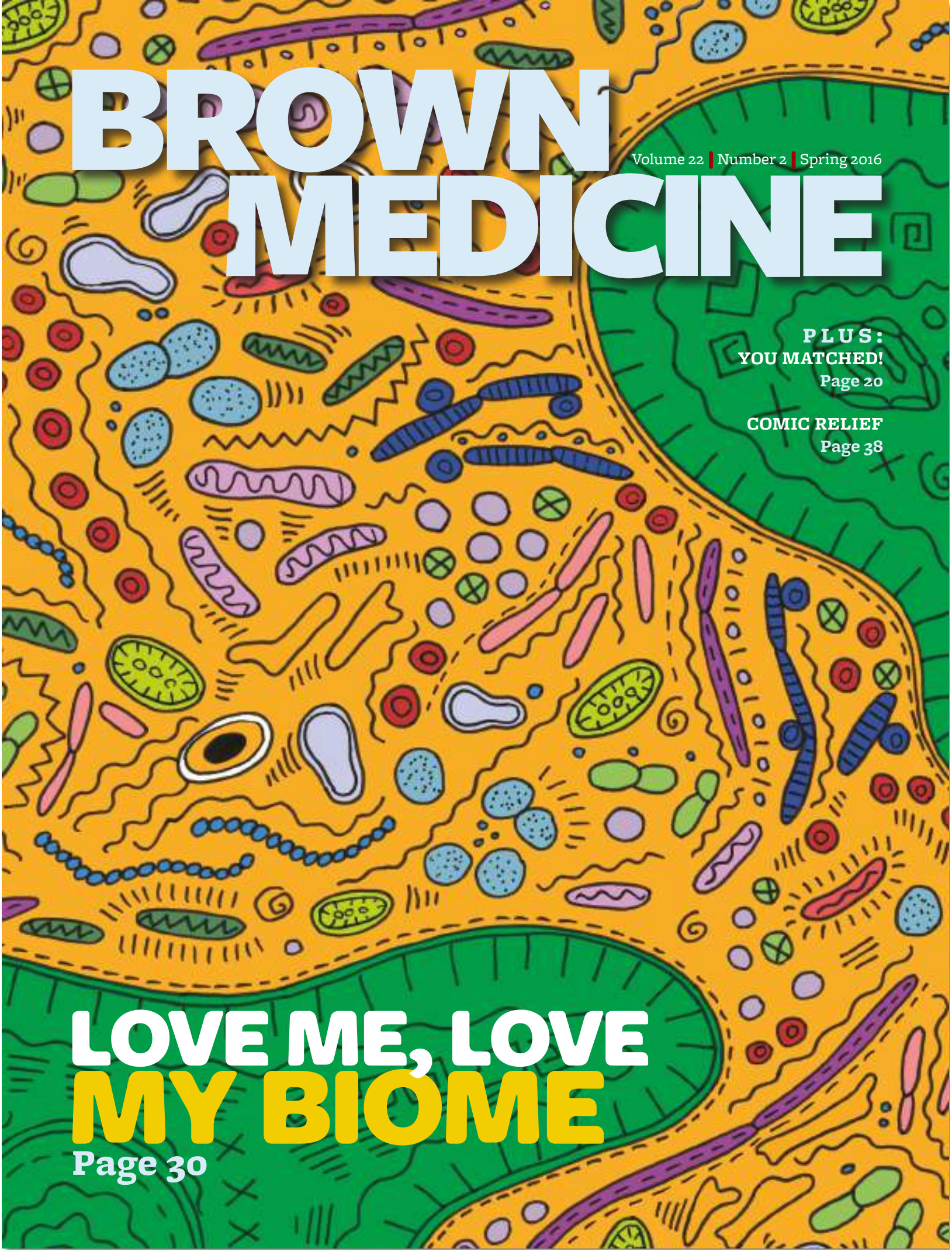
BROWN MEDICINE

Volume 22 | Number 2 | Spring 2016



PLUS:
YOU MATCHED!
Page 20

COMIC RELIEF
Page 38

LOVE ME, LOVE MY BIOME

Page 30

LETTER FROM THE DEAN

Hot Topics

This issue of *Brown Medicine* features a story on one of the hottest research areas in science: the microbiome.

At Brown, we dipped a toe into this area last year when we recruited Shipra Vaishnava and Peter Belenky to our faculty, and you'll meet them in this story. To facilitate microbiome research, we invested heavily in outfitting a new germ-free laboratory space. It's an exciting field that might hold the key to some of our most pressing health issues, and it's exactly the type of promising, high-impact research that we need to do more of.

