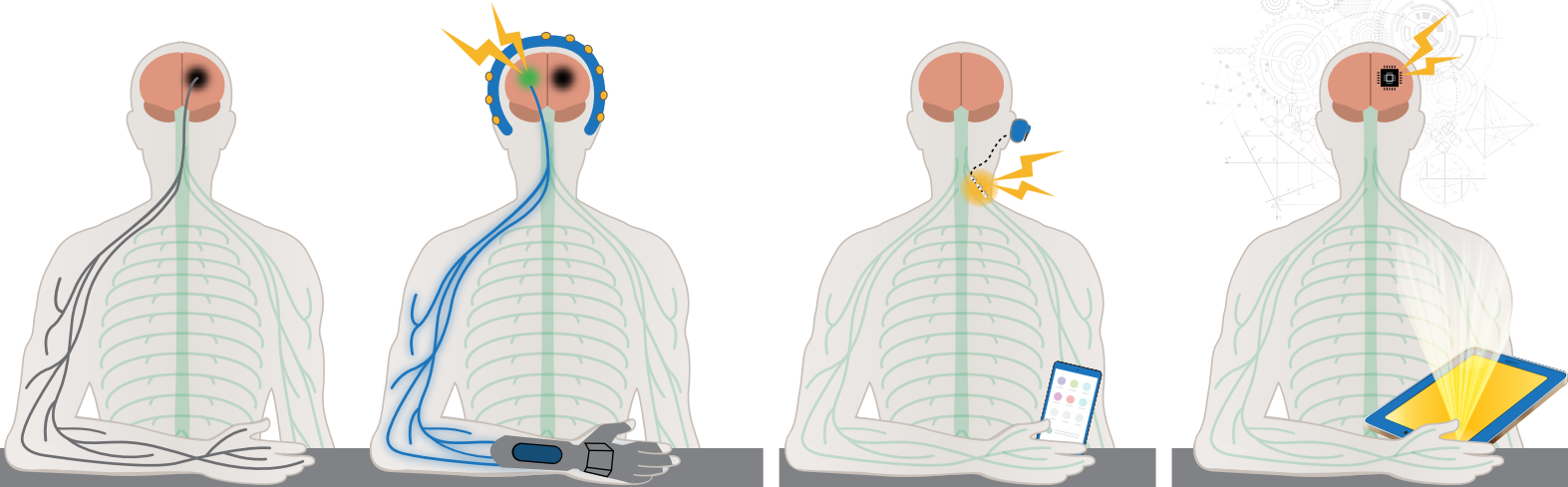


TIM PARKER



# Restoration to augmentation

Neural interfaces that can enhance intelligence, creativity and memory one day might be as common as pacemakers. **Are we ready?**



## TODAY

### RETHINKING INJURY & RESTORING MOVEMENT

As depicted in the figure above, a stroke has caused part of the brain to die. This damage has caused function loss in the opposite side of the body. The area that maintains motor intention, i.e., “planning the movement,” is still intact. Execution is lost, but intention to move the arm is still present.

The IpsiHand device detects the wearer’s intention to move the hand via electrodes attached to the uninjured brain area (green). The electrodes send signals to a computer that converts the information and moves the fingers of the robotic exoskeleton. As new neural connections form, the uninjured brain area takes over the paralyzed hand, regaining independent control. Within months, the device is no longer needed.

## 5-10 YEARS

### RESTORING BALANCE

A wearable ear device in development stimulates the vagus nerve to help patients alleviate symptoms of treatment-resistant depression. Controlled through a phone app, the device would send electrical pulses up one of the body’s most used nerves akin to a pacemaker.

## 15-20 YEARS

### ENHANCING COGNITION

Permanent devices implanted directly into the brain may one day be able to enhance our memory, creativity and intelligence. With the proper funding, such an implant would be as safe and cost-effective as LASIK eye surgery within our lifetimes, said Eric Leuthardt, MD.

After starting his neurosurgery residency at Washington University in 1999, Leuthardt reached out to Dan Moran, PhD, a brain-computer interface researcher conducting his own experiments, and picked up a new set of skills outside of his medical training: engineering.

Leuthardt helped measure cerebral signals in epilepsy patients using implanted electrodes. After careful analysis, his group saw a pattern. Immediately before patients moved muscles, there was a burst of activity on the same side of the brain as the muscles being moved.

This defied the accepted notion of contralateral motor control — that neural signals cross the brain to control muscle movement on the opposite side of the body. Moving your left hand, it was thought, was done by the right side of the brain. The new findings, however, suggested the initial

signal of intention to move occurred ipsilaterally, on the same side.

What was more, many signals for pre-motor planning could be detected by electroencephalography (EEG). This meant researchers could watch patients imagine moving their muscles with a non-invasive EEG machine resting on the scalp.

The group then studied stroke patients, whose brain damage left irreversible motor impairment. Even though the patients could not move their hands, EEG data showed they still could imagine moving them. Within a year, the researchers were able to use signals for imagined movement to move cursors on computers in the lab.

“Those endless hours to create one of the early prototype platforms for brain-computer interfaces was one of the most joyous years of my life,” Leuthardt said.



MATT MILLER

**Eric Leuthardt, MD, and mentee Sarah Chiang, a first-year medical student, study a portable electroencephalogram (EEG) headset that allows quick and easy neural data retrieval from many patient populations. A lab space near Leuthardt's office, filled with technical devices, is dedicated to student projects.**

As his residency was ending, Leuthardt thought about how he could continue this work.

"I wanted to make brain-computer interfaces a clinical reality," Leuthardt said. "So I looked at that and worked my way backward, asking myself, 'What things do I need to do to change the world as it relates to brain-computer interfaces?'"

He developed a three-pronged strategy. First, he had to prove such technology would be helpful for patients. Next, he would demonstrate it could fund its own development beyond research grants. Finally, he needed to change public perceptions about neuroprosthetics.

Technologically, Leuthardt faced an issue of resolution. Despite the powerful potential implications the EEG techniques offered patients, EEG machines could only detect low-frequency activity through the scalp, a fraction of the data for such intricate processes.

"You can almost think of it like sound in a room," Leuthardt explained. "As we're talking, the high-frequency stuff doesn't make it through the walls. The low-frequency stuff — the bass — makes it through the walls."

Placing implants directly in the nervous system, then, could provide that higher resolution.

But putting invasive experimental computer chips in people's brains is harder to sell.

## "Too science fiction"

Leuthardt's first attempt at selling a neural implant proved instructive for how the social and market forces can affect medical innovation. From 2005 to 2007, he helped develop an implantable neuroprosthetic device that would help restore nerve function after spinal injuries.

The company failed to court enough investors to take off. In addition to the high cost to get it to market, Leuthardt said the concept was still considered "too science fiction." The public did not seem ready to accept that a computer could assist in the analog act of moving muscles or that this would override the risk of potentially causing more damage in a procedure.

"Even though we were doing it and showing evidence for it, the world just couldn't believe it at that time," he added. "Nor was it ready to finance the risk of that. That crucible of forcing us to think in terms of market forces really reshaped our strategy and got us looking at doing brain-computer interfaces for stroke."

