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MEDICINE@BROWN

LAST DAYLIGHT, **BY ANGELA ZHANG MD'21**
REYNISFJARA, ICELAND, 2015
New Year's Eve in Iceland: a move that puzzled many, as heavy snow blocks off Iceland's famed Golden Circle and the latitude only allows five hours of cold daylight. This beach, known for its black pebbles of eroded lava and basalt formations imagined in Icelandic folklore as trolls and ships caught in an eternal battle, encapsulates the vastly desolate and almost transcendental feeling of Iceland in the winter. I was packing up my camera in anticipation of the snow, but when I saw this stranger walking along the beach I couldn't resist taking one last hasty frame against the sunset. When I need a meditative and centering moment, I sometimes pull out this photo to be reminded of how small I felt against the wonders of nature on this island—and how important it is to preserve it.

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ON THE COVER:
Nora Burgess ’74 MD’77 stands in front of one her own paintings.

PHOTOGRAPH BY TIMOTHY ARCHIBALD

Meeting of the Minds

This issue of *Medicine@Brown* highlights the Center for Translational Neuroscience. The center is one of the horizontally integrated research teams within the Brown Institute for Translational Science. It brings together physician-scientists and researchers to focus on diseases of the brain, such as Alzheimer's, amyotrophic lateral sclerosis, and epilepsy. We've been successful in recruiting new researchers to join our well-established faculty to create a center focused on finding treatments and cures for some of the most devastating diseases of the brain. I think you'll enjoy reading about the team's innovative approaches and ideas for moving the field forward.

Alzheimer's disease research, both clinical and basic science, is a major focus for Brown. In December, a multidisciplinary group of researchers received $750,000 from the Alzheimer's Association to launch a phase-one clinical trial of a drug to potentially treat Alzheimer's disease. The team includes John Sedivy, PhD, a professor in the Department of Molecular Biology, Cellular Biology, and Biochemistry; Stephen Salloway, MD, of Psychiatry and Human Behavior; Rami Kantor, MD, of the Department of Medicine's Division of Infectious Diseases; and Constantine Gatsonis, PhD, from the Department of Biostatistics in the Brown School of Public Health. The drug they will be testing is from a class of therapeutics typically used to treat HIV and AIDS. Research by Dr. Sedivy, published in 2019 in *Nature*, showed that the drug can potentially reduce a type of age-related cellular inflammation that has been associated with Alzheimer's. This new clinical trial is an initial step toward determining if the drug may benefit people with the disease.

This study exemplifies the work we are doing in the Brown Institute for Translational Science and in the Division of Biology and Medicine. This integrated team of basic and pathogenesis-focused scientists and master clinicians collaborating with experts from the School of Public Health is working together, attracting outside funding and testing the application of Dr. Sedivy's discovery in a real-world setting. If this study is successful it will have an amazing impact at Brown and the world and will change our understanding of the mechanisms that underlie this devastating disease. This is exactly the type of research we do and want to do more of through BITS.

—JACK A. ELIAS, MD
Senior Vice President for Health Affairs
Dean of Medicine and Biological Sciences

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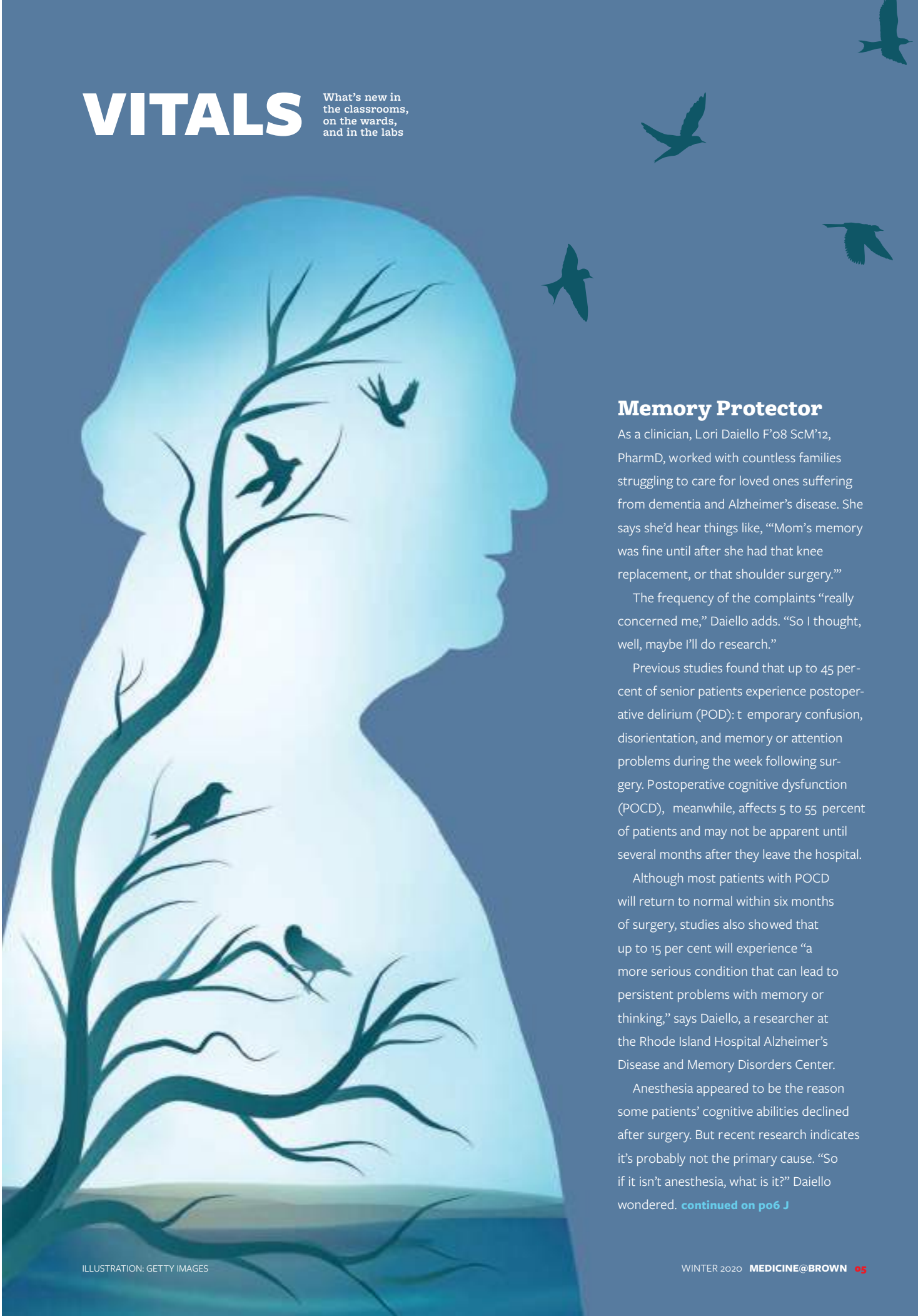
VITALS

What's new in the classrooms, on the wards, and in the labs



Memory Protector

As a clinician, Lori Daiello F'08 ScM'12, PharmD, worked with countless families struggling to care for loved ones suffering from dementia and Alzheimer's disease. She says she'd hear things like, "'Mom's memory was fine until after she had that knee replacement, or that shoulder surgery.'"

The frequency of the complaints "really concerned me," Daiello adds. "So I thought, well, maybe I'll do research."

Previous studies found that up to 45 percent of senior patients experience postoperative delirium (POD): t emporary confusion, disorientation, and memory or attention problems during the week following surgery. Postoperative cognitive dysfunction (POCD), meanwhile, affects 5 to 55 percent of patients and may not be apparent until several months after they leave the hospital.

Although most patients with POCD will return to normal within six months of surgery, studies also showed that up to 15 per cent will experience "a more serious condition that can lead to persistent problems with memory or thinking," says Daiello, a researcher at the Rhode Island Hospital Alzheimer's Disease and Memory Disorders Center.

Anesthesia appeared to be the reason some patients' cognitive abilities declined after surgery. But recent research indicates it's probably not the primary cause. "So if it isn't anesthesia, what is it?" Daiello wondered. **continued on po6 J**

ILLUSTRATION: GETTY IMAGES

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The answer may lie in the blood-brain barrier, which is supposed to prevent noxious substances in the blood from entering the brain. However, for reasons that are unclear, the blood vessels that form this protective structure can become damaged over time. Daiello says that in some people, the combination of a "leaky" blood-brain barrier and high concentrations of certain inflammatory proteins found in the bloodstream after surgery may be at least partly responsible for postoperative cognitive problems.

Now Daiello, an associate professor of neurology and of health services, policy, and practice (research), can test the hypothesis, thanks to a $3.8 million grant from the National Institutes of Health.

Over the next five years, she and her team will scan the brains of 200 people undertaking major surgery, before and then three months after their operations. The researchers will also conduct paper-and-pencil memory tests and study inflammatory factors in the blood.

Anesthesia isn't "entirely off the hook" as a possible contributor to memory loss, Daiello says. But she hopes that this research might help scientists find ways to prevent postoperative cognitive problems in senior surgical patients.

—AMANDA M. GROSVENOR

A Way With Words

This neurology resident knows how to spell success.

Dys•di•ad•o•cho•ki•ne•sia. A term used to describe a person's inability to complete rapid movements, it's a word you would expect only a seasoned neurologist to know, or perhaps a heady medical student. But at age 14, the 1999 Scripps National Spelling Bee champion Nupur Lala RES'22, MD, could spell it without missing a beat.

For Lala, now a second-year resident in neurology at Rhode Island Hospital, spelling complex words was just part of her daily eighth-grade routine. But prior to middle school, in Tampa, FL, she had no exposure to spelling competitions at all. She first competed in a spelling bee only because the teacher was holding it in her seventh-grade English class. "I wanted some extra credit," Lala says. "I didn't think it would lead anywhere."

But after she won the classroom competition, then the school-wide one, and then the regionals, she was off to Washington, DC, to compete in the 1998 Scripps National Spelling Bee, which a year before she had never even heard of.

While she only made it to the third round that year, Lala was energized and eager to go back. Her mother helped her train, quizzing her for three to four hours a day on lists she scrounged up from past competitions and words from the dictionary.

At the 1999 competition, Lala spelled

PHOTOGRAPHY: ASSOCIATED PRESS

1999 Scripps National Spelling Bee champion Nupur Lala is now a neurology resident at Brown.

her way into the championship round, achieving the goal she set out for herself. But when there were two spellers left, she realized winning the entire spelling bee "could actually happen." The famed word she won with was logorrhea—excessive and often incoherent talkativeness.

As champion, Lala was ineligible to participate in the spelling bee again, so she focused on other interests—including medicine. Reading about conditions like autism sparked an interest that she later followed at the University of Michigan, where she studied brain, behavior, and cognitive science. After a master's in cancer biology at MD Anderson, followed by medical school at the University of Arkansas, she has become interested in brain cancer and hopes to study it as a resident at Brown.

While she stopped spelling competitively after her win, it has still been part of her life. "When I won the spelling bee, I didn't believe it at the time, but I was told that this is something that will follow you for the rest of your life," she says—from a colleague commenting on her ability to spell seemingly impossible words to phrases she learned in eighth grade popping up in her medical textbooks.

But what has been the "most humbling" part of her success, Lala says, has been the kids she inspired. Partially because she was the star of the beloved movie *Spellbound*, a documentary about the 1999 bee, many children have told her how much she inspired them to compete in spelling competitions. When she attended the national championship in 2014, "several kids came running and tried to take pictures of me and held their cell phones up like people do when they're trying to photograph an actual celebrity. I never thought that anyone would be interested that many years later," she says.

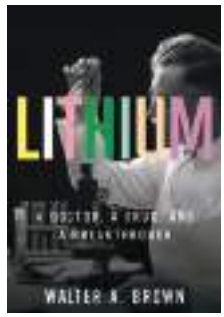
"My time in spelling bees gave me a lot of confidence and helped me learn to work hard toward something. I think I got what I needed to from that experience," Lala adds. "With that said, it easily remains one of the best experiences I've ever had."

—ANEEQAH NAEEM '20 MD'24

OVERHEARD

"I've walked into a patient's room and said, 'You're failing this treatment and we need to move on.' And I got the equivalent of an emotional slap in the face because patients don't want to feel like they failed anything."

—DON DIZON, MD, professor of medicine and director of women's cancers at Lifespan Cancer Institute, on the role of language in patient care, on *Medscape*.



BOOKSHELF

MIRACLE DRUG

Lithium: A Doctor, a Drug, and a Breakthrough
BY WALTER A. BROWN, MD
Liveright

Brown, a clinical professor emeritus of psychiatry and human behavior, brings to life the discovery of lithium as a treatment for bipolar disorder in this lively account, conveying his fascination with the drug, as well as his gratitude for the good it's done for millions of patients.

Brown traces the disorder's history, and its sometimes barbaric "treatments," to the mid-20th century, when an Australian psychiatrist with no research training and keen observational skills found, in a series of crude experiments (and baffling leaps of logic), that lithium so thoroughly treated patients' mania that they could leave his hospital and lead normal lives.

Other researchers picked up the baton, demonstrating that lithium prevented symptoms too—and that it's safe. Brown writes with affection and respect for their unwavering dedication to get lithium accepted worldwide. Indeed, he writes, their collective achievement launched the "pharmacological revolution." **—PHOEBE HALL**

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DOCTOR SPEAK

Physician Communication: Connecting with Patients, Peers, and the Public
BY TERRY L. SCHRAEDER, MD
Oxford University Press

Schraeder, a journalist, physician, and clinical associate professor of family medicine, offers a comprehensive guide to all forms of communication, from face-to-face patient interactions to effective tweeting to media interviews. She provides practical tips and techniques that can be adopted and tweaked according to the speaker and the situation in order to ensure that messages are satisfactorily received and understood.

The "why" behind better communication, she writes, is borne out by the data. It improves patient satisfaction and clinical outcomes, and decreases physician liability and burnout. However, Schraeder says, physicians cannot simply emulate some communication techniques that they think patients will perceive as empathic or respectful. "We must be empathic and respectful. We must listen and relate," she writes. "We must care both about and for our patients."

—KRIS CAMBRA

ASK THE EXPERT: SIMONE THAVASEELAN

Why are more people getting kidney stones?