To that end, we are working steadfastly on increasing funding for research, through both federal grants and philanthropy. We're working specifically on some large federal grants for clinical and translational research that would drastically improve our ability to bring basic science discoveries into the clinical realm. Our end goal is to convert this knowledge into treatments and therapies for our patients. With the BrownTogether campaign in full swing, we are calling on our alumni, parents, and friends to join us in this enterprise.

Also in this issue is a summary of our Match Day events. We are about to send another cohort of Brown-trained physicians out into the world. We're proud of these graduates, and as they shift from students to alumni, we can't wait to see what they'll do next.

Sincerely,

Jack A. Elias MD

Jack A. Elias, MD
Dean of Medicine and Biological Sciences

DAVID DELPOIO

DAVID DELPOIO; PATRICK O'CONNOR; HAL MAYFORTH

"I am not sure anything could fully prepare me for this unique roller coaster of emotions surrounding the Match." —*Natasha Coleman MD'16,* *Page 27*

INSIDE

DEPARTMENTS

Cover: Keith Haring-inspired illustration of a microbial community by **Sigrid Knemeyer**, MS, CMI

LETTER FROM THE EDITOR

When I Was a Kid …

You've seen those chain emails, the ones where the author talks about how our generation grew up without any of the safety measures we take today, and we turned out "just fine."

"Relative to what?" I always want to say. Just because you didn't die from not wearing a seat belt doesn't mean thousands of children didn't. You might not have gotten melanoma from never wearing sunscreen yet, but you still could. You played in the dirt until the streetlights came on …

Wait a minute, there might be something to that dirt thing.

This issue's story about the microbiome has one main conclusion: we don't know much at all about them, but the microorganisms that live on every body surface may have tremendous impact on our health. Is that what's causing the alarming uptick in dangerous food allergies? Is it behind gastrointestinal diseases that so many, including people I love, suffer from?

Right now, it's only speculation, but there seems to be some logic in the idea that today's clean living has wiped out too many of the microbes that we actually need. Germs are bad, we learned as children. They must be avoided, washed away with antibacterial soap, expunged by antibiotics even if you're not sure they're causing your illness. But it seems we overcorrected.

Much more research is needed before we figure out what the microbiome is doing and what steps are needed to correct the imbalance. We're already doing fecal microbiota transplants for people whose guts have become overrun by *C. difficile*. One day will we be taking supplements, like vitamins, to add microbes back into our bodies?

Imagine the chain emails of 20 years from now—"We took antibiotics for every sniffle and we turned out OK." But will we?

BROWN MEDICINE

Volume 22 | Number 2 | Spring 2016

INBOX

DAVID DELPOIO

A TALE OF TWO RAVIS

When Ravi Sarpatwari MD'16 (above right) arrived at Alpert Medical School, everyone kept telling him he had to meet "the other Ravi." They were talking about Ravi D'Cruz MD'13 RES'16 (left), who shared more than just a first name. Both men had been architects before following the call to medicine. Both visited Bali shortly before this photo was taken—Sarpatwari for a head-clearing, pre-Match Day vacation, and D'Cruz for his honeymoon, with Minoo Ramanathan '11 MD'16 (see page 28). And both will continue their education at Alpert Medical School: Sarpatwari as an emergency medicine resident, and D'Cruz in the neonatal-perinatal medicine fellowship program after he completes his pediatrics residency this summer.

MISTAKEN IDENTITY

In the spring issue of *Brown Medicine*, the image caption on page 42 was incorrect. Carole St. Pierre-Engels '72 MD'76 is the graduate. We regret the error.

NOW SOME GOOD NEWS

Brown Medicine received the Bronze Award for Best Magazine (circulation under 50,000) in the Council for the Advancement and Support of Education's District 1 Excellence Awards.

YOUR TURN

Please send letters, which may be edited for length and clarity, to:

- *Brown Medicine*
  Box G-R220
  Providence, RI 02912
- Brown_Medicine@brown.edu

Or tweet us @BrownMedicine

As Seen on Twitter

MATT KLEIN
@MKLEINMD
My incredible med school mentor @meganranney & @BrownEDHI featured in @BrownMedicine!