Leuthardt returned to non-invasive therapies for stroke patients. This time, they went beyond moving cursors on a screen. Leuthardt's team designed a robot worn on the patient's hand that could translate his or her imagined movements into physical ones. This allowed patients to couple thoughts of movement with the sensation of the robots moving them.

These patients' brains slowly rewired themselves to allow them to do tasks they hadn't done in years, such as pick up a marble again.

By the end of their clinical trial in 2016, most of the patients saw meaningful improvements in as few as three months of sessions. The patients are working to return full use of their hands. However, the team was surprised to find that, after the initial rewiring, the patients continued to make improvements without the device.

The results provided a vivid view of what the neuroplastic brain was capable of.

"A powerful moment for me was a man not being able to put his pants on to being able to put his pants on," Leuthardt said. "We had a woman who was deaf and couldn't do sign language when she lost one of her hands, and now she can do sign language again."

## Rewiring the world

The non-invasive device, now called IpsiHand, is being developed by one of Leuthardt's companies, Neuroolutions.

Leuthardt heads several other companies, including eQuility, which promotes a less invasive vagus nerve stimulator for alleviating depression. Engaging the public is a key component that helps his technology gain wider acceptance and further drives his companies' successes.

Leuthardt and Washington University neurosurgeon Albert H. Kim, MD, PhD, have launched the "Brain Coffee" podcast with Barnes-Jewish Hospital. In it, the longtime friends chat about the neuroscience topic du jour over coffee at Vincent Van Doughnut in The Grove neighborhood.

Leuthardt contributes to several blogs, including "Mind Blender" for Psychology Today, and has published two novels depicting the promise and perils of brain-computer interfaces. He uses them not only to drum up excitement for the neuroprosthetics but also to connect viscerally with readers and raise concerns about the potential dangers that come with neural augmentation. In his 2014 thriller, "RedDevil 4," a neurosurgeon teams up with detectives to uncover how a brain-chip virus has turned ordinary citizens into murderers.

"These books aren't Pollyanna," he said. "In many ways, they're cautionary tales. It gets people engaged and thinking about these things."

Leuthardt views the steady fan mail from the novels as a bellwether indicating that implantable brain-computer interfaces are catching on.

At public talks, he polls audiences on whether they would consider getting a chip.

"Hardly anybody said they would when I started asking years ago," he said. "Nowadays, most people raise their hand."

Leuthardt now is focused on producing the follow-up to his successful 2016 play, "Brainworks: Your Mind on Life," with Kim. The first "Brainworks" nabbed top honors in the "Informational/Instructional/Program Special" category in that year's Mid-America Emmy awards.

The "Brainworks" plays aim to bring neuroscience to life as the duo deliver a play-by-play narration of neurobiology with actors portraying scenes from everyday life: coffeehouse mating rituals, competing in races, drinking alcohol. The plays originated as an attempt to make their regular public talks on neuroscience more engaging.

"After one of our joint talks in the community, we had someone come up to us and say that we need to bring this to Broadway. He said it half-jokingly, but we were really intrigued by the idea," Kim said. "That was the brainchild of 'Brainworks.'"

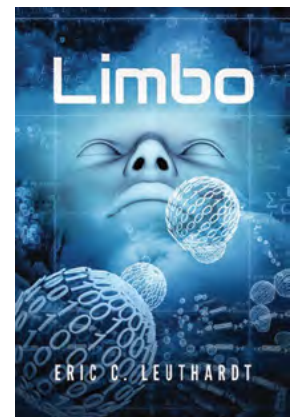
Audiences flocked to it, thanks to the approachability Leuthardt and Kim brought to the topics.

"Initially for the play, someone asked if we should wear our white coats on stage and we said, 'No way! Absolutely not!'" Leuthardt said. "What we found was that people like to be part of the conversation."

In Leuthardt's office, the Emmy hangs alongside other artifacts and medical arcanum from over the years: a surgically altered goat vertebra that led to the company OsteoVantage; a first-edition copy of Michael Crichton's "The Terminal Man"; early prototypes for brain-controlled robots.

Leuthardt said his creative work, much like his discoveries in research, speaks to a central truth that our brains are not fully programmed when we are born. His work with IpsiHand and other brain-computer interfaces he sees in the future has shown him that, with the help of computers, we can push our abilities even farther.

"So often we talk about the brain as a physical and the mind as this ethereal, separate part. Because of that, we always think of our minds as something that's fixed. But that isn't fair," he said. "When you think about neuroplasticity and cognitive capacity, most people have the potential to be more than they ever thought they could be." □



Eric Leuthardt, MD, has written two novels depicting the promise and perils of brain-computer interfaces. He uses them not only to drum up excitement for neuroprosthetics but also to connect viscerally with readers and spark conversation about neural augmentation.



MATT MILLER PHOTOS

# Match Day 2019

On Match Day, March 15, thousands of physicians-to-be across the U.S. learned where they will train as medical residents after graduation. Of the 125 Washington University medical students who applied for residency, 41 will train at Barnes-Jewish Hospital and two at St. Louis Children's Hospital. Altogether, this year's class will be represented at hospitals in 21 states and Washington, D.C. The largest group of students — 29 — will train in surgery, followed by 24 in internal medicine.



- ARIZONA**  
**Mayo Clinic School of Graduate Medical Education**  
 GENERAL SURGERY  
 Patricia Lu
- CALIFORNIA**  
**Harbor-UCLA Medical Center**  
 EMERGENCY MEDICINE  
 Hoang Pham  
**San Joaquin General Hospital**  
 SURGERY-PRELIMINARY  
 Deepak Lingam  
**Stanford University Programs**  
 INTERNAL MEDICINE  
 Robert Gallo  
 NEUROLOGICAL SURGERY  
 Rukayat Taiwo  
 PSYCHIATRY/RESEARCH  
 Anish Mitra  
**University of California-Los Angeles (UCLA)**  
 OPHTHALMOLOGY  
 Teresa Chen  
 Michael Mathison  
**UCLA Medical Center**  
 OBSTETRICS-GYNECOLOGY/PRELIMINARY  
 Christine Averill  
 PLASTIC SURGERY (INTEGRATED)  
 Nirbhay Jain  
 RADIOLOGY-DIAGNOSTIC  
 Tracie Kong  
 Jason Yoon  
**University of California-San Diego Medical Center**  
 OBSTETRICS-GYNECOLOGY  
 Estefania Fernandez  
 PEDIATRICS  
 Eileen Chen  
**University of California-San Francisco**  
 INTERNAL MEDICINE  
 Kavon Javaherian  
 PLASTIC SURGERY (INTEGRATED)  
 Jodi Lapidus  
**University of Southern California**  
 INTERNAL MEDICINE  
 Xinyu (Steve) Wang  
**VA Greater Los Angeles Healthcare System**  
 PSYCHIATRY/UCLA/SAN FERNANDO VALLEY PARTNERSHIP  
 Mary Chavarria
- COLORADO**  
**University of Colorado School of Medicine-Denver**  
 PSYCHIATRY  
 Sirish Veligati
- DISTRICT OF COLUMBIA**  
**MedStar Georgetown University Hospital**  
 GENERAL SURGERY  
 Victoria Cui
- FLORIDA**  
**University of Central Florida College of Medicine/GME Consortium**  
 EMERGENCY MEDICINE/GAINESVILLE  
 Jyotirmoy Das