Simone Thavaseelan RES'10 F'11, MD, is an associate professor of surgery (urology), clinician educator, at the Warren Alpert Medical School, the section chief of urology at the Providence VA Medical Center, and the residency program director at Rhode Island Hospital. A specialist in endourology, she took on this question that's affecting more and more of her patients.

Kidney stones affect one out of 11 people, and those numbers are going up, perhaps due to an unexpected culprit: climate change. Warmer weather makes people more susceptible to dehydration; this decreases urine output and concentrates calcium, oxalate, and uric acid, which contribute to kidney stone formation. As temperatures rise, researchers have noted an uptick in the rates of nephrolithiasis procedures.

Patients with stones smaller than 5 millimeters in diameter may not need surgery, though they are likely to require pain relievers. A medication such as tamsulosin can help speed passage. Larger stones usually require a procedure to break up or remove them. These include minimally invasive techniques like shockwave lithotripsy, which uses soundwaves to cause fragmentation of stones; or ureteroscopy, in which a urologist uses a thin laser fiber to fragment the stone. Very large and complex stone disease may require percutaneous nephrolithotomy, which removes stones through a small incision and often requires a short hospitalization.

The cornerstone of prevention for kidney stones is water intake, especially on hot days. Obesity and diet also may play roles in susceptibility. To reduce risk of recurrence, patients should aim to drink 80 ounces of water per day, with a goal of making two liters of urine; maintain a low-sodium diet; limit oxalate-rich foods like spinach, chocolate, and tea; and consume a moderate amount of calcium and plenty of fruits and vegetables. Recurrent or high-risk stone formers can be evaluated with additional testing, such as 24-hour urine collection, to make individualized recommendations.

ILLUSTRATION: LARA TOMLIN

Bedside Manner

Med students aim to treat the most basic ailment: loneliness.

Being in a hospital can be difficult, painful, and oftentimes overwhelming for patients. But those without any family members or friends to visit them may face the extra burden of loneliness when they're already at their lowest point.

To combat this isolation, the Brown Students at the Bedside Program pairs patients in the hospital who have no visitors with medical students. These students, often in their preclinical years, will spend 30 minutes to an hour sitting with a patient and talking, watching TV, or just keeping them company.

"We care for patients in all stages of life who have limited social support, and that could be for a lot of reasons. Sometimes the patient has no one in their lives or they have family that are far away and can't come be with them," Katie DeCarli RES'19, MD, MBE, says. "It's a vulnerable time for patients when they're ill enough to be in the hospital. We saw a need to provide those patients with some companionship."

Physicians are trained to treat and diagnose medical issues, but emotional wellbeing plays an important role, too. Brown Students at the Bedside aims to fulfill that need. "We see patients as people," says Cynthia Peng MD'20, who plays music for patients as part of another program, Healing Through Harmony. "At the fundamental basis, that's what we do."

When a patient is admitted and a member of the medical team notices they have no one with them, they ask if the patient would like a student visitor. If they say yes, the team recruits a medical student. For preclinical students, being able to spend more time in the hospital and talk with a patient one-on-one is invaluable.

"This is a way for us to start helping patients and we learn while we do it," Dan Kraft MD'22 says. "It's a two-way street. We're learning and thinking critically about what it means to care for people, and not just their diseases—and that's useful for everyone."

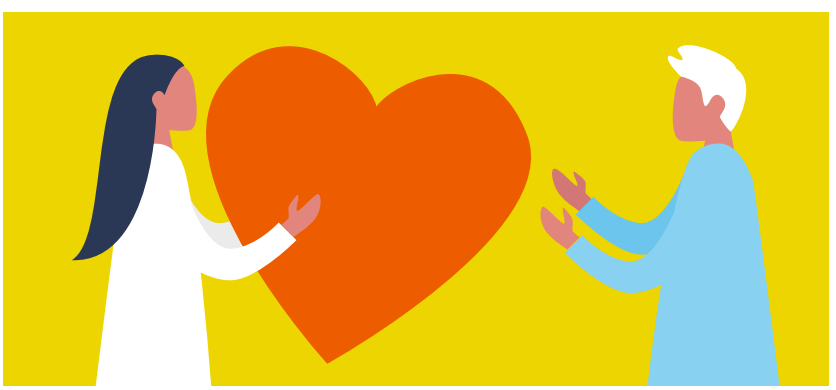
"Students learn about physical diagnosis, but at the early stages in medical school, to sit down and to really interact and get to know who a patient is, what they value, if they're suffering and lonely, is important," says Fred Schiffman, MD P'96 MD'00, the Sigal Family Professor of Humanistic Medicine. "To just be able to reach down to patients' human core is something very special for students and patients alike."

The program is flexible to prioritize patients' desires. There is no set curriculum or assignment; instead, students respond to what the patient wants to do. While some patients wish to talk, others simply prefer to sit with someone.

"I visited an agitated elderly woman with dementia who was hard of hearing. Instead of talking, we just sat together and watched TV. Whenever she didn't understand what was happening, I would help her out. It was my presence that was important there, not the conversation," Kraft says. He says that after he left, her care team told him that her agitation had significantly decreased. "Sometimes agitation is a sign of suffering," he adds. "If we can ease that pain, that's useful for both the patient and the entire medical team."

The program is in place at Rhode Island Hospital, The Miriam Hospital, and HopeHealth Hospice. The leadership team, which includes medical students, residents, and faculty advisers, hopes to ensure all hospital patients have someone to visit them.

"The act of talking to someone is a beautiful and simple thing," Peng says. "Having that humanistic touch and reminding people of this fundamental truth—that we treat the patient first—is so important for trainees." **—AN**



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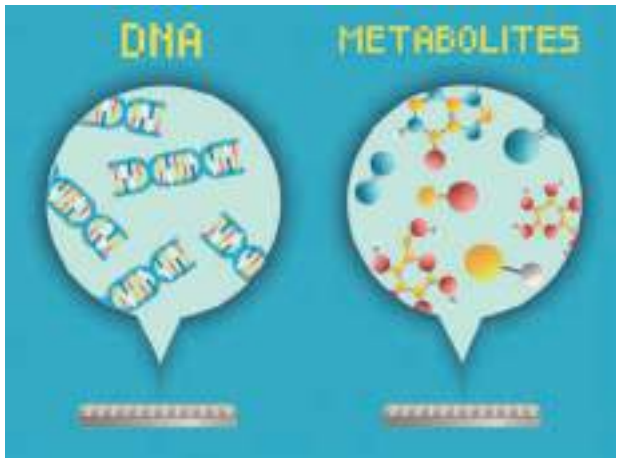
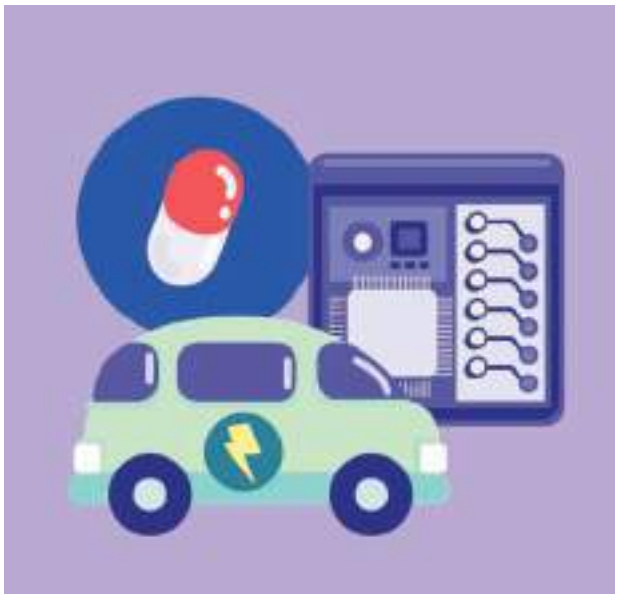




COOL TOOL

Toon In

There are many avenues that lead Brown students to careers in research. For Chibuikem Nwizu '15 MD'25 PhD'25, that av enue was cartoons.

Specifically, it was short animated videos called SciToons, created by a group of students and faculty as a fun way to communicate scientific concepts.

The idea for SciToons first came to Oludurotimi Adetunji, PhD, associate dean of the college for undergraduate research and inclusive science and adjunct assistant professor of physics, at an American Physical Science conference. After scientists presented their research, reporters lined up to speak with them about their findings.

But no one wanted to talk with the journalists, for fear of being misquoted or misunderstood.

"That got me thinking that there's got to be a better approach to getting the public excited about the research we do broadly as scientists," Adetunji says.

He wanted to create a compelling way to share scientific research with a non-scientific audience. And he knew kids and adults love animation. "I decided, maybe there's got to be an interaction between animation, storytelling, and science. What does that look like?" he says.

In 2011, Adetunji launched his first cartoon as an experiment. A team of students, half STEM and half non-STEM, produced a video about geology in collaboration with Jan Tullis, PhD, professor emerita of geological sciences. They got good feedback from educators and the general public.

But it took two years before the group released another cartoon. Meanwhile, Adetunji worked to formalize SciToons, which combines art, animation, high-quality multimedia composition, and storytelling. He recruited students interested in research and communications.

To make sure the science is clear, the team working on a project will present it to the whole group to solicit feedback. Each video script can go through five to 12 drafts. "Each draft gets cleaner and cleaner and simpler and simpler," Nwizu says.

After the script is finalized, the team moves into storyboarding and then animation, and hires a voiceover artist to narrate. Each four- to five-minute video can take eight months to a year to produce. It's time consuming, but also immensely rewarding. Nwizu says making SciToons gave him many important skills, like "being able to communicate an idea," which is invaluable as he begins grant writing.

The group has made more than 30 cartoons on topics ranging from stroke to data visualization to climate change, and been featured by the National Academy of Sciences, FermiLab, DARPA, and the NIH National DNA Day. Former SciTooners work at places like Ted-Ed and *The Atlantic*; Adetunji says they credit SciToons with giving them the necessary experience to work in communications.

With more than one million views on YouTube, SciToons is just getting started. **—AN**

ILLUSTRATION: COURTESY SCITOONS

IN VIVO

TO THE RESCUE

At age 16, Scott Pasichow RES'19 F'20, MD, MPH, found his calling as a volunteer EMT in East Brunswick, NJ. "It felt really good to be there for people in a critical time," he says. Now an EMS fellow at Brown, he's more motivated than ever to make life better, and not just for his ambulance and emergency department patients. He joined the Emergency Medicine Residents Association board to help shape resolutions related to training and patient care, and has lobbied legislators in Washington, DC, and Providence. In 2017, he started a local Emergency Medicine Advocacy Day to get his colleagues involved. Pasichow's activism extends beyond humans. He and his wife, Heather Kopsco, have two rescued pit bulls. "It was very important to us to do that," he says. Breeds involved in dog bites are often misreported. "I think every dog when you get bit by them becomes a pit bull-type dog. It hurts every rescue dog when that message gets out." —PH

COUCH POTATO
Pasichow and Kopsco hope to train Mia as a therapy dog. "She definitely has the personality and the temperament to be in an ICU or at a children's hospital," he says.

MISNOMER
Isis was named for the *Downton Abbey* pooch—two years before the terrorist group began making headlines and "ruined our dog's name," Pasichow laughs.

DRIVE TO DO MORE
From physicians' mental health to unconscious bias in the ED, Pasichow has more causes to champion than he can take on. "I wish I had more time in the day," he says.

LITTLE RASCAL
Sierra, 2, "is not always the best behaved" with the dogs, Pasichow admits—but like most pit bulls, Mia and Isis are "pretty docile and loyal to family."

FIRST RESPONDER
With paramedics doing more pre-hospital care, from stroke triage to ultrasound, having a physician on the scene can make a difference in patient care and outcomes, Pasichow says.

PHOTOGRAPHY: ADAM DETOUR

The Heat Is On

It's time for medical schools to teach the health effects of climate change.

BY JORDAN EMONT SCM'20 MD'20, ANGELA ZHANG MD'21, JESSICA HOFFEN SCM'22 MD'22, SARAH HSU '17 SCM'22 MD'22, AND JULIA ROTHSCHILD '17 SCM'22 MD'22

When Monica's daughter was in the pediatric ICU, Monica was terrified. After six hospital admissions in 2018 for asthma, the young girl had gotten every test, procedure, and medication that the specialists at the local children's hospital could offer. When asked why her daughter had so many severe attacks, Monica had a clear answer: "She can't go outside in the heat."

High heat diminishes outdoor air quality. The combination of high temperatures and ultraviolet radiation transforms compounds in car exhaust into ozone, a chemical essential to blocking the sun's radiation when high up in our atmosphere, but a potent lung irritant when closer to the ground. Ozone exposure has been linked to increased long-term risk of death from pulmonary disease; people like Monica's daughter who have pre-existing lung conditions are most susceptible. In urban environments with both higher temperatures and more traffic, like Monica's home of South Providence, low-lying ozone production is inevitable on a hot summer day. It's no wonder the girl so frequently struggles to breathe.

And she is not alone. The World Health Organization estimates that 88 percent of the global health burden of climate change falls on children under 5 years old. However, climate change and hot days are not just pediatric and pulmonary problems: heat waves harm maternal health and fetal development, cause more deaths than any other natural disaster, and can even interact with psychiatric medications.

Rhode Island is the first state whose average annual temperature has risen more than 2 degrees Celsius over the past 100 years.

Despite the known association between heat and increased ozone, the medical team never told Monica and her daughter that high temperatures could trigger asthma attacks. Not one physician ever advised her to keep her daughter inside on hot days. They certainly never said that over time, there may be more of these toxic hot days due to climate change.

This might be because their doctors did not know enough about the effects of climate change on asthma. In a 2015 survey of American Thoracic Society members, only 38 percent of the 915 respondents reported that they felt moderately or very knowledgeable about the health effects of climate change. In our 2019 survey of first-year medical students at the Warren Alpert Medical School, only 10 percent of respondents felt confident discussing the topic.

Although projections show that climate change will continue to cause more frequent and more extreme hot days worldwide, few medical schools are educating the next generation of physicians in how this will impact the health of their patients. In fact, it was not until June 2019 that the AMA released a statement stressing the importance of climate change education—but offered no guidelines for implementation.