## GEORGIA

### Emory University School of Medicine

INTERNAL MEDICINE/RESEARCH  
Stephen Linderman  
OBSTETRICS-GYNECOLOGY  
Caroline Wentworth

## ILLINOIS

### Cook County Health and Hospitals System

DERMATOLOGY  
Tina Hsu

### Illinois Eye and Ear Infirmary

OPHTHALMOLOGY  
Mathew Margolis

### Northwestern McGaw/

### Lurie Children's

PEDIATRICS  
Erin Klein

### Northwestern McGaw/NMH/VA

INTERNAL MEDICINE  
Jacob Groenendyk

NEUROLOGY

Juan Deliz Gonzalez

OPHTHALMOLOGY

Stephen Hawn

### Rush University Medical Center

ORTHOPAEDIC SURGERY

Sarah Tepper

### University of Chicago

### Medical Center

EMERGENCY MEDICINE

Ravi Chacko

GENERAL SURGERY

Tanvi Subramanian

## INDIANA

### Indiana University School of Medicine

ANESTHESIOLOGY  
Shane Johnson

## IOWA

### University of Iowa Hospitals and Clinics

MEDICINE-PSYCHIATRY  
Seth Howdeshell

## MARYLAND

### Johns Hopkins Hospital

INTERNAL MEDICINE

Rachel Goldberg

Lucy Li

ORTHOPAEDIC SURGERY

Farah Musharbash

### University of Maryland

### Medical Center

INTERNAL MEDICINE  
Kevin Li

## MASSACHUSETTS

### Boston Children's Hospital

PEDIATRICS  
Colby Chiang

### Boston University

OPHTHALMOLOGY  
Anjlie Gupta

### Brigham & Women's Hospital

INTERNAL MEDICINE  
Hari Raman  
Michael Senter-Zapata

## NEUROLOGY/BWH-MGH

Marina Avetisyan  
Andrew Kraft

### Massachusetts General Hospital

PSYCHIATRY

Anastasia (Tasha) Evanoff

## MICHIGAN

### Henry Ford Hospital

OBSTETRICS-GYNECOLOGY  
Gayathri Vadlamudi

### University of Michigan

### Hospitals-Ann Arbor

OBSTETRICS-GYNECOLOGY

Samantha Bayer

PEDIATRICS

Aristides Diamant

## MISSOURI

### Barnes-Jewish Hospital

ANESTHESIOLOGY

Kevin Cohen

Jaelyn Yu

CLINICAL PATHOLOGY

Andrew Hughes

DERMATOLOGY

Lily Chen

Ian Ferguson

Abby Rosenberg

Cynthia Wang

DERMATOLOGY/PHYSICIAN

SCIENTIST

Sunaina Khandelwal

EMERGENCY MEDICINE

Nicholas Karlow

Weston McCarron

Ryan Rees

Robert Stephens

GENERAL SURGERY

Tsehay Abebe

INTERNAL MEDICINE

Howard Chen

Cheuk Ho (Jeffrey) Choi

Kevin Garza

Vivek Hansalia

Kai Jones

Micah Luderer

Hayley Motowski

Mary Morgan Scott

NEUROLOGY

William Everett

OBSTETRICS-GYNECOLOGY

Tamara Cameo

Whitney Grither

Nicholas Spies

Mark Valentine

ORTHOPAEDIC SURGERY

Elizabeth Graesser

Sally Jo

OTOLARYNGOLOGY

Aisling Last

Sampat Sindhar

PHYSICAL MEDICINE & REHAB

Andrea McCullough

PLASTIC SURGERY (INTEGRATED)

Alexandra Keane

Damini Tandon

PSYCHIATRY

Ami Chiu

Fayola Fears

Christine Horan

Nitya Sreevalsan

## RADIOLOGY-DIAGNOSTIC

Brian Cusworth  
Daniel Friedman

Mahati Mokkarala

UROLOGY

Nicholas Pickersgill

### St. Louis Children's Hospital

CHILD NEUROLOGY

Gazelle Zerafati-Jahromi

PEDIATRICS

Dean Odegard

### Saint Louis University

### School of Medicine

CHILD NEUROLOGY

Caroline Zhong

DERMATOLOGY

Yang (Sunny) Li

## NEW HAMPSHIRE

### Dartmouth-Hitchcock

### Medical Center

EMERGENCY MEDICINE

Paul McMurry

## NEW YORK

### Hospital for Special Surgery

ORTHOPAEDIC SURGERY

Yusef Jordan

### Montefiore Medical Center/

### Einstein

INTERNAL MEDICINE

Alexander Goldberg

### New York Presbyterian

### Hospital-Columbia University

### Medical Center

FAMILY MEDICINE

Jenny Tobat

NEUROLOGICAL SURGERY

Travis CreveCoeur

### New York Presbyterian Hospital-

### Weill Cornell Medical Center

RADIATION ONCOLOGY

Christopher Tricarico

### New York University

### School of Medicine

INTERNAL MEDICINE

Gabriela Abrishamian-Garcia

### University of Rochester/Strong

### Memorial Hospital

ORTHOPAEDIC SURGERY/

RESEARCH

Derek Schloemann

VASCULAR SURGERY

Kshitij (Kash) Desai

### Zucker School of Medicine-

### Northwell/North Shore

### University Hospital & Long

### Island Jewish Medical Center

INTERNAL MEDICINE

Yuting Ye

## NORTH CAROLINA

### Duke University Medical Center

DERMATOLOGY/DIVERSITY

Elaine Otchere

GENERAL SURGERY

Lillian Kang

INTERNAL MEDICINE

Jon Robert (JR) Peacock

Brian Rabe

INTERVENTIONAL RADIOLOGY

(INTEGRATED)

Russell Thompson

## SURGERY-PRELIMINARY

Natalie Griffin

## OHIO

### Case Western Reserve/

### University Hospitals

### Cleveland Medical Center

GENERAL SURGERY

David Ebertz

### Ohio State University

### Medical Center

EMERGENCY MEDICINE

Michael Miles

## PENNSYLVANIA

### Children's Hospital of Philadelphia

CHILD NEUROLOGY

Maya Silver

### Hospital of the University of

### Pennsylvania

GENERAL SURGERY

William Johnston

### University of Pittsburgh

### Medical Center

ORTHOPAEDIC SURGERY

Jonathan (Jay) Dalton

### Wills Eye Residency Program

### at Jefferson

OPHTHALMOLOGY

Cathy (Kat) Zhang

## TEXAS

### Baylor College of

### Medicine-Houston

OBSTETRICS-GYNECOLOGY

Danielle Chirumbole

### University of Texas Health Science

### Center-San Antonio

OBSTETRICS-GYNECOLOGY

Reece Clark

### University of Texas

### Southwestern Medical School

DERMATOLOGY

Swapneel Patel

PSYCHIATRY/CHILD

PSYCHOLOGY

Anna Faubion

### U.S. Air Force/San Antonio

INTERNAL MEDICINE

Craig Yugawa

## UTAH

### University of Utah

### Affiliated Hospitals

PLASTIC SURGERY (INTEGRATED)

Evelyn Reed

## WASHINGTON

### University of Washington

### Affiliated Hospitals

ANESTHESIOLOGY/CLINICAL

BASE YEAR

Robert Lucas Thomas

PEDIATRICS

Maeve Woeltje

SURGERY-PRELIMINARY

Amar Shah

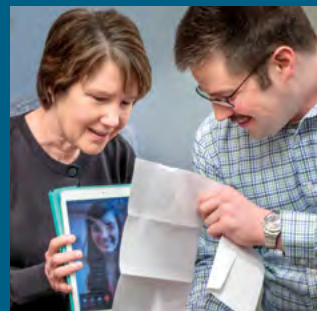
## WISCONSIN

### Medical College of Wisconsin

### Affiliated Hospitals

PLASTIC SURGERY (INTEGRATED)

Ellen Larson



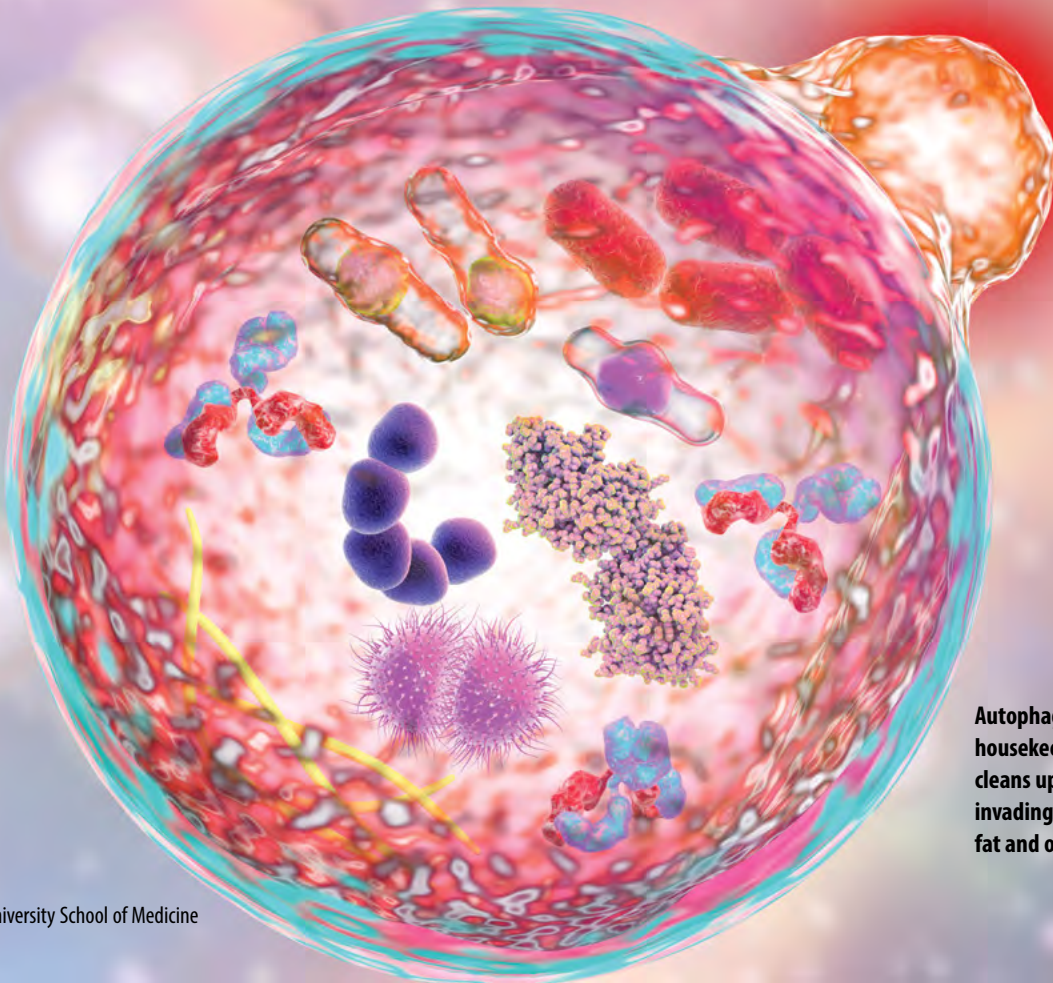
See more photos online:  
[outlook.wustl.edu/match2019](http://outlook.wustl.edu/match2019)

# Extending human life

Two centers focus  
on chronic diseases  
of aging

BY LIBBY DOWDALL

**A**s a School of Medicine faculty member and pharmaceutical executive, Emeritus Trustee Philip Needleman, PhD, learned what it takes to move a drug from the lab to the market. And as a longtime member of the school's national council, he has kept close tabs on advances at the school. Recognizing the potential of two specific research areas, Needleman and his wife, Sima, MSW '74, a retired medical social worker and volunteer leader at the Brown School, have made a \$15 million commitment to accelerate drug development aimed at a wide range of conditions.



**Autophagy is a cellular housekeeping system that cleans up damaged proteins, invading microbes, excess fat and old cellular parts.**

The gift establishes two centers at the School of Medicine: the Philip and Sima Needleman Center for Autophagy Therapeutics and Research, which will enhance efforts to address the aging process; and the Philip and Sima Needleman Center for Neurometabolism and Axonal Therapeutics, focused on the breakthrough work of two faculty members who are pursuing treatments for neurodegenerative disorders.

## Slowing the degenerative process

Although it plays a critical part in maintaining cell health, the process of autophagy was not widely known until recent years, when its emerging role in many diseases led to an explosion of interest. The autophagy pathway functions as a recycling center for cellular debris such as misfolded proteins, degraded lipids and worn-down cell parts. When functioning optimally, it keeps many diseases at bay. But the process declines with age, opening the door to degenerative conditions.

To prevent or treat age-related illnesses, scientists at the Needleman Center for Autophagy Therapeutics and Research will work to identify and develop drugs that target key parts of the autophagy pathway. Their research has the potential to help patients with Alzheimer's disease, cardiovascular disease, osteoporosis, cancer and other conditions.

David H. Perlmutter, MD, executive vice chancellor for medical affairs and the George and Carol Bauer Dean of the School of Medicine, will direct the center. "With this center, we are establishing aging as a top priority of the school and beginning to make progress toward measurable outcomes," he said. "And we are excited to have Phil work closely with us every step of the way."

The center will be one of the few in the country dedicated to autophagy.

## Exploiting a discovery

While the autophagy center will be built from the ground up, the Needleman Center for Neurometabolism and Axonal Therapeutics creates a formal structure around a longstanding research partnership between Jeffrey Milbrandt, MD, PhD, the James S. McDonnell Professor of Genetics and head of the Department of Genetics, and Aaron DiAntonio, MD, PhD, the Alan A. and Edith L. Wolff Professor of Developmental Biology, who will co-lead the center.

The two began collaborating a decade ago to investigate the root causes of nerve degeneration, which is implicated in conditions such as Parkinson's disease, amyotrophic lateral sclerosis (ALS), multiple sclerosis, glaucoma and peripheral neuropathy.