A CLIMATE-AWARE CURRICULUM

Climate change will be the single largest risk factor for new disease patterns in the coming century. It not only will increase the frequency and severity of hot days, but also change the habitats for ticks and mosquitoes, which are vectors for diseases like Lyme and Zika. Rising sea levels and severe weather events will restrict where people can live and the availability of food and water, leading to geopolitical and health consequences associated with new population distributions.

These effects are most severe among already vulnerable populations, and extend beyond just health outcomes. On top of coordinating medications, emergency department visits, and transportation, Monica has to pay extra for air conditioning throughout the summer so her daughter can breathe in the hotter temperatures—another cost on an already financially strained household.

Physicians will be the first line witnessing these health effects, and medical schools have a social responsibility to ensure that future physicians are educated about climate change. We need to know how to work with patients and health systems toward solutions that reduce the effects of climate change. We need to lead advocacy efforts for local and national legislation that mitigates further environmental damage and builds resilience in the underserved communities most affected by these deleterious consequences.

The Washington Post reported last summer that Rhode Island is the first state whose average annual temperature has risen more than 2 degrees Celsius over the past 100 years. As Brown medical students and Rhode Island citizens, we are responding to the urgent need for climate change education by integrating it into the curriculum at the Medical School. We successfully campaigned for an introductory lecture on climate change and health for first-year students during the Health Systems Science course. We created an elective on climate change and health that debuted last August and will continue to be offered in fall semesters.

Together with undergraduates, medical students, and even attending physicians, we delve into climate change education by inviting guest speakers to foster critical discussions on topics like reproductive, respiratory, and mental health in the era of climate change, and sustainability within the health care system. Finally, to disseminate this information to the medical community at Brown and beyond, we are developing a podcast series that covers topics such as asthma, direct heat-related morbidity and mortality, changing infectious disease patterns, natural disasters and pregnancy, and migration due to climate change and climate disasters.

Ultimately, we aim to provide a broad framework for thinking about climate change as a risk amplifier for a multitude of pathological processes. We hope to empower students to think critically about the domestic and global populations that will be most affected and to carry this knowledge into their careers as trainees and attending physicians. More medical schools are joining this cause by the day. Together, we can ensure that the next generation of physicians has the education necessary to advocate in partnership with families like Monica's.

JORDAN EMONT is applying for residency in obstetrics and gynecology. **ANGELA ZHANG** is the diversity and inclusion fellow for the Office of Diversity and Multicultural Affairs. **JESSICA HOFFEN** has worked in environmental health with Native American communities in the Southwest. **SARAH HSU**'s interests include climate action, health care sustainability, and immigration justice. **JULIA ROTHSCHILD** is interested in the effects of health inequities on the mother-child dyad. Emont, Hoffen, Hsu, and Rothschild are students in the Primary Care-Population Medicine program.

ILLUSTRATION: GETTY IMAGES

ESSAY

Not Just a Diagnosis

A personal tragedy reminds a student to see the people behind those coveted teaching cases.

BY JOANNA GEORGAKAS MD'21

Bzzzz... the patient's phone vibrates on the small desk. My preceptor is searching for the new labs in the chart. The patient takes this as an opportunity to peer down.

"Two new Eastern equine encephalitis cases," the patient says, looking up at me. My stomach drops. "The first one died a week ago. News said he was from right here in Warwick, too."

I nod along. "They sprayed the area this weekend," I say. "Hopefully that helps."

Two weeks earlier. It's early September, and I'm spending my free weekend catching up with my best friend. My phone buzzes, I look down, surprised to see that my cousin is calling. She has news about our cousin from Warwick. "You know that EEE story all over the news ..." she begins.

The next patient comes into clinic for a routine follow-up, but she's preoccupied with worries about the virus known as "triple-E." She asks me to examine all bumps and bruises, review symptoms, and if I know anything about the Warwick case.

The virus was grabbing headlines across the Northeast last summer and fall, as mosquitoes, and then humans, tested positive for the rare yet deadly disease. It starts off with flu-like symptoms—headache and high fever—and rapidly progresses as the brain swells and patients exhibit more severe neurological symptoms including seizure, hallucinations, and coma. About a third of people with EEE die; survivors can suffer brain damage and paralysis.

As summer gave way to fall, frightened parents kept kids inside. Night football games were rescheduled and canceled. Towns announced aerial spraying to kill the infected mosquitoes. By November, when the first frost hit, the CDC had received

PHOTOGRAPHY: GETTY IMAGES

Could this be EEE? I don't want to exclude it, but will the residents think I am being extreme?

reports of 36 confirmed cases for 2019, including 14 deaths. Three cases were in Rhode Island. The first case was my cousin.

My cousin was the man who was there to build up my self-esteem after my father left. He was the person who made me smile when it was hard to, and who was always unapologetically himself.

He lived in Warwick. He was a dad, a brother, an uncle, a coach, a fighter …

He was only 58.

He was much more than the EEE case.

I say nothing about the case to the patient. Instead, I calmly reassure her that the bumps she is concerned about are blisters from her new shoes and that it is unlikely she will get EEE. We move on to discuss the reason for her follow-up today.

I escape after clinic to Neurology Happy Hour, eager to chat more about the field. As a student, and thus assumed to be well versed in social media, the doctors ask me about what I'd want to see posted on their residency program's Instagram account.

"I like learning about medical cases on the accounts I follow," I reply without much thought.

"We could post about our triple-E case," one of the docs eagerly chimes in.

Wednesday didactics happened to coincide with flu clinic, so classmates I haven't seen in a while are at the Medical School. I approach a circle of friends standing in line to get flu shots. We trade rotation tips and talk about exciting cases we've gotten to see so far while we wait.

"I saw the guy with triple-E last week!" one friend shares.

I excuse myself, blaming didactics for my abrupt exit.

It's another day at the clinic. I knock on the door and enter. A man, middle aged, presents with general fatigue and a headache that he reports as 8 out of 10 on the pain scale. He says he works outside in the early mornings and evenings. My heart races. Could this be EEE? I don't want to exclude it from the differential, but if I include it will the residents think I am being extreme? I think of the medical proverb, "When you hear hoofbeats, look for horses, not zebras."

I decide to include it.

"If it was triple-E, not much we would be able to do," the resident replies.

I agree.

Throughout our medical training, it can feel like we carry around a trainee passport. We eagerly fill each page with stamps of new, exciting cases, cherishing the "zebras" we manage to collect along the way. Often in our practice of recording and sharing these experiences, however, we lose sight of the personal.

Throughout the last few weeks on my family medicine clerkship, I was unable to escape the personal impact of the EEE case, with daily reminders of my loss coming from patients, peers, residents, attendings, and the local news. It made me reflect and think more deeply about my own trainee passport. I thought about the people behind each stamp, how the families I worked with are doing now, and how I can be more thoughtful moving forward in my own interactions.

I also have thought more about the impact of sharing these cases with my peers. While my personal experience, with its publicity, may be on the extreme end, we never truly know who may be affected by the stories we share.

I hope that my cousin will be immortalized in the trainee passports of the medical professionals who saw him. I know he will live on in my own—as a strong, proud father and a dojo master. I hope the people who cared for my cousin will also find time to reflect on the lessons he taught them. I hope that they, too, record a piece of his persona, and not just his diagnosis.

Living through the personal and the medical behind my own EEE stamp, I have become more grateful for the opportunity to support patients during intimate and life-changing periods of their lives. While I will continue to add stamps to my trainee passport, I'm now more cognizant of their value.

Thank you to all the patients who have contributed to my passport and who have truly taught me medicine. You, too, will never be forgotten.

JOANNA GEORGAKAS graduated from Middlebury College in 2014 with majors in neuroscience and gender/sexuality/feminist studies. She is part of the Medical Education Scholarly Concentration.

Doffing the White Coat

BY JEN A. MILLER

Alumni of the first graduating classes define retirement on their own terms.

FORTY-FIVE YEARS AGO, Brown graduated its first class of medical students of the modern era. The early classes were vanguards, guiding the making of a medical school in the Brown tradition. They are at the forefront yet again. Now in their 60s and 70s, greater numbers of those early alumni are transitioning into retired life.

Retirement can be especially challenging to physicians. According to a study published in the *Canadian Medical Association Journal*, doctors still worry about their patients, even after they retire. Beyond financial reasons, physicians who delay retirement do so because of concern for their patients, lack of interests outside of medicine, and fear of losing their identities.

Brown's first graduates have faced all of these things, and have found different ways to forge new paths in retired life. From editing medical journals to helping universities get accreditation to birthing goats, medical alumni are entering their golden years in personal—and busy—style.

PHOTOGRAPHY: GETTY IMAGES

“Everybody needs a family doctor right now.”

WHILE ROBERT GEORGE ’73 MD’77, P’02, P’02, and Elizabeth Ruedisueli George ’73 MD’77, P’02, P’02, went to Brown together, they met long before that: in middle school. “We started dating in high school our senior year. It turned out we had both applied to Brown,” Bob says. “As undergraduates we were both accepted into the new PLME and went from there.”

“Went from there” was into 38 years as family physicians in the small town of Mercersburg, PA. The couple retired from that practice two years ago.

Bob and Liz George

“Retired,” though, is a loose term. Bob still sees patients five to six days a month, traveling to different medical offices to do so “because everybody needs a family doctor right now,” he says. Physicians retired from full-time practice are filling in and will most likely continue to do so: according to the Association of American Medical Colleges, the US will see a shortage of almost 122,000 physicians by 2032; about half will be in primary care.

Liz has focused her work on something she started while she was still working full time: Healthy Eating Adventures, a community-based, 28-day program to support people in learning a whole foods, plant-based lifestyle. “Participants are inspired to eat this way when they hear about the science behind the health benefits of plant-based eating,” she says. Coaches, pre- and postlab work, shopping trips, cooking demos, and weekly “share and learn” potlucks create an atmosphere of support and “adventure” in which to change lifelong habits.

She started the program in 2010 after the alarming news that, in America, current generations will not live longer lives than their parents. According to the most recent statistics from the Centers for Disease Control and Prevention, life expectancy in the US fell from 78.9 years in 2014 to 78.6 years in 2017.

Liz also had seen the rise of life-threatening illnesses, like diabetes and heart disease, in her practice, and wanted to do something about it. “These are lifestyle-based diseases,” she says. Healthy Eating Adventures is part of her nonprofit, Mercersburg Area Council for Wellness (MACWell), which is creating “a groundswell of community commitment to making the area a place that inspires its population to live well.” Programs include increasing walkability and bikeabilty, revitalizing the local stream, and building a streamside trail. The work put into Healthy Eating Adventures also comes from changes Liz saw in the doctor/patient relationship, which she says played a role in her retiring before she was truly ready. “I felt that the pressure in practice was to spend less time with your patients, whereas they should have been getting more time to learn about healthy habits,” she says.

Despite still being involved in their community, Bob says the relationship is different now, and it’s taken some getting used to. “It was very hard to leave patients behind,” he says. “We practiced in a small town, so we knew almost everybody and everybody knew us.”

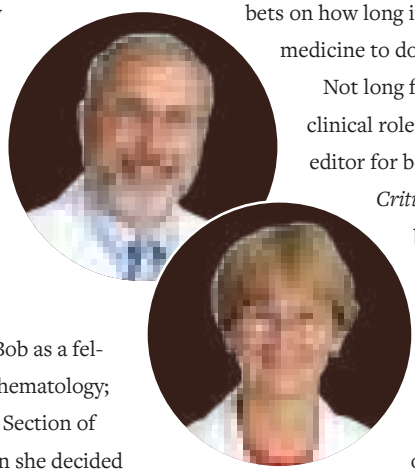
How their retirement will evolve is a story untold. It does include travel, with a bike/barge trip from Amsterdam to Bruges, and recent trips to New Zealand and Antarctica with the Brown alumni group. As Bob says, “We’re still in the process of figuring out what retirement looks like.”

PHOTOGRAPHY: RYAN SMITH

"Clearly Mom and Dad don't understand the concept of retirement."

LIKE THE GEORGES, ROBERT PARKER '73 MD'76 and Margaret Parker '73 MD'77 went to medical school together, though separately at first. They met in freshman year biology at Brown, but Margaret went to Tufts for medical school while Bob stayed in Providence.

That arrangement of being in two cities, even ones not that far apart, wasn't working out. So they did something that they hadn't planned on doing until after they graduated—something that in the 1970s would give Margaret a rational explanation for transferring, though: they got married.



"Transferring after one year of medical school was not typical," she says. "Saying I was doing it because we were getting married worked."

They went on to work at the National Institutes of Health for more than a decade: Bob as a fellow and then senior investigator in pediatric hematology; and Margaret as the head of the Critical Care Section of the Critical Care Medicine Department. When she decided she wanted a more clinical position, they both took jobs at Stony Brook University in New York. At the time, Stony Brook had no division for pediatric hematology/oncology nor a division of pediatric critical care, so they started both. Though she trained in internal medicine, "Pediatrics is where I always belonged," Margaret says. "I stayed there for the next 27 years." In 2018, they retired, she as director of pediatric critical care at Stony Brook. Bob had stepped down as director of hematology/oncology about six months before retiring.

A lot of their immediate post-work time was taken up by a big change that's typical for retirees: they moved. But not to a sunshine state. They relocated to the eastern shore of Maryland, into a house that had belonged to Bob's father, who himself had recently moved to New Hampshire. "The initial transition stuff was all around moving: getting organized to move, getting moved, all that sort of stuff," Margaret says. "That sucked up some of our time and energy."

Margaret had made "noises about retiring first," Bob says. "We have four kids, and they figured Margaret would be fine with retirement, but I would flunk retirement, and they were taking bets on how long it would take me to find something back in medicine to do."

Not long for either of them, because they carried non-clinical roles into retirement. Margaret is the associate editor for both *Critical Care Medicine* and *Pediatric Critical Care Medicine*, and Bob is on the editorial board of both. They're part of the Pediatric Acute Lung Injury and Sepsis Investigators (PALISI) Network, which studies critical care issues in critically ill children, and have traveled to Vancouver and Montreal to attend PALISI meetings. So far, focusing on the academic side without the clinical has worked for them. "You don't have the aggravation of all the regulation and paper and billing," Bob says.