The center builds on the researchers' 2017 discovery related to SARM1, a protein involved in the destruction of axons, the long nerve fibers that transmit electrical signals throughout the nervous system. Many researchers had studied the protein, but none had uncovered what the Washington University team found: SARM1 is an active enzyme that is key to the

degenerative process. This unexpected finding opened the door to future work to create a drug to block SARM1 from triggering axon degeneration. Moreover, DiAntonio and Milbrandt realized that thousands of proteins with scaffold-like structures similar to SARM1 also could be active enzymes that may be similarly useful for developing drugs.

The flexible funding provided by the Needleman will allow the researchers to move quickly. "There's a sense of urgency," Milbrandt said. "This is the crowning achievement of our careers so far, and we want to be the ones to carry this work forward — we don't want to wait for normal grant funding mechanisms to kick in."

## Investing in scientists

The researchers have received valuable mentorship from Needleman, who has been meeting with them at a St. Louis Bread Co. café. "We tell him about our project, and he offers advice and makes suggestions about the venture capital world and the pharmaceutical industry," DiAntonio said. "His experience, contacts, and willingness to counsel us are helping to expedite the drug-development process."

Though their gift focuses on research, at its root is a desire to invest in exceptional scientists. "I go back to my time in the laboratory and what would have had an impact on me," Philip Needleman said. "A gift like ours means that you don't have to apply for grant funds every year. You can really stick to a problem and take risks.

"Because I have lived in both academia and industry, I can see the special people who have that twinkle in their eye, who see over the horizon and know how to execute," he added. "I expect rapid progress from these two groups."



MART MILLER

Philip and Sima Needleman



MATT MILLER

Rodger and Paula Riney, center, recently came to campus to meet with oncology leaders. Above, the Rineys greet John DiPersio, MD, PhD, left, deputy director of Siteman Cancer Center, and Ravi Vij, MD, Rodger Riney's physician and principal investigator on three multiple myeloma studies.

# Seed funding

BY CHANNING SUHL

Research investment targets lesser-known form of cancer

**M**ultiple myeloma remains largely incurable for most patients, despite improvements in treatment options. The blood cancer, which affects the plasma cells of bone marrow, takes the lives of 11,000 Americans each year. Now, a \$20 million gift from Rodger Riney and his wife, Paula, is bringing hope to those afflicted — including Riney himself.

The Paula C. and Rodger O. Riney Blood Cancer Research Initiative Fund supports efforts of physicians and scientists at Alvin J. Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine. Together, this multidisciplinary team has broad expertise in multiple myeloma, genomics, immunology and immunotherapy, imaging and pharmacogenomics.



The gift provides investigators with crucial seed funding to conduct research and generate early data so that they can apply for larger federal grants. Effectively competing for these grants requires that the hypotheses first be validated to some degree.

“We just need the resources to be able to develop this,” said Ravi Vij, MD, professor of medicine in the Division of Oncology and Rodger’s physician. “And this gift provides us a resource to develop it.”

Currently, the gift provides continued funding for three studies. An earlier \$5 million gift in 2016 from the Rineys provided start-up funding for the studies. The research aims to:

- Refine a promising immunotherapy technique called CAR-T cell therapy and apply it to multiple myeloma.
- Classify the genes and proteins of multiple myeloma patients and mine the data to identify inherited susceptibility and treatment options.
- Use a unique, 3-D tissue-engineered bone marrow created from individual patient cells to screen medications for personalized treatment. Washington University is the only institution using the patient’s bone marrow microenvironment and own stem cells in a 3D model, Vij said.

## Diagnosed with cancer

Following his diagnosis in 2015 at the age of 69, Kirkwood native Rodger Riney approached the disease with the same type of business acumen that has served him well throughout his successful career. Riney founded the brokerage firm Scottrade in 1980 and held the position of CEO until its sale to TD Ameritrade in 2017.

He turned to Siteman for treatment, where he and Paula delved into learning as much as possible about the disease and available options. The information was more daunting than he expected. While new drugs have been approved for treatment in recent years, results have varied widely. Some patients respond well, while others don’t respond at all — and the reason for the discrepancy isn’t clear. Even for those patients who experience remission, treatment rarely cures the disease, and the median life expectancy today is eight to 10 years.

“So our answer was, we should get more involved. We should do more for research and get something done now,” Riney said. “I have a vested interest in a cure in four years, not a cure in 40 years. So I’m trying to do that and hope that others will too.”

Riney is eager to make a difference for himself and the 30,000 Americans diagnosed yearly — and Washington University, a leading multiple myeloma research center, is the right place to make it happen, he said. In 2015, the National Cancer Institute awarded university researchers \$13.7 million, spurring creation of the Center for Multiple Myeloma Nanotherapy.

“Within two or three visits with me, he (Riney) began asking about multiple myeloma research,” Vij said. “He wanted to know if he could help advance our work.”

Rodger and Paula soon met with David H. Perlmutter, MD, executive vice chancellor for medical affairs and the George and Carol Bauer Dean of the School of Medicine.

“Yes, these are the kinds of resources that can spur the most imaginative and innovative approaches,” Perlmutter said. “But also, Paula and Rodger have given us the kind of passion and vision to pursue our best ideas with urgency and profound purpose.”

*“I feel fortunate to be under the care of their physicians and researchers, and proud to invest in the advancement of leading-edge research.”* — Rodger Riney

## Becoming an advocate

In the three years since the diagnosis, Rodger has become an advocate for multiple myeloma research and treatment. He serves as a member of the board of directors for the Multiple Myeloma Research Foundation, and also has participated in clinical trials at Siteman, including a study comparing the efficacy of two drug regimens in halting disease progression.

The Rineys, longtime community and nonprofit leaders who also support Alzheimer’s and Parkinson’s disease research at Washington University, have found that multiple myeloma lacks funding compared to many better-known cancers. They saw an opportunity to make an impact on human health that could affect their own lives as well as many generations to come.

“I certainly hope our children and grandchildren won’t have to worry about this disease,” Paula said.

They are happy to see that impact take shape in their own community.

“Siteman and Washington University are gems to have in St. Louis,” Rodger said. “I feel fortunate to be under the care of their physicians and researchers, and proud to invest in the advancement of leading-edge research.”

*Mary Lee and Julia Evangelou-Strait contributed to this story.*

## 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.

## 1950s

**William "Bill" Reynolds, MD '56**, is retired and lives in Missoula, Mont. He enjoys spending summers at his cabin at Lindbergh Lake, Mont.

## 1960s

**Joshua "Dr. Josh" Grossman, MD '65**, and **Roberta "Mickey" Grossman, OT '64**, enjoy spending time with their recently adopted rescue dog, a shih tzu named Bear.



They strongly encourage rescuing animals through adoption. The Grossmans can be reached at [drjosh@embarqmail.com](mailto:drjosh@embarqmail.com) and would love to hear from classmates and other alumni.

**Earl Hearst, LA '66, MD '69, HS**, and his wife, Sherrie, live in The Villages in Florida and spend spring and summer months in Silver Spring, Md. Hearst enjoys



participating in senior sports and has won Senior Olympics game medals in pickleball, table tennis, bowling and basketball.