When they visited one of their children, they were both working on their respective editorial duties. "Clearly Mom and Dad don't understand the concept of retirement," they were told.

Going into retirement is "like changing your job," Bob says. And while there's a lot of reasons to retire from practice, "leaving medicine in and of itself as the sole reason is not a good idea because then you're retired and you have all this time on your hands. What the hell are you going to do?"

"Physicians by our very nature want to be productive and want to feel wanted and needed. It's part of our ego structure," he adds. "So you have to have something that you're moving into, not just that you're moving away from medicine."

“Time flies. You don’t want to waste it.”


Nora Burgess

WHEN NORA BURGESS ’74 MD’77 RETIRED, the first thing she did was stop. “In all candor, I have to say I rested. I took six months and made no commitments,” she says. She had been a cardiothoracic surgeon at Kaiser Permanente in San Francisco, and wrapped up her working life as the medical group CFO and an assistant physician-in-chief.

“I had to get used to the fact that when the phone rang, it was not always a problem, which had been my experience for the last 40 years,” she says. “Being able to sleep at night and not have to worry about how someone was doing and wondering if I should go in and check on them—it took me six months to be reoriented from that point of view.”

Burgess tried new things. That included volunteering at Toluma Farms & Tomales Farmstead Creamery, a goat and sheep dairy in Marin County, CA. “I wanted to be outside and do something totally different,” she says.

One of her first assignments was mucking out stalls and putting in new alfalfa for the nanny goats and their kids. She worked during lambing and kidding season, which meant she had to “go up into the hills and find new moms and newborn lambs and kids,” she says, so they could bring the babies down to the barn.

“That was a lot of fun. There’s nothing better than a newborn goat,” Burgess says.

She also made a wish list by asking herself: “If I was 95, what would I look back and see that I have done?”

So she’s taken art lessons, everything from pastels to pine needle baskets. She and her husband have traveled—a lot: to the Aleutian Islands, the Kamchatka Peninsula, to Myanmar along the Irrawaddy River and Cambodia, Moscow to St. Petersburg via the Volga Baltic Waterway, the Northwest Passage from Greenland to Nome via Ballot Strait to Peel Sound, Patagonia and the Chilean fjords, Iceland, Africa, and the Galapagos.

They’re doing the kind of “remote travel you want to do when you’re healthy and on the younger end of retirement,” she says.

With her 96-year-old father, she wrote a book for their family so that his story, along with genealogy and photos, are in one place for them to share and enjoy.

She did some volunteer mission work in the Dominican Republic and Guatemala, but her tertiary care skills didn’t translate as well as more primary care-oriented specialties.

Burgess remembers a piece of advice she once got from a senior cardiothoracic surgeon mentor. He told her that “you don’t have to do the same thing forever,” she says. “He was giving me permission to look at things with a blank page, imagining what new skills and experiences might be interesting.”

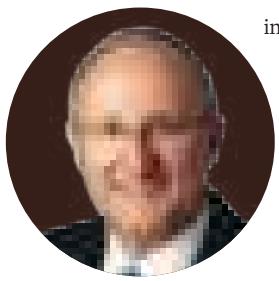
For the first time, “I felt I had the luxury of managing my own time, which is pretty exhilirating. I could do anything.” Retirement is “figuring out what that means for you,” she adds. “Time flies. You don’t want to waste it.”

PHOTOGRAPHY: TIMOTHY ARCHIBALD

“It’s very difficult to come home and consume oxygen.”

GLENN MITCHELL ’67 SCM’69 MD’75 RES’77, MPH, followed an unusual path to medical school. He wasn’t pre-med and didn’t take the MCATs. He got his undergraduate degree at Brown and was in his first year of graduate school toward what he hoped would be a PhD in engineering. “After losing my grad student deferral when the rules for the Vietnam draft lottery were announced, I searched for options other than being drafted,” he says. With the help of faculty connections, he worked in weapons development under contracts from the Department of Defense and other government agencies.

His experiences during those years led him to abandon the PhD in engineering and decide to become a physician instead. “The graduate school dean said he could change my concentration from engineering to medicine,” Mitchell says. A few months later the Medical School was established, and he was grandfathered into the first class.



Mitchell’s career didn’t take a straight line from there, either. In the 1980s, he taught at Brown and became chief of emergency medicine at Pawtucket Memorial Hospital. He also tried to establish an emergency medicine program at Brown, though it didn’t take at the time.

So he joined the Army at 37 years old, where he stayed for more than 20 years. In that time, he became a flight surgeon, commander of the US Army Aeromedical Center, then deputy commander of the Eisenhower Army Medical Center, and command surgeon of the US Army Southern Command, which was responsible for all US military interactions in 31 countries in South and Central America and the Caribbean. In his last two roles with the military, he served as chief of clinical operations for the US Army Medical Command and commander of the William Beaumont Army Medical Center. He retired from the Army in 2005.

But he wasn’t done yet. He went back to being a full-time emergency physician and director and chief of ambulatory care at the Indian Health Service for two years (and learned to speak some Navajo). At the same time his wife, Jane Hathaway Mitchell, set up the first inpatient adolescent and psychiatric treatment unit for the Navajo tribe, “and did it with Western medicine mixed with shamans and sweat lodges and culturally appropriate methods,” he says.

Mitchell went on to serve as the chief medical officer and vice president of clinical safety of Mercy Health System in St. Louis for five years, building their informatics facility and setting up their electronic health records system.

After leaving Mercy, he thought that’s when he would finally retire. “I was in my 60s and I thought, ‘OK, that’s enough for me.’”

For two years, he did just that, with some consulting mixed in. But he got antsy with at-home life. So he became the founding chair and professor of medical informatics at the Harrisburg University of Science and Technology in Pennsylvania. He was recently promoted to vice provost of the university.

“When you’re dealing with being retired after being sort of a semi-type A physician forever and going around the world and interacting with the health care system, it’s very difficult to come home and consume oxygen,” he says. “It turned out to be too hard for me. I needed to work, and luckily I have a spouse who understands that.” Jane has retired after a career in psychology and nonprofit work with the Red Cross.

Now 73 years old, Mitchell says he doesn’t know what the future holds. After all, even though he is retired from the Army, he still carries the rank of colonel. “I could get called back to active duty,” he says. “I think I would go right after they call my dog.” **M@B**

JEN A. MILLER is an award-winning freelance writer and author. She’s a regular contributor to *The New York Times* and writes their weekly running newsletter.

Hive Mind

ILLUSTRATION BY EVA VAZQUEZ

BY DAVID LEVIN

AS AN ORGAN, the brain is staggeringly complex. Every thought, feeling, sensation, or memory you've ever experienced is held and processed by a mysterious web of matter inside your skull, from your first bike ride to the place you left your keys five minutes ago.

Because of its complexity, it's one of the organs scientists understand the least. Yet the medical disciplines involving the brain are strangely siloed; there's neurology, which deals with one set of medical disorders, and there's psychiatry, which deals with another set of disorders generally relating to mood and behavior.

"The fact that these are two separate disciplines is a historical artifact," says Judy Liu, MD, PhD, a neurologist at Brown who studies severe epilepsy. "The reality is that neurologists and psychiatrists both must strive for an understanding of nervous system function in the course of treating brain disorders."

A new collaboration of scientists works to push solutions to brain diseases out of the lab and into the hands of patients.

Liu came to Brown in 2017, joining forces with her longtime colleague Eric Morrow, MD, PhD, the Mencoff Family Professor of Biology, to find a better approach. They founded the Brown Center for Translational Neuroscience, a research group that aims to break down barriers between disciplines studying the brain. Its goal: to develop not only a new understanding of how the brain works, but new ways of diagnosing and treating the diseases that affect it.

"Translational science—taking lab research and applying it to new treatments in the clinic—by nature requires collaborations, especially when it comes to the brain," says Morrow, both a psychiatrist and a molecular neuroscientist, who is founding director of the new center. "You really need multidisciplinary teams; a certain diversity of skill sets ranging from patient-oriented work to experimental basic lab science, involving genetics, and cell biology. There are also various exciting new ways to model disease processes in the lab, and to test new treatment strategies."

The center has five main areas of focus: autism, epilepsy, Alzheimer's disease, rare neurogenetic disorders, and psychiatric disorders, such as schizophrenia and stress-induced conditions. The infrastructure necessary to embark on these multidisciplinary approaches is difficult to maintain in one laboratory alone. As a formal center, by contrast, all scientists under its umbrella can share staff with high-level expertise, such as in patient-oriented studies or in human stem cells. The investigators also share expensive laboratory equipment, such as advanced microscopes and equipment for high-throughput studies of cells and treatments. Location is critical, too. With the juxtaposition of many of the laboratories, collaboration is as simple as walking down a hallway and talking to a colleague. There's room for improvement there, however. Although most of the center's affiliated faculty are within the Laboratories for Molecular Medicine at 70 Ship Street, others span a number of different buildings, including some on Brown's main campus.

"The center really avails itself to team approaches," says Morrow, who's also an associate professor of neuroscience and of psychiatry and human behavior. "I believe that we are now able to work on more projects and, importantly, more ambitious projects than we could prior to forming the center."

STARTING WITH PATIENTS

The Center for Translational Neuroscience's projects stem from clinical problems that families face, and the goal is to find solutions through collaboration between bench scientists and clinicians. The group's philosophy, which they loosely call a "bench to bedside to bench" model, brings patients, researchers, and physicians together early in the process to help focus the search on important problems that present in the clinic.

This is exactly the type of integrated team approach that the Brown Institute for Translational Science (BITS) fosters. CTN is one of the horizontally integrated research teams within BITS, and it's also a systematic collaboration between BITS and the Robert J. and Nancy D. Carney Institute for Brain Science.

"We have all of the ideal elements in CTN. We have invested in physician-scientists, basic scientists, and a robust program for students and trainees. On top of that, we have seamless collaboration with the relevant clinical departments as well as other areas of the University," says Jack A. Elias, MD, senior vice president for health affairs and dean of medicine and biological sciences at Brown. "We were fortunate to receive philanthropic funds that allowed us to establish endowed professorships for both established faculty members and to recruit outstanding researchers. I have very high expectations for what this team is going to accomplish."

"The mission of the center is really twofold," Morrow says. "The first is to advance knowledge of the pathogenesis of brain disease. So what are the causes, and what are the mechanisms? Brain disorders are among the most enigmatic conditions affecting humankind. The second part of the mission is to translate this knowledge to improved outcomes for families affected by brain disease. That could be a new method of diagnosis, it could be a new biomarker that guides treatment, it could be a new therapy. But regardless, it all starts with observations in the clinic."

ILLUSTRATION: GETTY IMAGES

“It’s that kind of desperate situation that makes doctors into scientists.”

Working directly with patients can provide families with much-needed hope, he adds. In many cases, brain diseases like severe autism can leave families feeling isolated and alone. “The disease has a huge impact on them psychologically, financially, and emotionally. It can be very powerful for them to know that there’s a laboratory or a student that’s devoting their career to better understanding and treatments for their loved one’s condition,” Morrow says.

Over the last two decades, that sort of patient-centric research has been a driving force for Morrow—and in particular, for Liu. As a young doctor completing a residency in neurology, she witnessed firsthand how devastating neurological diseases and their treatments could be.

“I helped care for one child with life-threatening epilepsy who had undergone multiple surgeries to stop his seizures,” recalls Liu, the Sidney A. Fox and Dorothea Doctors Fox Assistant Professor of Ophthalmology, Visual Sciences, and Neuroscience. “His doctors had determined that one whole side of the brain was causing seizures, and removed it entirely. But then the seizures came back, and the patient had a second procedure. With each surgery, the patient still didn’t really gain good control of the epilepsy.

“It’s that kind of desperate situation that actually makes doctors into scientists,” she adds. “After working in a clinical environment, you’re really driven to find out what could possibly be different about the cases that can’t be controlled on regular medications. What do we do differently? How can we choose treatments more precisely, and how can we better predict their outcomes?”

Answering those questions is a difficult task. But since all neurological and psychiatric disorders take place in a single organ, whatever scientists discover about one disorder may provide key information for treating another. Liu, also an assistant professor of neurology and of molecular biology, cell biology, and biochemistry, cites her collaborations with Morrow, who specializes in severe autism, as an example. By working together, it became clear that the diseases they each study may share a common thread: a high percentage of autism patients also have epileptic seizures—and vice versa—so both disorders could be triggered by common root causes.

“We’re not totally sure what initiates a seizure. Most of the time patients with epilepsy are normal. But every once in a while, something happens in a neural circuit where seizures are generated and propagated and the brain can’t put on the brakes,” Liu says. “That’s what we need to know: how neurons interact with each other and what happens during seizure generation.”

BUILDING A BETTER MODEL

Probing these interactions in a living human brain is nearly impossible for technical, medical, and ethical reasons, however. The closest the center’s researchers can get to the real thing are brain samples removed during epilepsy surgery, but even then they’re left with only the “seizure focus” or the non-functional brain tissue, which they have no way of comparing to healthy tissue from the same patient. So the group instead is working on better models of the disease that they can study in the lab.

Using genetically engineered mice, the researchers can stimulate activity that causes seizures, and measure it as it happens with cutting-edge technology like fluorescent proteins, which mark affected cells with a glowing hue, and optogenetics, a process that lets researchers trigger specific neurons with tiny pulses of light inserted into the brain through fiber optic cables. The center has also developed an emphasis on the use of CRISPR/Cas9 to generate new non-traditional models, such as in rats, which have more complex behavior and can be better models, particularly for some neurodegenerative diseases.

As sophisticated as they may be, rodent models can still only approximate the core causes of neurological disease. To really pick it apart requires finding a system that can mimic the exact activity of the human brain, says Alvin Huang, MD, PhD, a molecular biologist and neurologist who left Stanford, where he trained with Nobel Laureate Thomas Sudhof, to join the center in September 2019. Now teamed up with Morrow and Liu, Huang has increased the number of MD/PhD physician-scientists in the center even more.

"Brown's collaborative spirit makes for such a unique and exciting place to study the brain."

Huang, the GLF Translational Assistant Professor of Molecular Biology, Cell Biology, and Biochemistry, points out: "We have come to realize that in fact there is a huge difference between humans and all the other model organisms. I mean, a mouse is a mammal and technically should be close enough, but in fact, many recent articles are showing that in terms of brain cells, they have very different behaviors."

Instead, Huang and other researchers at the center engineer human brain cells in a dish that can replicate the disease for experiments in the lab. Using specialized methods, Huang and other center scientists are able to "reprogram" blood or skin cells from patients, causing the cells to revert to an early, stem cell-like state. These cells, called induced pluripotent stem cells (iPSC), still hold all DNA of the original patient, including the genetic mutations or disorders that may be at the root of their disease. From here, the scientists can grow the iPSC into a number of different brain cell types, including neurons and glial cells (the other important cell type in the brain), and use them to examine how a disease sets in, and how treatments may work on the cells from the very patients who may one day receive them.

A COMMON THREAD

Liu and Morrow have been using iPSC to study neurodevelopmental disorders. Huang uses them to focus in on Alzheimer's—and says there may be some relationships between basic mechanisms in neurodevelopment and neurodegeneration.

"Many of the mechanisms that are recognized in epilepsy, for example, are not uncommon in Alzheimer's disease. In fact, Alzheimer's patients have a very high prevalence of epilepsy," Huang says. "We now have evidence showing that in early stages of Alzheimer's, the leading cause of cognitive impairment is abnormal hyperexcitability, which is very similar to what happens in epileptic patients."

Those flashes of extra activity between neurons are so similar, he notes, that the only drug currently approved to treat Alzheimer's is also used to treat epilepsy. "If you use those drugs to calm down this overexcited brain activity, you can restore cognitive function to some extent," he says. "But it doesn't work for every single patient—and even if it does work, it won't last long, because that hyperexcitability is most pronounced in the early stage of Alzheimer's before a lot of the neurons die off."

ILLUSTRATION: GETTY IMAGES

Huang is collaborating with other researchers at the center to find new ways to treat Alzheimer's and prevent it from progressing. But he's convinced that testing drugs only in rodents won't be effective. Instead, he's using human iPSC to create a "brain on a chip," a tiny flexible substrate that he can seed with stem cells. Using this method, he can effectively steer the cells' development and grow tissue that mimics a real brain, complete with all the blood vessels and complex connections between brain cells.

"All those human structures can be generated in a dish from the same iPSC. With this technology, we can kind of assemble all those cell types ourselves to mimic the brain's microenvironment," Huang says. Studying the interactions of the brain cells themselves, he adds, also lets him iterate easily, growing multiple organoids that he can use to test drug targets quickly and efficiently.

MOVING PARTS

Answers to some of the broader questions about neurological diseases, such as Alzheimer's and amyotrophic lateral sclerosis (ALS), may lie at synapses.

Gregorio Valdez, PhD, a neuroscientist who joined the center from Virginia Tech late last year, studies the effect of normal aging and age-related diseases on neurological circuits, and particularly synapses. Valdez, an associate professor of molecular biology, cell biology, and biochemistry, has made great strides into our understanding of how synapses degenerate with advancing age and in ALS, a neurodegenerative disease that affects motor neurons. While its symptoms are mainly physical—patients gradually lose the ability to move their limbs or even speak—he says its root cause may have a great deal of overlap with other neurological disorders.

Normally, when prompted by the brain, motor neurons send a chemical signal that tells muscles when to contract. The neurons themselves are separated from the muscle fibers by a tiny gap, and along with a special type of glial cell this region forms a synapse called the neuromuscular junction. In ALS, however, the synapse stops working and completely falls apart, so the brain's signals are never received—rendering the nearby muscles effectively useless.

The study of the peripheral synapse may provide critical insights into other neurodegenerative diseases, Valdez says. The series of cellular and molecular changes that cause synapses to degenerate progressively in ALS might be the same that result in Alzheimer's.

"Neuromuscular synapses are much more accessible than synapses in the brain, by nature of not being inside a skull," he says. "By looking at how those junctions malfunction or disappear in ALS, we are likely to learn something about the brain by proxy."

It might also be possible to learn about how the brain naturally degenerates as patients age, he adds. Even in the absence of disease, pathological changes start to take place as people get older. Connections between motor neurons and muscles weaken, and stop sending and receiving chemical signals in the same way.

"The synapses lose some factors that are important to keep them healthy, and thus in a youthful state," Valdez says. "You'll find that a lot of things associated with the initial progression of diseases like ALS and Alzheimer's also happen during normal aging. If you look at synapses of healthy people as they get older, you'll see similar changes to those caused by age-related neurological diseases."

For that reason, the work that Valdez and the rest of the center is doing may not only help treat disease, but treat problems we'll all face as we continue the inevitable journey into our golden years.

CAMPUS-WIDE COLLABORATION

The type of massively interdisciplinary work that the Center for Translational Neuroscience is doing—work that crosses disciplines, diseases, and even life stages—is a natural fit for Brown, says Diane Lipscombe, PhD, the Reliance Dhirubhai Ambani Director of the Carney Institute for Brain Science.

"Brown's collaborative spirit, driven by the curiosity and creativity of faculty and students, is what makes this such a unique and exciting place to study the brain. The Carney Institute is invested in building on our distinguished brain scientists on campus by hiring new faculty to tackle areas of great need in society," says Lipscombe, who is also the Thomas J. Watson, Sr. Professor of Science and a professor of neuroscience. "When a researcher joins the brain science community we want them to be able to hit the ground running, drawing on the expertise of colleagues at Brown from across the disciplines to do impactful research toward new cures and treatments."

"That's one of the things that really inspires me about working at the center," Morrow adds. "Together with my colleagues and our students, I know we're all trying to develop a knowledge base and treatments that will improve the lives of families affected by neurological and psychiatric disease. It makes me love coming into work each day—the fact that all of us are able to work together toward that common goal makes this a really special place." **M@B**

DAVID LEVIN is a freelance science writer in Boston.

BY SARAH C. BALDWIN
PHOTOGRAPHY BY ADAM DETOUR

Instead of a scalpel, Danielle Sawka wields the tools of her trade: a sketchpad and pen.

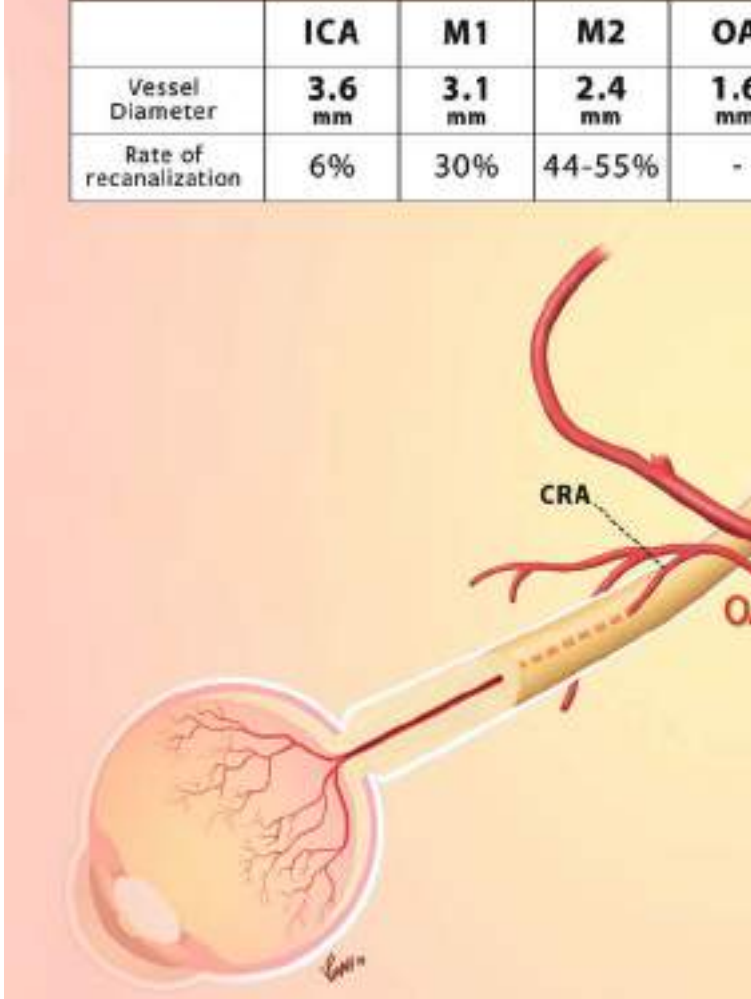
WORTH A THOUSAND WORDS

IN WAYS OLD AND NEW, VISUALS PLAY A KEY ROLE IN HOW WE LEARN, TEACH, AND PRACTICE MEDICINE.

IN THE BLUE ROOM OF HASBRO CHILDREN'S HOSPITAL, Danielle Sawka '22 MD'26 stands off to the side as six figures in blue huddle over the operating table. On it, a tiny shape draped in sheets is bathed from above in bright white light, a Betadine-swabbed belly poking through an opening in the fabric. A herd of machines on wheels hisses and beeps.

Like a conductor raising his baton, the hospital's pediatric surgeon-in-chief, François Luks, MD, PhD, initiates the time-out that is part of the Universal Protocol: "Baby girl Prentiss. Laparoscopic gastrostomy." The anesthetist, then the circulating nurse confirm the name of the patient and the procedure. Luks points to the mark where the incision will be. "Are there any concerns?" There are none. The operation begins.

Wasting no time, Sawka steps closer to the table. Only her watchful, wide-open eyes, the shade of a pale winter sky, are visible between the surgical cap and mask. Three monitors suspended from the ceiling by giant tentacles suddenly come to life as a telescope—a thin, wand-like tube containing a camera and a light cable—descends a cannula that's been inserted in the baby's abdomen. The camera moves forward gingerly, projecting a view of liver, colon, and stomach. Low-ceilinged and pink, the baby's insides look like the GoPro footage of a spelunker in a Himalayan salt cave. Pincers come into view and grip the veiny flesh of the stomach. "You see how we tent the stomach, Danielle, so the guidewires can be inserted and anchor the G-tube?" Luks says.



Sawka's gaze locks onto one screen and then another, then drops to the large sketch pad cradled in her left arm. With a pencil she makes a few tentative dashes on the paper, looks up again, and delivers a flurry of marks. A series of sketches with hasty annotations cascades down the paper, marking the steps of the procedure. She turns the page quickly and keeps drawing as she tries to keep up with the surgeon.

As a student in Luks's popular course, Introduction to Medical Illustration (PLME 0400), Sawka is here not to do the surgery or even just watch it, but to *see* it. What began in 2010 as a two-hour workshop for first-year medical students is now a semester-long course offered to Brown and Rhode Island School of Design undergraduates that covers not only the fundamentals of drawing, such as point of view, light and shadow, outline and contour, but the history and ethics of medical illustration as well. In addition to live models and plant and animal specimens at RISD, students sketch cadavers in the anatomy lab and operations like this one. They hear from practicing medical illustrators, such as Ian Suk, from the Johns Hopkins School of Medicine's storied Department of Art as Applied to Medicine, as well as Julia Lerner MD'23, who trained there, and the Warren Alpert Medical School's own Vinald Francis, hired last summer.

Medical drawings have existed for more than 2,000 years, evolving from third-century BC renderings on papyrus, to Leonardo da Vinci's 15th-century Vitruvian Man, to Andreas Vesalius's 16th-century *De Humani Corporis Fabrica*, to the works of 20th-century stars Max Brödel and Frank Netter. Today's artists have replaced sable brushes and carbon dust with styluses and software like Photoshop, but their role, according to the Association of Medical Illustrators, is the same: they are visual problem solvers.

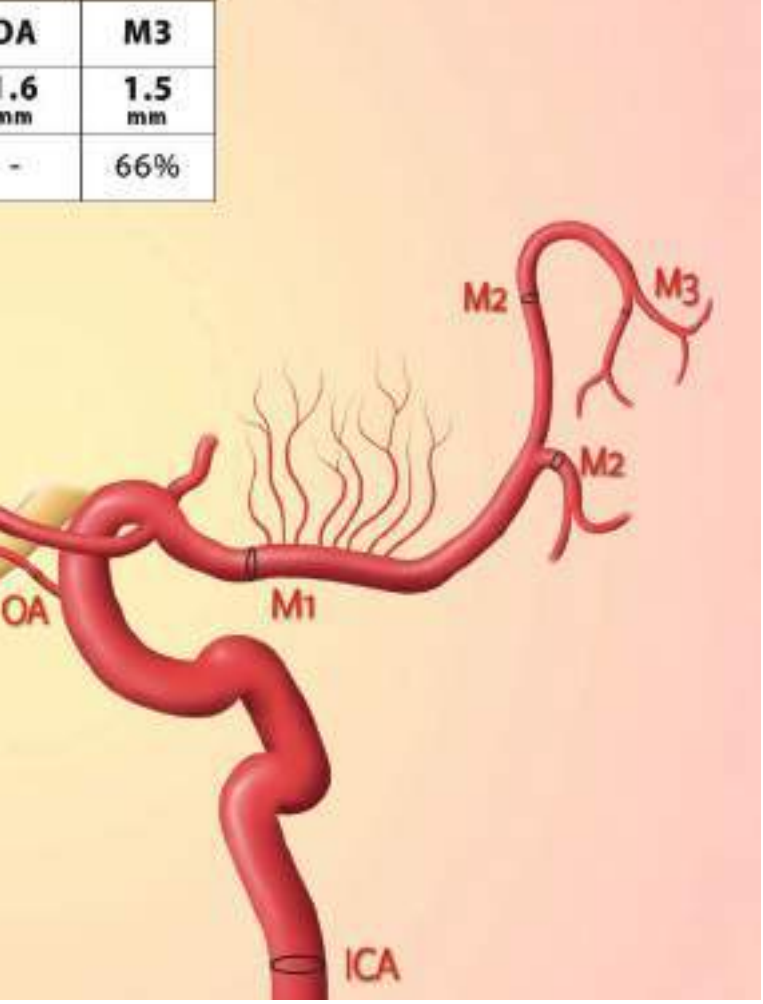
Luks, who is also professor of surgery, of obstetrics and gynecology, and of pediatrics, is quick to point out that the goal of his course is not to turn students into Leonardos, but to teach them to communicate—with their patients, with students, with each other. "If you convert big words into easy language, it's still very abstract. If you draw it, it's concrete," he says. "An image sticks." Lerner considers drawing a particularly important tool to use with patients, "especially when there are barriers in health literacy, or even language."