## 1970s

**James Mick, MD '70**, and his wife, Francine, celebrated their 49th wedding anniversary in August 2018 in Arizona. He looks forward to seeing everyone at the School of Medicine's 50th Reunion in 2020.

**Edward Rose, MD '71**, was invited by the Committee on Ethics of the American College of Rheumatology to write an article titled, "The Inherited Opioid Patient," which was published in the July issue of *The Rheumatologist*.

**Barbara Mandell, LA '69, MD '73**, recently relocated her practice on Long Island, N.Y., and has joined the staff of Northwell Health in Rockaway Park, N.Y.

**Lincoln Berland, MD '75**, was awarded a Gold Medal from the Society of Computed Body Tomography and Magnetic Resonance on Oct. 8, 2018.



**Eugene Rubin, PhD '77, MD '78**, and **Charles F. Zorumski, MD, HS '82**, both at the School of Medicine, celebrated their 1 millionth hit for their blog, "Demystifying Psychiatry," which deals with research and issues in psychiatry, attempting to make them understandable and relevant. They have been blogging for *Psychology Today* for several years.

## 1980s

**Mitchell Strominger, LA '82, MD '86**, moved to the University of Nevada, Reno School of Medicine, after an 18-year tenure with Tufts Medical Center in Boston.

**Eric D. Green, MD/PhD '87, HS '91, Honorary MD '18**, was awarded an honorary degree at Washington University's 157th Commencement for his work in helping to shape the field of genomics and its application to medicine.



## 1990s

**Susan Benfield, MD '91**, has worked with Westside Community Health Services since 1994, specializing in prenatal and maternal-child health care. She has a daughter, Allison, who is married and working, and a son, Zachary, who is a college sophomore studying theater arts.

**Allen Kachalia, MD '99**, recently was appointed senior vice president of patient safety and quality at Johns Hopkins Medicine. He also will serve as director of the Armstrong Institute for Patient Safety and Quality. In his new role, Kachalia will manage all patient safety and quality initiatives at Johns Hopkins Medicine. He also will oversee academic and scholarly efforts at the Armstrong Institute, which was created to help coordinate and support the health system's patient safety and quality improvement efforts.

## 2000s

**Michael Lamb, MD '01**, recently entered an anesthesiology residency in Galveston, Texas, with estimated graduation in June 2021.

**Beth Templin, DPT '04**, is board-certified in geriatric physical therapy. She recently expanded her St. Louis practice specializing in geriatric care to include a gym space designed for older adults. HouseFIT provides group exercise classes, small intense boot camps and educational workshops for older adults, in addition to physical therapy and wellness visits.



**Rishindra M. Reddy, MD, HS '07** was installed as the first José José Alvarez Research Professor of Thoracic Surgery at

the University of Michigan (U-M). After completing his cardiothoracic surgery training in Seattle, he joined the staff at Michigan in 2009. He is currently clerkship director and the chair of the U-M Comprehensive Robotic Surgery Program.

## 2010s

**Anthony Fehr, PhD '11**, is assistant professor of infectious disease in the Department of Molecular Biosciences at the University of Kansas, Lawrence.



**Valerie Salazar, LA '00, PhD '11**, is lab head at Novartis Institutes for Biomedical Research in Basel, Switzerland.

**Suzanne Skaggs, OT '17**, accepted a full-time position as an occupational therapist with a local hospital and began working three days after passing her National Board for Certification in Occupational Therapy exam and becoming a licensed occupational therapist.

## Helping deaf children

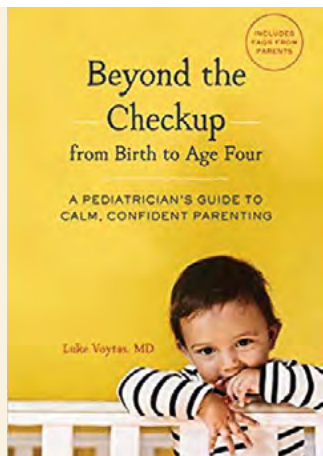
**Christy Chadwick** earned a Master of Science in Deaf Education specializing in listening and spoken language in 2016. Now, she lives on Maui as an advocate and consultant for families who have children who are deaf or hard of hearing. She is also founder of Hawaii Hears, an organization offering education, advocacy, resources and support for families with children who have hearing loss in Hawaii.



According to Chadwick, Hawaii has the highest prevalence rate of children born with a hearing loss, more than any other state, and only 65 percent of those children are receiving early intervention services. "The lack of services creates a large gap for students who are deaf and hard of hearing to keep up with their typically hearing peers in reading, language and academics," she said.

All services, supported by donations, are free to families. Hawaii Hears also brings professional development opportunities to those working with children who are deaf or hard of hearing.

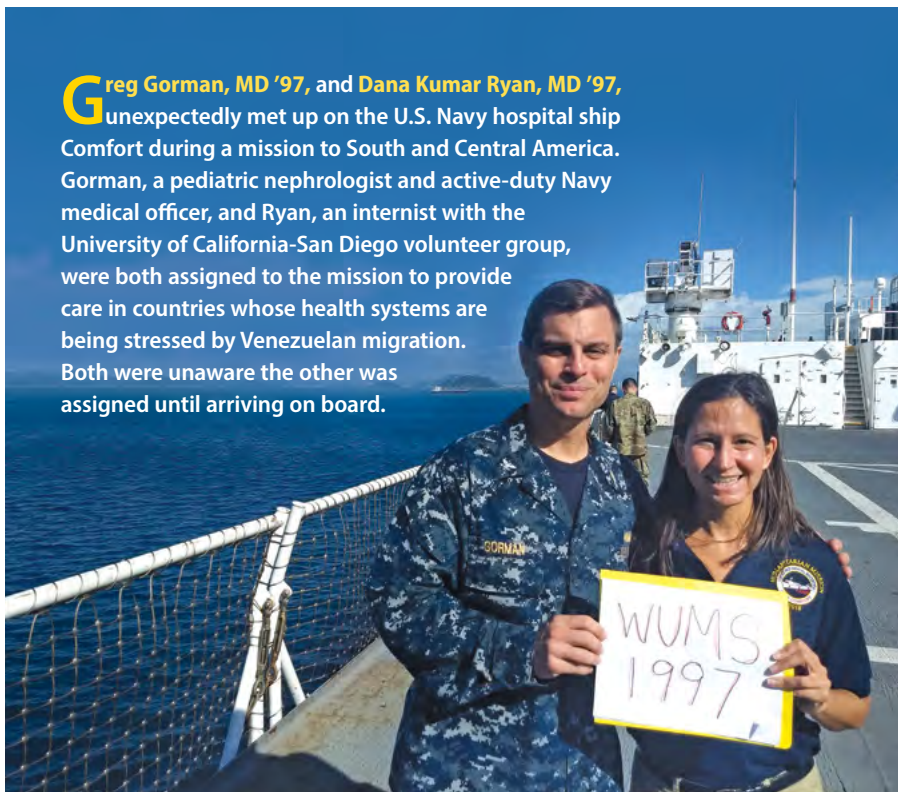
Along with individualized services, Chadwick works to seek reform at the state level for children who are deaf or hard of hearing. She is also a registered yoga teacher.



**L**uke Voytas, MD '05, recently published his first book titled, "Beyond the Checkup From Birth to Age Four: A Pediatrician's Guide to Calm, Confident Parenting." He is a practicing pediatrician in Portland, Ore.



**Greg Gorman, MD '97, and Dana Kumar Ryan, MD '97**, unexpectedly met up on the U.S. Navy hospital ship Comfort during a mission to South and Central America. Gorman, a pediatric nephrologist and active-duty Navy medical officer, and Ryan, an internist with the University of California-San Diego volunteer group, were both assigned to the mission to provide care in countries whose health systems are being stressed by Venezuelan migration. Both were unaware the other was assigned until arriving on board.



**Chuan-Huan “Dennie” Cheng**, a former biochemist in the nutrition research office in the Department of Preventive Medicine and Public Health, died peacefully in Placerville, California, on Sunday, July 22, 2018.

Cheng grew up Suzhou, China, with a sister and five brothers. She majored in biochemistry at Central University in China during the Japanese invasion. She won a scholarship to study at Cornell University and left China for the U.S. in 1948. After receiving a master’s degree from Cornell in 1950, she completed a PhD at Michigan State University in 1955.

For 20 years, she worked at Washington University School of Medicine. Cheng was in charge of the nutrition research office, where she pioneered the TPP method of measuring the nutritional impact of vitamin B1. She later changed her field of study to nerve transmission in the Department of Neurology, where she worked until 1982. Cheng and her husband, William Jen-Pu Cheng, moved to California in 2000.

Her husband preceded her in death. Survivors include children Helen Cheng, Nancy Cheng, James Cheng and Elizabeth Krist.



**John C. Herweg, MD**, a former associate dean and pediatrician, died Monday, April 2, 2018. He was 96.

Herweg graduated first in his class from Washington University School of Medicine. He fell in love with pediatrics and did his internship at St. Louis Children’s Hospital.

Following his service as a captain in the U.S. Army Medical Corps, Herweg returned to Children’s Hospital and became chief resident in pediatrics. There he met and married fellow pediatrician Janet Scovill.

In 1951, after a brief time in private practice, Herweg joined the staff of Children’s Hospital. He and Janet had four children: Judith, Marjorie, Mary Jo and James. Janet passed away in 1958, and he married Dorothy Glahn, head nurse on the infants’ ward at Children’s. They had one daughter, Jan Marie. They also had a loving, supportive marriage that lasted 59 years.

Herweg was a fixture at Children’s Hospital in the 1950s and early ‘60s — honing administrative skills that would serve him in the years ahead and gently interacting with his young patients and their families.

In 1965, Herweg became associate dean of the School of Medicine. He served for nearly 25 years, dedicating himself to the development of hundreds of future physicians. In his time as head of the Admissions Committee, he made it his mission to increase the number of minority and women candidates. He was known for his unwavering support of students, helping them surmount whatever obstacles they might face in the course of their studies.

In retirement, John and Dorothy indulged their shared love of birds and nature, traveling all seven continents in search of far-flung winged species. Later, Herweg developed a passion for protecting the environment — reading deeply, writing advocacy letters that appeared often on the opinion page of the St. Louis Post-Dispatch and contributing generously to organizations devoted to protecting endangered wildlife and wilderness spaces.

*Editor’s note: Dorothy “Dottie” Glahn Herweg, NU ‘47, died Tuesday, April 16, 2019. She was 94.*



**John M. Kissane, MD**, a premier anatomic pathologist, died Wednesday, Oct. 31, 2018. He was 90.

Kissane’s long-time affiliation with Washington University began as a medical student in 1948. He studied anatomic pathology — focusing on renal-genitourinary and pediatric pathology — under the tutelage of Robert A. Moore, MD, then department chair, and Margaret G. Smith, MD, who was the department’s first pediatric pathologist.

After graduating from medical school in 1952 and completing residency, Kissane, a captain in the U.S. Army Medical Corps, was assigned to France. There, he served as chief of laboratory services at the 34th General Hospital, Orleans, from 1955 to 1957. As a result, he became a committed Francophile.

Kissane joined the Department of Pathology faculty in 1958 and became a full professor in 1968. Many important studies emerged from Kissane’s laboratory with the application of microchemistry and histochemistry in experiments on the kidneys, adrenals and pancreas. In 1967, he and Smith co-wrote the seminal work “Pathology of Infancy and Childhood.”

Kissane’s knowledge extended to the broader realm of medicine and pediatrics. He co-edited papers from more than 70 Barnes Hospital clinicopathologic conferences over a 30-year period, which were published in the American Journal of Medicine.

A voracious reader and extensive traveler, Kissane enjoyed talking about wide-ranging topics, such as the American west, literature, opera and baseball. An excellent ballplayer in his younger days, he was scouted by more than one professional team.

Even after retiring, Kissane was consulted on problematic cases and he attended the weekly autopsy conference. Kissane was the reason that some discovered anatomic pathology and pediatric pathology as a lifelong calling. He is missed by his children and grandchildren, colleagues and former students and residents.



**Gerald Medoff, MD**, professor emeritus of medicine and former director of the Division of Infectious Diseases, died Monday, Jan. 14, 2019, in Evelyn's House hospice care in Creve Coeur, Mo., following a long bout with Parkinson's disease. He was 82.

Medoff became director of the infectious diseases division in 1972 and served for two decades, leading the division's transformation into a nationally renowned clinical and research arm of the university. In 1992, he became vice chair of clinical affairs in the Department of Medicine. And in 2000, he co-founded the Division of Hospital Medicine.

Medoff was perhaps best known for his insistence on compassionate care for patients from all walks of life. At the start of the AIDS epidemic, when many providers refused to care for such patients, Medoff established an AIDS clinic and fostered specific programs to ensure the best possible medical care for them and their loved ones. He formed close relationships with his patients and taught generations of trainees how to listen to, examine and care for patients with compassion and respect.

At the height of the epidemic, Medoff founded the first AIDS Clinical Trials Unit at Washington University, creating resources and infrastructure to provide care and identify new methods to diagnose and treat patients with HIV.

In 2014, the division established the annual Gerald Medoff, MD, Visiting Professorship, in honor of Medoff's leadership, vision, dedication and commitment to excellence.

He is survived by his wife, Judith Medoff, his sons Benjamin Medoff, MD, and Nathaniel Medoff, and four grandchildren.



**William T. Shearer, MD, PhD**, a former Washington University trustee and School of Medicine alumnus and former faculty member, died Tuesday, Oct. 9, 2018, at his home in Houston. He was 81.



Shearer was elected to the university's Board of Trustees for a four-year term as an Ethan A.H. Shepley Trustee in 2007. He also served on the School of Medicine's National Council from 2007 to 2012.

Shearer earned a medical degree from the School of Medicine in 1970 and completed residencies at St. Louis Children's and Barnes hospitals. He joined the medical school faculty in 1974 and was promoted to professor in 1978.

He remained an active alumnus after moving to Baylor College of Medicine in 1978 as professor of pediatrics and immunology and chief of the allergy and immunology service at Texas Children's Hospital. A renowned immunologist, he gained worldwide attention there for his innovative care of David Vetter, affectionately known as "The Boy in the Bubble." He also conducted important research to prevent and treat pediatric HIV/AIDS.