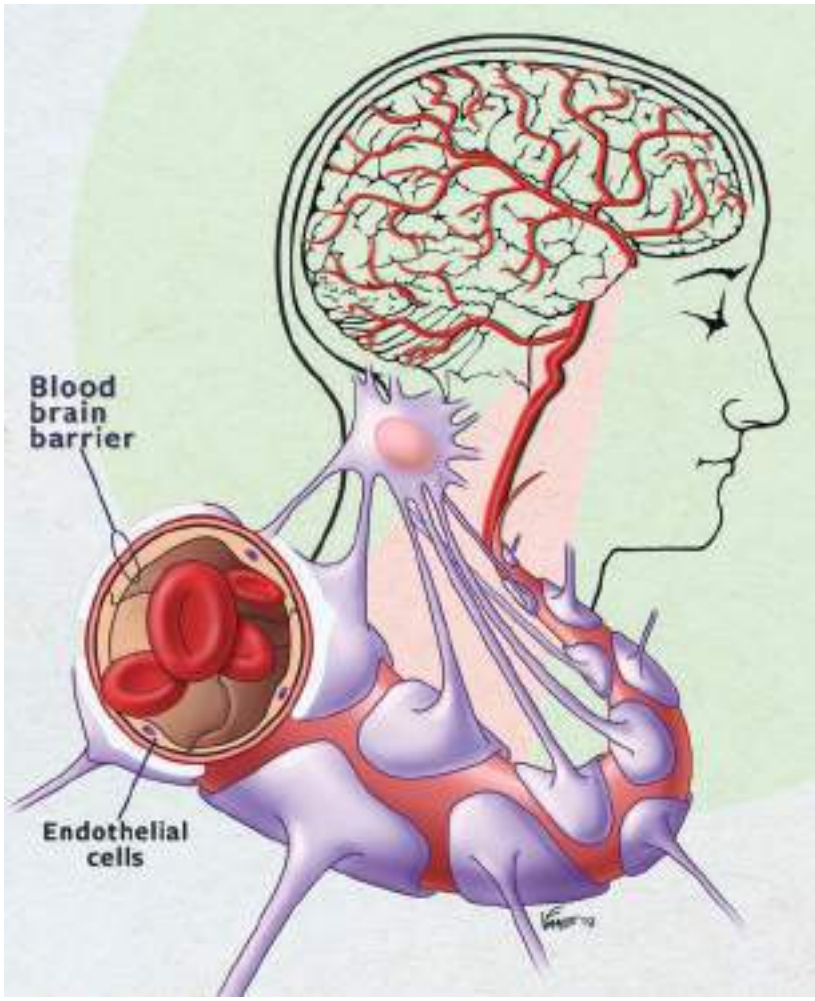
It's also a great teaching tool for oneself, Luks says, since to be effective, even the most rudimentary drawing requires a thorough understanding of the pathology or procedure: "Think about a complicated operation. How do you attack it? You break it down in its simplest parts, then figure out what's essential and what is not." To do this, Luks has his students watch a video of a gallbladder removal several times, and then represent it—in only three drawings.

In addition to this analytical thinking, medical drawing demands close observation, which Francis points out is an integral part of medical training. "By the time you're actually [doing] a procedure, you've seen it many, many times. And you understand it inside and out. … No amount of lecturing can take the place of that."

Sawka adds that while such close observation is important, just as useful is "the ability to filter out certain details" to make the visual appropriate to the viewer's level of understanding. Both skills are key for clinicians, as Luks, Kevin Liou '10 MD'15, Paul

"If you convert big words into easy language, it's still very abstract. If you draw it, it's concrete. An image sticks."





Top left: Vinald Francis's drawing of the ophthalmic artery was part of an article published in the journal *Stroke* in February. Above: Francis's drawing explained the blood-brain barrier for a lay audience.

George '01 MD'05 RES'08, and Jay Baruch, MD, director of the Program in Clinical Arts and Humanities, pointed out in a 2014 paper in *Medical Education*: "The ability to select which details are relevant to the larger picture … is also essential in non-visual aspects of clinical practice, such as in formulating diagnoses and delivering oral presentations."

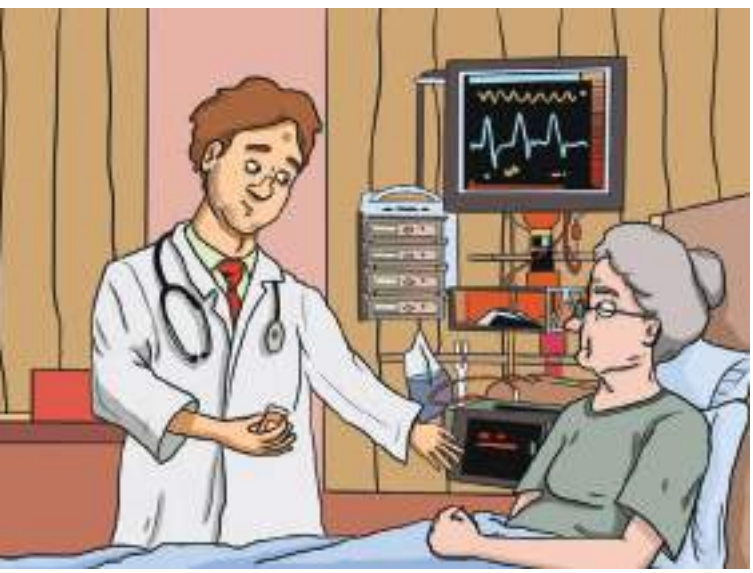
Sawka says that "the chance to learn from such an accomplished surgeon, medical illustrator, and professor" as Luks makes PLME 0400 the best course she's ever taken. It's now being replicated by Jill K. Gregory, associate director of instructional design at Icahn School of Medicine at Mount Sinai.

LESS IS MORE

This paring-down to the pith has its most extreme expression in what's known as the visual abstract, in which the key points of a scientific paper are represented in a three-panel format using simple, stylized icons accompanied by succinct text—and then tweeted. The first visual abstract is attributed to a surgical resident at the University of Michigan, Andrew Ibrahim, who in July 2016 tweeted an infographic on a yellow background linking to "The Impact of a Pan-regional Inclusive Trauma System on Quality of Care in London," which appeared in the *Annals of Surgery*. Since then, the trend has been consecrated with a hashtag and endorsed in a tweet by Atul Gawande ("Love the #VisualAbstract format. More journals need to pick this up.").

And it has spawned a revolution in how scientific information is shared. To date, some 80 journals and organizations have integrated visual abstracts into their dissemination strategy; some even require authors to submit a visual abstract and tweet along with their paper. (*Stroke* was the first, in 2017.) The yellow-and-black design has become the *Annals of Surgery*'s signature look, and Ibrahim, now the journal's creative director, has published an open-access online primer on the topic. Meanwhile, in June 2019, an editorial in the *Journal of the American Geriatrics Society* compared a text-only tweet to a tweet with a visual abstract; the authors found that the standard tweet received 24,984 impressions, 17 retweets, and 36 likes over eight days, while the post with the visual abstract received 168,447 impressions, 81 retweets, and 100 likes in half that time.

ILLUSTRATIONS: VINALD FRANCIS



Despite the rise of narrative medicine and the popularity of journaling, not everyone processes with words.

While visual abstracts have been compared to movie trailers or previews, Luks calls this approach the "IKEA model" of non-verbal communication. "Nobody's better than IKEA at describing something visually without words in as few images as possible. They've turned it into an art." Luks, who enjoys creating visual abstracts and tweets, sits on the social media committee of the American Pediatric Surgical Association; has spoken at SciVizNYC, a multidisciplinary gathering on the visualization of scientific information; and presented twice at the Association of Medical Illustrators conference.

Given the convergence of several social phenomena—the overwhelming amount of material doctors need to consume to stay up to date, the increasing prevalence of user-focused design thinking, the use of smartphone technology—not to mention scientific journals' basic mission to disseminate research, it's perhaps not surprising that health care professionals prefer this concise, DIY approach. The science shows that the brevity of visual abstracts might be easier for working memory to process, and graphics are more likely to be encoded in long-term memory, making them easier to retain and recall.

The downside to visual abstracts is that so far, they're neither shareable beyond social media nor searchable on PubMed. But Luks refutes the criticism that visual abstracts constitute a dumbing down: "Most of my colleagues draw, some better than others. But we all use images. It's what we've always done."

ILLUSTRATIONS: FRANK DENG

"The Palliative Path," by Frank Deng '20, demonstrates the immense, positive differences physicians and health professionals can make in people's lives. Using a dark, nearly monochromatic image (top left), Deng evokes the loneliness and fear patients feel when facing chronic or terminal illness without an engaged care team; while his colorful, robust images depict a better quality of life when physicians compassionately connect with patients and families, even if a cure is not possible.

THE PICTURE OF HEALTH

Visual language works because "no one speaks jargon," Luks says. Technical medical terms can impede effective communication—especially at critical times in a patient's care. Sheyla Medina MD'20, who all her life has used drawing to learn concepts, has seen the role art can play in compassionate, patient-centered care.

During a gap year as a Bray Fellow in Medical Humanities, Medina worked at Women & Infants Hospital's Women's Intimacy and Sexual Health Clinic with patients who had been treated for gynecologic and breast cancers. She says that explaining concepts through images rather than words enabled the women to "process and digest some of the hidden meanings behind their curiosities about treatment effects on the body."

Medina wondered if there was a way to combine visual art with effective storytelling through comics. She partnered with Luks, who also had been thinking about medical comics, and Fred Schiffman, MD, the Sigal Family Professor of Humanistic Medicine, to secure an Arnold P. Gold Foundation grant on the use of visual communication—as opposed to the more commonly used essay—as a tool of reflection and expression. Despite the rise of narrative medicine and the popularity of journaling, Medina says, "not everyone processes with words."

For their pilot project, Medina, Luks, and Schiffman recruited seven undergraduates or recent graduates (including one RISD student) who had completed PLME 0400. Each student had to convey, through a comic, their conception of what humanism in medicine means. Over the course of five interactive workshops, they learned the technical basics and narrative tricks of comics with the help of Emily Slapin, an instructor at RISD, and received feedback on their work. The comics were displayed in the Medical School last fall.

The workshop leaders found that students were highly motivated to integrate humanities into their careers and considered comics to be a valuable way to communicate concepts and facilitate reflection. Shortly after the exhibition, Medina traveled to Orlando to present the findings at the Gold Humanism Society's inaugural Gold Humanism Summit. Several of the comics will be published in the *Annals of Internal Medicine*.

Medina, who was born in Peru, explored meanings of health and well-being across cultures as a public health major at the University of Pennsylvania. Years before she was drawing medical comics, she observed the healing power of storytelling when she interviewed Ojibwe in Minnesota about their experiences with western and traditional medicine for a research project. One of her conclusions: "The stories themselves are medicine." **M@B**

SARAH C. BALDWIN is a freelance writer and host of the *Trending Globally* podcast. She is the former editor of *Brown Medicine*.

CHECK-UP

What's new with Brown Medical Alumni

Back to School

A year ago, Roxanne Vrees '98 MD'03 RES'07 could not have imagined that she'd be where she is now, serving as associate dean for student affairs at the Warren Alpert Medical School. And yet, when she looks back over the trajectory of her career, it makes total sense.

"I love working with the trainees—the med students, the residents," Vrees says. She began this new role on September 1.

Vrees became interested in medicine as a child, when she began comparing her experiences with the health care system in the US with those in Jamaica, where she lived until she was 10. In high school, she learned about Brown's Program in Liberal Medical Education from an older student.

After concentrating in psychology as an undergrad, she thought she'd go into pediatrics—until she did her pediatrics rotation and realized that her affinity to pediatrics was based on her desire to have a family of her own. She chose obstetrics and gynecology instead, because, she says, "it's such a diverse specialty with a little bit of everything. You're doing primary care, you're doing surgery, and you get to take care of women across their entire lifecycle … and there's nothing more exciting than delivering a baby!" (She got the family, too: Vrees and her husband, Matthew Vrees MD'97, a clinical associate professor of surgery, have two children.)

She matched to the residency program at Women & Infants Hospital, where Donald Coustan, MD, the department chair at the time, became an "incredible mentor." Vrees says she's not sure she fit the blueprint for what a Women & Infants resident looked like on paper or in person, but Coustan "saw something in her."

That's true, Coustan says. "When I met Roxanne, I saw that she was an active thinker. She has an inquisitive nature, and she related well to patients. She's very bright."

After a year and a half in private practice, Vrees returned to Women & Infants to work in their specialty emergency room. Much like a general emergency department, Vrees says, "You never know what's going to roll through the door—you're a first responder. It might mean life-or-death decisions in the moment."

It also means sometimes caring for women who have been sexually assaulted. "We were able to build a sexual assault nurse examiner [SANE] pr ogram. In Rhode Island we are the only emergency room that has a comprehensive SANE program and post-assault follow-up clinic for all of our survivors," she says. This work has become her primary area of interest and clinical expertise; she became medical director of emergency obstetrics and gynecology at Women & Infants in 2011. On the academic side, Vrees was the associate residency program director and ob/gyn core clerkship director until becoming associate dean.

Though she completed all of her education and training at Brown, Vrees feels like there's much about the Medical School that's still brand new to her. "I'm kind of feeling like a medical student again," she says.

One thing that's different is that there's more support and focus on student wellness, she says. Another thing that's slowly changing is the stigma around mental health issues, especially for physicians. "We have students who struggle with anxiety, depression, eating disorders," Vrees says. "I think we're having more open dialogue about some of these really challenging issues, but also having support and resources for students who are struggling."

Those resources include a learning specialist on staff, as well as a Counseling and Psychological Services therapist dedicated to medical students. "These are all things that we didn't have that I think have really elevated the culture of wellness and student support at AMS," Vrees says.