In 2000, he received Washington University's Alumni Achievement Award for his international leadership on research and clinical care.

He is survived by his wife, Lynn Des Prez, and five sons and one daughter.

Pioneering hematologist **J. Evan Sadler, MD, PhD**, a world-renowned expert in the study and treatment of blood clotting disorders and director of the Division of Hematology, died Thursday, Dec. 13, 2018, at his home in Clayton, Mo., following a brief illness. He was 67.

Sadler, the Ira M. Lang Professor of Medicine, was also a professor of biochemistry and molecular biophysics. His work helped reveal reasons why blood clots when it shouldn't and why it fails to clot when it should. Such disorders lead to heart attacks, strokes and uncontrolled bleeding, which together cause more deaths annually in the U.S. than all types of cancer combined.

"Evan was a brilliant scientist who was among the first to apply the tools of recombinant DNA technology to the field of blood coagulation," said Stuart Kornfeld, MD, the David C. and Betty Farrell Professor of Medicine. "This, combined with the high quality and great depth of his studies, propelled him to the top of his field. On a personal level, I have never met a more humble and fair-minded individual who was always striving for excellence. Evan was the perfect role model for the physician-scientist pathway."

Sadler pioneered the study of proteins called von Willebrand factor and ADAMTS13, which play vital roles in orchestrating the events that lead blood to clot. Based on his lab's basic research, Sadler also led work to improve the clinical guidelines used to diagnose and treat clotting and bleeding disorders.

He is survived by his wife, Linda J. Pike, the Alumni Endowed Professor of Biochemistry and Molecular Biophysics; daughter, Brooke E. Sadler; son, Evan D. Sadler; mother, Clara Rose Sadler; and two grandsons, Jasper and Dexter Haller.



**Stanley E. Thawley, MD,**

professor emeritus of otolaryngology-head and neck surgery, died Tuesday, Jan. 22, 2019, while at work in St. Louis. He was 75.



Thawley came to the School of Medicine in 1971 for his residency in the ear, nose and throat (ENT) specialty at then-Barnes Hospital, now Barnes-Jewish Hospital. He joined the Department of Otolaryngology faculty in 1975, where he remained for his entire career.

“Dr. Thawley cared for thousands of patients throughout his 44 years at Washington University,” said Craig A. Buchman, MD, the Lindburg Professor and head of the Department of Otolaryngology-Head & Neck Surgery. “He taught many residents, published many papers and provided excellent specialty care for his patients, who included veterans and extended beyond St. Louis to the rural communities of Madison and St. Genevieve counties. Dr. Thawley was beloved by his patients and will be greatly missed.”

A 2017 BJC Today story marking Thawley’s retirement from full-time work noted his “gentlemanly manner, his love of children and his willingness to drive from St. Louis for decades to serve up to five generations of patients in rural Missouri.”

He is survived by his wife, Betty; sons David and Mark Thawley; nephew John Thawley III; and three grandchildren.

**1930s**

**Jules Paul Guidry III**, DE '38; Nov. '18

**1940s**

- Paul T. Berry**, MD '48; Aug. '18
- Ruby M. Brooks**, NU '43, NU '43; Dec. '18
- Charles E. Carleton Jr.**, MD '49; Oct. '18
- Klaus R. Dehlinger**, MD '44; Nov. '18
- Edward E. Elder**, MD '49; Aug. '18
- Robert P. Gibb**, MD '48; July '18
- Virginia Krebs**, NU '47; July '18
- Alfred H. Lampe**, MD '48; Aug. '18
- Milton M. Voda**, DE '46; Aug. '18
- Richard G. Weaver**, MD '47; Dec. '18

**1950s**

- Gerald L. Behrens**, LA '50, MD '54; Oct. '18
- Abe Elliot Braverman**, LA '48, MD '52; Dec. '18
- Robert W. Butcher**, MD '53; Oct. '18
- Farrell M. Calton**, MD '59; Nov. '18
- Robert E. Caraway**, MD '56; July '17
- Charles Conrad Carter**, HS '56; Sept. '18
- James K. Cordonnier**, MD '59; Aug. '18
- June Schoknecht Dewey**, NU '55; Nov. '18
- Joy Elinor Moeller Dill**, NU '52; Dec. '18
- Richard E. Ernst**, LA '49, MD '53; Dec. '18
- Rachel Gaither**, PT '59; Aug. '18
- James C. Griffin**, MD '54; Aug. '18
- Charlotte E. Hockenberger**, NU '51; Nov. '18
- Norman F. Kenck**, DE '58; Nov. '18
- Roy W. Melton**, DE '53; Jan. '19
- John S. Meyer**, MD '56; Jan. '19
- Bill G. Prater**, MD '51; Jan. '19
- Beverly Koch Simpson**, NU '56; Dec. '18
- Relton W. Spotts**, DE '57; Aug. '18
- James B. Strachan**, LA '50, MD '52; Sept. '18
- Jean N. Vann**, OT '50; June '18
- Harvey W. Veit**, LA '47, MD '51; Dec. '18
- Oscar C. Zink**, LA '50, MD '54; Nov. '18

**1960s**

- Joseph Drew Callahan**, HS '63; Dec. '18
- Robert L. Chesanow**, HS; Sept. '18
- Thomas A. Dew**, HS; Nov. '18
- Barrett W. Dick**, MD '63; Aug. '18
- Charles E. Dobbs**, HS; Dec. '18
- Donald E. Eriksen**, DE '62; Nov. '18
- Allen B. McCoy**, DE '66; Dec. '18
- John Mendelsohn**, HS; Jan. '19
- Glen D. Pittman**, MD '63, HS '67; Oct. '18
- Steven I. Plax**, LA '57, HS '64; Sept. '18
- Walter D. Stevenson III**, MD '66; Nov. '18
- Paddy Taber**, HS; Sept. '18
- Leo T. Wagenbrenner**, HS '65; Oct. '18
- David A. Williams**, MD '62; Dec. '18

**1970s**

- Stephen M. Hall**, DE '70; Nov. '18
- Thomas Clark Hill**, MD '72; Nov. '18
- James C. Morris III**, HS '70; Dec. '18
- Carl F. Moyer**, HS '72; Dec. '18
- Dennis Nishimine**, DE '74; Dec. '18
- Louise A. Partin**, PT '77; Aug. '18
- Robert Vance Rouse**, MD '74; July '18
- Charles F. Shield III**, MD '72; Sept. '18
- Dale N. Thuline**, MD '74; Oct. '18

**1980s**

- Mary Autrey**, OT '85; Sept. '18
- Stephen Timothy Finger**, DE '82; July '18
- David Alan Johnson**, MD '86; Dec. '18
- Chris Owen Woodard**, HS '89; Nov. '18

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## Making sense of scents



**T**his image depicting the maze-like structures of the mouse olfactory epithelium, the tissue responsible for the sense of smell, recently was named a 2018 BioArt competition winner. Graduate student Lu M. Yang, working in the lab of David M. Ornitz, MD, PhD, the Alumni Endowed Professor of Developmental Biology, created the image. The Federation of American Societies for Experimental Biology holds the annual contest.

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