Since her appointment, Vrees has been in the listening phase, learning more about student needs and working on her vision for the student affairs office. One thing she knows is she wants students to see her as a success story. "I wasn't a PLME student who just coasted through and everything was great. There were bumps in the road. I'm a first-gen college student, only physician in my family. I want students to look at me as what can happen on the other end despite the struggles, despite the challenges."

—KRIS CAMBRA

PHOTOGRAPHY: ALEX GAGNE

Happy Camper

THIS PEDIATRIC ENDOCRINOLOGIST HAS THE BEST SUMMER JOB


Greg and Ali Fox

The dinner bell rings at 5:30 on a perfect summer day, calling campers of all ages to a rustic main lodge deep in the woods of West Greenwich, RI. As they grab seats at long wooden tables, the din of talking, laughing, and utensils clattering on plates is instantaneous and deafening.

"It's controlled chaos," pediatric endocrinologist Gregory Fox RES'00 F'03, MD, observes from the middle of the fray, smiling like a proud papa.

For nearly two decades Fox has volunteered as medical director of Camp Surefire, the only one in the state for kids with type 1 diabetes. He's cared for hundreds of campers, taught them to manage their condition, and watched them grow more confident in themselves and their abilities as they've returned, year after year.

"This is my baby," says Fox, a clinical assistant professor of pediatrics at Brown. "It is an extended family."

When he began volunteering at the camp as a pediatric endocrinology fellow, he suddenly confronted the day-to-day realities of diabetes management. Though his father had type 1, and he'd counseled countless families on managing the disease, "I got to camp, and I thought, uh-oh. Now I need to put myself in their shoes," Fox says.

"I've learned more about managing kids with diabetes at camp than I've learned in 20 years in the office," he adds. "I learn something new every year."

Camp Surefire is often the first—and only—sleepaway camp that its campers have attended. Type 1 diabetes requires 24/7 vigilance, something few parents will entrust to anyone else. It reassures them that Fox and many staff work in health care or are certified diabetes educators. "I lose a lot of sleep because I don't want anything bad to ever happen to one of these kids," Fox says. "I think their parents realize that."

Many kids with type 1 feel isolated. At camp, they're surrounded by people just like them. "From the very minute they show up, they feel like they're part of something," Fox says.

His whole family is part of it too: his wife, Ali, volunteers as executive director, and their kids, Joe, 18, and Anna, 16, have leadership roles. "It's such an incredible part of our lives," Fox says.

—PHOEBE HALL

FROM RISK TO REWARD

Adolescence can be a turbulent time, but physicians and other adults can play an important role in helping teens navigate safely to adulthood, says Marina Catallozzi '92 MD'96, MSCE, who calls her adolescent medicine practice in Washington Heights, NY, "a bridge over troubled water."

Catallozzi wears many hats—she's the director of the General Public Health Program at Columbia's Mailman School of Public Health, an associate professor of pediatrics and population and family health at Columbia University Medical Center, and vice chair for education in the Department of Pediatrics, and she runs qualitative research on the drivers of adolescent behavior.

But whether she's intervening at the academic, public, or patient level, "I'm always trying to help people think about care, research, and advocacy for adolescents," she says. This population has specific needs but is often misunderstood; that's precisely why Catallozzi embraced it.

Health strategies targeted at adolescents often focus on risk reduction. But Catallozzi prefers to frame teens' risky behavior as a natural process of human development and an opportunity to channel risk-taking into positive achievement. "It is a time when people need extra support and resources, and if we can provide that, it can be rewarding," she says.

In practice, this involves creating a protected space where adolescents can ask—and be asked—sensitive questions. Catallozzi advocates for a motivational interviewing technique called "strengths-based communication," a way of asking questions to help young people understand their own skill sets to lead them toward positive choices. Thanking patients for sharing this sensitive information helps them make great strides.

"They are engaging with an adult who speaks to them like an adult," she says, "and that is often not the case in their lives." **—MARY STUART**

PHOTOGRAPHY: ALEX GAGNE (FOX); COURTESY OF CATALLOZZI

CLASS NOTES

ALUMNI

1970s

Mark Blumenkranz '72 MD'75 MMSc'76, P'05, P'08, was named CEO of Kedalion Therapeutics, a clinical-stage company developing topical ophthalmology therapies that he cofounded in 2015 and where he also serves as chairman. The American Academy of Ophthalmology recently honored him for his significant contributions to his field.

Arthur Horwich '72 MD'75 was awarded the 2020 Breakthrough Prize in Life Sciences for his discoveries regarding protein formation within cells. The prize is a set of international awards, known as the "Oscars of Science," which honor important, recent achievements in the categories of fundamental physics, life sciences, and mathematics. He is a professor of genetics at the Yale School of Medicine.

Joel Shalowitz '74 MD'77, P'03, MBA, wrote a textbook, *The U.S. Healthcare System: Origins, Organization and Opportunities*, published in July by Jossey-Bass. In addition to practicing internal medicine, he has been on the faculty of Northwestern's Feinberg School of Medicine for more than 35 years and was a clinical professor and director of the Health Industry Management Program at the Kellogg School of Management for 28 years. Joel is a senior fellow at the Research Institute of the Finnish Economy and an affiliate professor at the Institute of Management of the Scuola Superiore Sant'Anna in Pisa, Italy.

Griffin Rodgers '76 MMSc'79 MD'79 received the American Society of Hematology Award for Leadership in Promoting Diversity in December at the ASH annual meeting. He is the director of the National Institute of Diabetes and Digestive and Kidney Diseases.

1980s

Seth Berkley '78 MD'81 is CEO of Gavi, the Vaccine Alliance, which received the 2019 Lasker-Bloomberg Public Service Award.

David Rutstein MD'83, MPH, is the secretary-general of the Baha'i International Community, acting on behalf of the Baha'i world governing body in the conduct of its external affairs. Previously he was a primary care physician in Micronesia and worked for the US Department of Health and Human Services, including as a rear admiral in the US Public Health Service and as the deputy surgeon general. He lives in Maine and is married with three children.

Yul Ejnes '82 MD'85 was named chair-elect of the American Board of Internal Medicine, where he has served on the board since 2016. He is an internal medicine physician at Coastal Medical in Cranston, RI, and clinical associate professor of medicine at the Warren Alpert Medical School.

Steve Georas '83 MD'87 is the Walter & Carmina Mary Parkes Family Distinguished Professor at the University of Rochester Medical Center. Previously division chief of pulmonary and critical care medicine, he will retain his joint appointments as a professor of environmental medicine and of microbiology and immunology.

1990s

Steven Griswold MD'92 is a primary care physician who specializes in palliative care at Bon Secours Hartfield Medical Center in Hartfield, VA. He completed his residency at the University of North Carolina and worked in rural family medicine for 14 years before completing a geriatric fellowship at Virginia Tech in 2010. He was an assistant professor at Virginia Tech Carilion School of Medicine, medical director of the inpatient Palliative Medicine Services at Carilion Roanoke Memorial Hospital, and a geriatrician with Riverside PACE before joining Bon Secours' palliative team in 2015.

Geoffrey Gilmartin MD'97 is the chief medical officer of Proteostasis Therapeutics, a clinical stage biopharmaceutical company. He served most recently as chief medical affairs officer of the company.

Myechia Minter-Jordan '94 MD'98 is the executive vice president and chief impact officer at the DentaQuest Partnership for Oral Health Advancement. She joined the Boston-based company in October from The Dimock Center, where she was president and CEO.

2000s

Barrett Bready '99 MD'03 is the founder of the electronic genome mapping company Nabsys, which raised $21 million in equity led by Hitachi High-Technologies Corp. Barrett is an adjunct assistant professor of molecular pharmacology, physiology, and biotechnology at Brown and lives in Providence with his wife, **Alma Guerrero Bready** '09 MD'15 RES'18, and their daughter.

Sree Chaguturu '99 MD'04 is chief medical officer for CVS Caremark, CVS Health Corp.'s pharmacy benefits management business. He joined the company from Partners Healthcare, where he was chief population health officer.

Peter Lee '94 MD'05 PhD'15, MS, MPH, was elected to the International Academy of Astronautics, an independent organization of distinguished individuals elected by their peers for their outstanding contributions to astronautics and the exploration of space. Members have included Neil Armstrong, Buzz Aldrin, and John Glenn.

2010s

Rajiv Kumar '05 MD'11, founder of ShapeUp, and Matthew Farkash '09, co-founder of Blueprint Health, teamed up to form the Brown Angel Group. The group, which seeks to provide pre-seed investment capital and mentorship to entrepreneurs who have graduated from Brown, bridges a gap between the support students get while on campus and the support of companies that invest in later stages of development.

Andrew Matson MD'13 is an orthopedic surgeon in the Care New England Department of Orthopedic Surgery and Sports Medicine. He specializes in hand and upper extremity and is affiliated with Kent Hospital. He completed his orthopedic surgery residency at Duke and his hand and upper extremity fellowship at Harvard.

Hannah Janeway MD'15 gav e a talk titled "You Are More Powerful Than You Think" at the 2019 F emInEM Idea Exchange in New York. An emergency medicine physician, she is an International and Domestic Health Equity and Leadership fellow at the Ronald Reagan and Olive View-UCLA medical centers.

RESIDENTS

1980s

David Wazer RES'83, MD , received the Sanctae Crucis Award, the highest non-degree accolade the College of the Holy Cross bestows upon its alumni. An internationally recognized expert in the management of breast cancer, he is chair and professor of radiation oncology at Brown, director of the Lifespan Cancer Institute, and radiation oncologist-in-chief at Rhode Island Hospital.

2010s

Kristopher Day RES'15, MD , a plastic surgeon, joined Marshall Health and Cabell Huntington Hospital. He is an assistant professor in the department of surgery at the Marshall University Joan C. Edwards School of Medicine. He completed a general surgery residency at Brown, plastic surgery residency at the University of Tennessee, and craniofacial and pediatric plastic surgery fellowship at the University of Texas at Austin.

Abdullah Quddus RES'15, MD, is a cardiologist at Franciscan Physician Network Heart Center in Michigan City, IN. After graduating from Allama Iqbal Medical College in Lahore, Pakistan, he completed his internal medicine residency at Brown, where he was chief resident. He completed fellowships in cardiovascular disease and interventional cardiology at St. Luke's University Health Network in Bethlehem, PA.

Amy Grooms RES'17 F'18, MD, is an assistant professor in the department of psychiatry at the University of Arkansas for Medical Sciences. She completed her general psychiatry residency and a fellowship in psychosomatic medicine at Brown.

Omar Haque '02 PhD'13 RES'17, MD , MTS, received a Zuckerman Fellowship at the Harvard T.H. Chan School of Public Health. He also recently received a Translational Science Fellowship Research Grant from the American Society of Transplantation and a Resident Research Award from the American College of Surgeons. He completed his psychiatry residency at Brown and is a lecturer at Harvard Medical School.

Seth O'Donnell RES'17 F'18, MD, is an orthopedic surgeon in the Care New England Department of Orthopedic Surgery and Sports Medicine. He specializes in trauma and foot and ankle and is affiliated with Kent Hospital. He earned his MD at New York Medical College and served in the Navy as an undersea medical officer, with training in hyperbaric and

The White Coat Ceremony for the MD Class of 2023 took place in October. Top left: Ghazal Aghagoli '19 MD'23, Nailah Tucker MD'23, and Olivia Cummings '19 MD'23 r ead the notes left in their coat pockets by members of the Brown medical community. Center: Mark Hocevar '19 MD'23 r eceives his coat from Senior Associate Dean for Medical Education Allan R. Tunkel, MD, PhD. Right: Senior Vice President for Health Affairs Jack A. Elias, MD, offers welcoming remarks.

PHOTOGRAPHY: MADELINE JOHNS

diving medicine. He completed an orthopedic surgery residency and trauma fellowship at Brown, and his foot and ankle fellowship at Harvard, where he is a clinical instructor.

Marcoandrea Giorgi RES'18, MD , is a surgeon at Brown Surgical Associates. Specializing in general surgery and laparoscopic minimally invasive gastrointestinal surgery, he completed his residency in general surgery at Rhode Island Hospital and a fellowship in minimally invasive and bariatric surgery at the UC Davis Medical Center.

Dominic Kleinhenz RES'18 F'19 is an as sistant profes-sor of orthopaedics, clini-cian educator, at the Warren Alpert Medical School and a spine surgeon at University Orthopedics. He completed his orthopedic surgery residency and a fellowship in spine sur-gery at Brown.

FELLOWS

2010S

Travis Patterson F'19, MD , joined Carolina Orthopaedics and Neurosurgery Associates in Greenville, SC. He com-pleted his MD and residency at the Medical University of South Carolina and a fellowship in hand and upper extremity sur-gery at Brown.

Edward Smith F'19, MD , is an orthopedic spine surgeon for Rush Health Systems in Meridian, MS. He completed his MD and orthopedic resi-dency at Tulane and an ortho-paedic spine surgery fellowship at Brown.

IN MEMORIAM

Wendy M. Stein '81 AM'83 MD'92, 60, of San Diego, died May 20. A geriatrician licensed in California and Massachusetts, she specialized in hospice and palliative care. She is survived by her father and many aunts, uncles, and cousins. Gifts in her memory may be made to Jewish Family Service of San Diego at jfssd.org/donate.

James S. Harper, VMD, 72, of Sterling, MA, died August 19. He was the director of the Animal Care Facility at Brown, an associate professor emeritus of pathology and laboratory medicine, and an academic adviser to undergraduates and preveterinary students for 30 years, until his retirement in 2016.

Prior to coming to Brown, Dr. Harper was a veterinarian at several research facilities, including the National Institute for Neurological and Communicative Disorders and Stroke. In 1990, he completed paramedic training and served as a member of Sterling Fire and EMS for 28 years. He was also a member of the Rhode Island Disaster Medical Assistance Team. On September 11, 2001, h e was deployed with the team to New York City, where he cared for both human and canine first responders at Ground Zero.

A generous and selfless man, Dr. Harper was a member of the board of the Rhode Island Zoological Society and Providence Animal Rescue League, as well as an active and devoted member of his church. He is survived by his wife, Robin; his son, daughter-in-law, daughter, son-in law, and three grandchildren; as well as the faculty and staff who worked with him during his long career at Brown. Memorial donations in his name can be made to First Church in Sterling or Roger Williams Park Zoo at rwpzoo.org/membership-giving.

Mark A. Palumbo RES'94, MD, 57, of West Greenwich, RI, died September 15. A Providence native, he earned his undergraduate and medical degrees from Boston University. He returned to his home state for his orthopedics residency at Rhode Island Hospital, and then completed the spine surgery fellowship at Case Western Reserve University.

Dr. Palumbo was the chief of spine surgery at Rhode Island Hospital and University Orthopedics. He received many honors throughout his career, includ-ing the Award for Excellence in Teaching-Brown University Orthopedic Residency Program. As a professor of orthopaedics he authored or coauthored more than 70 publications.

He is survived by his wife, Anne, and their three children. Memorial contri-butions in Dr. Palumbo's memory may be made to The Tomorrow Fund, Hasbro Children's Hospital, 593 Eddy St., Providence, RI 02903.

Edward G. Stopa, MD, 65, of East Greenwich, RI, died September 18. After earning his bachelor's and medical degrees at McGill University, he completed his residency in pathology and fellowship in neuropathology at Brigham and Women's Hospital. He began his distinguished career on the faculty of Tufts University School of Medicine and the State University of New York before coming to Brown, where he was a professor of pathology and of neurosurgery. His engaging and entertaining teaching style drew numerous undergradu-ate, medical, and graduate students to brain science research.

For 25 years Dr. Stopa was the director of the Neuropathology Division at Rhode Island Hospital and oversaw the Brown Brain Bank, which provides human tissue for neuroscience research, particularly Alzheimer's disease. He led an NIH-funded laboratory focusing on neurodegeneration, was a medical adviser to the Alzheimer's Association of Rhode Island, and published more than 120 ar ticles in peer-reviewed journals.

Dr. Stopa loved spending time with his family and particularly cherished his role as a grandfather. He will be remembered for his vibrant personality, his larger-than-life stories, his eccentric clothing style, and his briliant mind.

He is survived by his wife of 39 years, Karen E. Stopa, MD; four daughters; and four grandchildren. Donations in his memory may be made to the Pancreatic Cancer Action Network (www.pan can.org) or the Alzheimer's Association (www.alz.org).

MOMENTUM

INVESTING IN FACULTY

Celebrating Faculty

The BrownTogether campaign has been instrumental in recruiting new faculty and recognizing the extraordinary researchers already at Brown. Thus far, 10 professorships have been newly established through philanthropy. Earlier this academic year, Provost Richard Locke hosted a celebration of faculty who were recently appointed to named chairs. Out of the 23 faculty honorees, 11 were from the Division of Biology and Medicine. Congratulations to all!

Wael Asaad, MD, PhD
Sidney A. Fox and Dorothea Doctors Fox Associate Professor of Ophthalmology, Visual Sciences, and Neuroscience

Jeffrey Bailey, MD, PhD
Mencoff Family Associate Professor of Translational Research*

Theresa Desrochers, PhD
Rosenberg Family Assistant Professor of Brain Science and Neuroscience*

Wafik El-Deiry, MD, PhD
Mencoff Family University Professor of Medical Science*

Yu-Wen Alvin Huang, MD, PhD
GLF Translational Assistant Professor of Molecular Biology, Cell Biology, and Biochemistry*

Mark Johnson, PhD
Royce Family Associate Professor of Teaching Excellence and Associate Professor of Biology

Judy Liu, MD, PhD
Sidney A. Fox and Dorothea Doctors Fox Assistant Professor of Ophthalmology, Visual Sciences, and Neuroscience

Rishi R. Lulla, MD, MS
Alan G. Hassenfeld Associate Professor of Pediatrics

Eric Morrow, MD, PhD
Mencoff Family Associate Professor of Biology*

Jeremiah D. Schuur, MD RES'05
Frances Weeden Gibson-Edward A. Iannuccilli, MD Professor of Emergency Medicine

Shipra Vaishnava, PhD
Manning Assistant Professor of Molecular Microbiology and Immunology

**Indicates a new professorship as a result of the BrownTogether campaign.*

Progress to Goal

BROWN TOGETHER

INVESTING IN STUDENTS

Rising to the BMAF Challenge

The Brown Medical Annual Fund (BMAF) provides students of the Warren Alpert Medical School the resources they need to have a dynamic and fulfilling medical education. It ensures the Medical School can provide robust experiences in research, classroom, and clinical settings. To accomplish this goal, last fall we asked members of the Brown medical community to make gifts in honor of a longstanding tradition, the White Coat Ceremony.

Alumni, parents, and friends had the opportunity to participate in a month-long BMAF challenge to celebrate the MD Class of 2023 receiving their first white coats. We are excited to announce that they met that challenge raising more than $127,000, which earned us an additional $100,000 match.

The generosity of these donors is only surpassed by the significance of the day, one filled with many special moments, including a thought-provoking speech by Liz Taliaferro MD'20. "You have the power and opportunity to shape what the field of medicine values," she said as students were about to receive their coats. "Medical education and health care will reflect your priorities, starting now."

Thanks to your support, the MD Class of 2023 will be inspired to set those priorities and pay it forward—whether because of a financial scholarship they received, a research opportunity they were afforded, or a scholarly concentration that was offered to enhance their education. Thanks to all who helped mark this occasion by participating in the White Coat Challenge.

Photo credit: Adam Mastoon

INVESTING IN STUDENTS

Rallying Around Women's Health

Ensuring access to reproductive health care is an issue that has inspired many in the Brown community to take note of the Medical School's leadership in women's health education, advocacy, and training. With philanthropic support from the Women's Reproductive Health Fund, the Medical School prepares students to address issues surrounding abortion, contraception, adolescent pregnancy and parenting, and infertility.

More than 70 members of the Brown University Club in New York and the Brown Women's Network gathered in November for a dynamic discussion on "Moving Women's Reproductive Health Care Forward." Moderated by Abigail Davies MD'19, the panel included Nancy J. Northup '81 LHD'18 hon. JD, P'16; Tara Shirazian '99 MD'03; and Benjamin P. Brown '08 MD'12, MS.

"Brown is poised to educate and empower the next generation of physicians to lead the way on reproductive rights."

Northup is president and CEO of the Center for Reproductive Rights, an organization that works to ensure reproductive health and freedom as a fundamental human right. Representatives of the center will argue the case against Louisiana's 2014 abortion law before the Supreme Court in the spring. Shirazian is president and medical director of Saving Mothers, which is working to eradicate preventable maternal deaths and birth-related complications in the developing world.

Brown is an assistant professor of obstetrics and gynecology, clinician educator, at the Warren Alpert Medical School.

Panelists emphasized the importance of making progress in this arena—in general, within their own work, and at Brown University.

"Women's reproductive rights and the innate right for women to make decisions over their own bodies is under siege right now in the US and around the world," Shirazian said. "Brown, always at the forefront of important initiatives, is particularly poised to educate and empower the next generation of physicians to lead the way on women's reproductive rights."

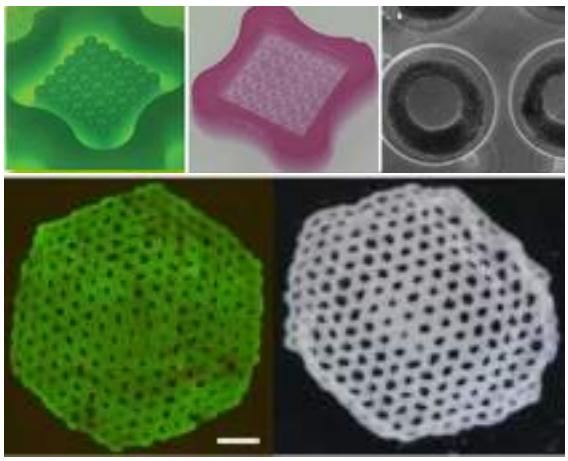
Reproductive health is integrated throughout the education curriculum at the Medical School, which is one of about 30 in the US offering an elective in family planning ethics and advocacy.

Ben Brown helped develop and is teaching the Medical School's new elective on family planning, which is supported by the Women's Reproductive Health Fund. "The elective is just one example of how Brown is working to improve reproductive and sexual health," he said. "By equipping senior medical students to be effective researchers, clinicians, and policy advocates, we are working to train the next generation of leaders in this arena."

TO LEARN MORE ABOUT THE WOMEN'S REPRODUCTIVE HEALTH FUND AT BROWN, contact **Cailie Burns**, Assistant Dean for Biomedical Advancement, at **+1 (401) 368-8155**, **Cailie_Burns@brown.edu**, or give online at **brown.edu/go/giving/womens-health**.

INVESTING IN RESEARCH

Biomedical Entrepreneurship



Lab-grown human tissue and extracellular matrix proteins for repair. Photo courtesy of Jeffrey Morgan, PhD.

Brown Biomedical Innovations to Impact (BBII) is a partnership between Brown's Division of Biology and Medicine and the Office of Industry Engagement and Commercial Venturing. The goal of the program is to help translate promising discoveries in biomedical research into product opportunities that may benefit patients and be commercially viable. BBII is part of a strategic initiative to invest in Brown's biomedical research enterprise, and thus far, more than $8 million of its $10 million goal has been raised through the BrownTogether campaign to support the effort.

BBII announced five awards for fiscal year 2020. According to Karen Bulock, PhD, managing director of BBII, projects were reviewed by an external advisory committee based on criteria such as potential impact of the product, market needs, and the patentability of the technology. "BBII also offers coaching and project management resources to guide technologies through proof-of-concept into well-defined product opportunities that will attract the attention of industry collaborators and potential investors," Bulock says.

Awards of $100,000 were given to the following Brown faculty members:

+ **Brian Alverson, MD**, and **Ravi D'Cruz, MD**, to develop and test a positioning device to stabilize feverish infants who must undergo a lumbar puncture to test for meningitis.

+ **Stephen Helfand, MD**, to discover new drugs to treat metabolic disorders such as obesity, hypertension, and type 2 diabetes.

+ **Chun Geun Lee, MD, PhD**, to focus on making chemical derivatives of the drug kasugamycin that are more effective at preventing and treating lung scarring, which may lead to the development of a new drug for pulmonary fibrosis.

+ **Jeffrey Morgan, PhD**, and **Blanche Ip, PhD**, to advance their method of producing lab-grown, human-derived tissue to repair the heart after a heart attack.

+ **Carl Saab, PhD**, to apply his objective EEG-based test for measuring pain to aid in the diagnosis of acute and chronic low back pain, which may lead to reducing the over-prescription of opioids.

"BBII helps to bridge the gap between academic biomedical discoveries and new products by providing much-needed funding for this type of research. We look forward to collaborating with the awardees to further develop their technologies toward real products that can help patients."

— Karen Bulock
Managing Director of BBII

The Golden Years

How do you stop being a doctor?

An acquaintance was telling me about his father-in-law who is 83 and recently fell. He suffered a brain injury that required surgery and a month in the ICU. "He's a physician," the man explained, "so he's eager to fully recover and get back to seeing his patients."

Wait, what?

This issue's cover story on alumni entering retirement has me thinking a lot about what I want from my "golden years." The imaginary scene involves Cape Cod, a small, friendly dog, and plenty of time for writing. It does not involve working when I'm 83.

But I suspect for this physician, he's not merely working. Being a doctor isn't like doing a job; it's much more a part of a person's identity. You don't stop being a doctor when you log out of the EHR at night. So how do you retire and suddenly stop being the person you've been for 40 or 50 years? You don't, and I think that's why many physicians are reluctant to stop practicing.

The close, unique relationships doctors form with patients are another reason I think it's hard to step away. When I interviewed Roxanne Vrees for this issue's alumni profile (see page 34), she said what she loves about ob/gyn practice is the potential to be with a patient through so many of life's milestones, from adolescence through the birth of a child through menopause. When you have been that intimately intertwined with another person's life, how do you up and leave them behind?

Doing some early research for the retirement feature on page 16, I spoke to Mark Nunlist '70 MD'80, who was building a boat with his newfound free time. I asked him if there was anything he missed.

"I miss 30-plus years in the same practice taking care of folks that I had delivered," he told me. "I miss my staff. I miss the relationships of three decades with patients and colleagues."

Now that is something I can relate to.

—KRIS CAMBRA, Editor

I was astonished to read Drs. Lewiss and Sharkey's article, "Silent No More" (Fall 2019), in which a male surgeon forcefully tries to kiss a female Brown premedical student on day two of her internship. The piece ends with the question, "What happened to the Brown premedical student?" The more important question that is omitted is, "What happened to the male surgeon?" There is no mention of anyone circling back with him to help him understand that his actions were inappropriate. What may have happened on day three and beyond to other students who feared reporting him, thinking it could tarnish their career trajectories? I recall witnessing a senior male physician admonishing a junior female physician, "Don't be a victim." The real issue is, "Don't be a perpetrator."

LYNN E. TAYLOR RES'00 F'05, MD
via email

WHAT SAY YOU? Please send letters, which may be edited for length and clarity, to: Medicine@Brown, Box G-P, Providence, RI 02912; med@brown.edu; or via social networks, which can be found at medicine.at.brown.edu.

TODAY'S STUDENTS / TOMORROW'S PHYSICIANS

"My academic future was unclear because my path was obscured by uncertainties and several life challenges — challenges I would not have been able to surmount without financial support. Your philanthropic gesture has motivated me to strive for a position that would afford me the chance to pay it forward."

Godwin Blay Boaful MD'21

INSPIRING THE PHYSICIANS OF TOMORROW

BROWN TOGETHER

Your support of the Brown Medical Annual Fund (BMAF) enables students like Godwin to expand their interests in medicine.

Make your gift today at brown.edu/go/GiveBMAF
Questions? Email bmaf@brown.edu

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Alpert Medical School

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Alpert Medical School

Brown University
Box G-P
Providence, RI 02912

TRADITIONS OLD AND NEW

Donning the white coat for the first time is a seminal moment in every physician's training. For the past two years, when students at the Warren Alpert Medical School slip their hands into their new coat's pocket, they find a congratulatory note submitted by an alum, faculty member, or other member of the community. These anonymous missives offer good wishes, congratulations, and like this one, sage advice.

PHOTOGRAPHY: MADELINE JOHNS