JUSTIN BAKER, MD, PHD
@JUSTINBAKERMD
Very insightful piece on #DigitalHealth "revolution" from @BrownMedicine. Required reading for those in this space. http://bit.ly/1R6I5kZ

NEIGHBORHOOD HEALTH
@NHPRIHEALTH
@BrownMedicine has a great piece on @ShapeUpRI founder @RajivKumarMD, one of our local health care heroes! http://tinyurl.com/jnxouwl

The BEAT

WHAT'S NEW IN THE CLASSROOMS, ON THE WARDS, AND IN THE LABS

INNER SPACE: Derek Merck, left, and Scott Collins use CT scan data in much of their research.

JASON ROSSI

The Next Frontier

Physicians and scientists look for answers in new dimensions.

This is where the magic happens: in a dimly lit corner of an ordinary computer lab behind a nondescript door in a drab corridor of Rhode Island Hospital.

At first the images on the oversized computer monitors where Scott Collins, RT(R)(CT), and Derek Merck, PhD, tap away seem as unremarkable as the surroundings: blurry, black-and-white diagnostic scans that only a scientist could love.

But with a few keystrokes, Collins is guiding a visitor on a virtual tour down a trachea and into a lung; then through a coronary artery and left atrium of a heart; then up a spinal column to peer through a cavity in the cervical vertebrae where a tumor once encroached.

Those inscrutable, two-dimensional pictures were mere raw material for the vivid, 3-D videos that Collins created on his desktop, as well as the models of spines and skulls the lab builds with a 3-D printer, and the larger-than-life renderings they project into a virtual reality theater, known as the Yurt, on Brown's main campus.

"It's almost like 4-D, where you're immersed in it," Clinical Assistant Professor of Neurosurgery Adetokunbo Oyelese, MD, PhD, says of the latter tool. Late last year he donned antennae-spiked goggles in the Yurt to view pre- and post-op images of his patient's spinal tumor. The sensation of standing inside a spine is so real, he says, it feels like "you literally walk down that path."

Collins, the lead CT technologist at the hospital, says, "It's just another way of looking at it from a new perspective." But that perspective, says Oyelese, who's also the assistant director of the neurosurgery residency program, has major educational potential. "They're giving you an almost palpable 3-D image," he says. For surgeons-in-training, "the hardest thing is translating 2-D to 3-D in your mind."

Merck, an assistant professor with joint appointments in diagnostic imaging and engineering, has made a career of bringing computer science and graphics to medicine. He says he and Collins, who began working with 3-D imaging software in the 1990s, fulfill the mission of the hospital's 3-D lab in complementary ways. "He knows the anatomy, the machines, the clinic; I know the esoteric math," Merck says. Both train and mentor residents and students, including students in engineering and computer science.

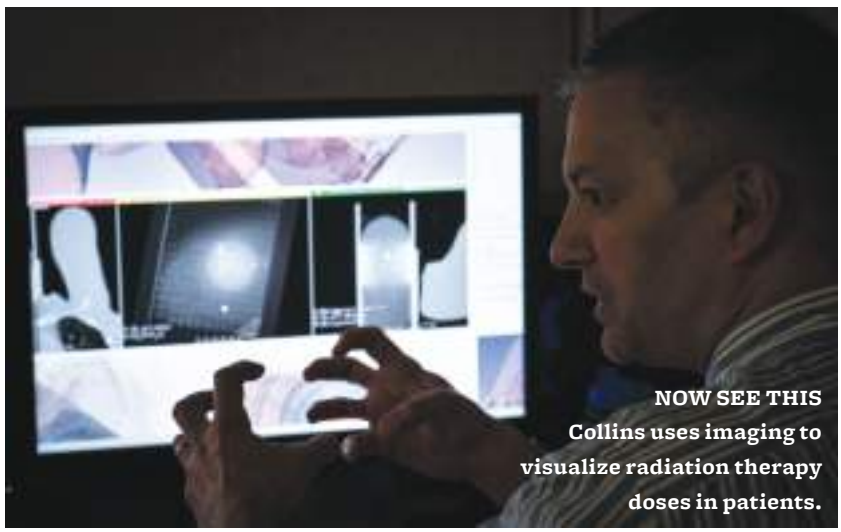
For now the lab's more novel services are being used in the educational and research spheres, which Merck says is the case at most institutions. "They're not using it in billable ways but for patient satisfaction and research," he says. For example, a 3-D print may help a surgeon visualize a procedure, but she'll likely find it more helpful when explaining her plan to her patient—who after the surgery can take the model home as a souvenir.

Merck and Collins want to get beyond that cool factor. After "walking" through a brain or a heart or a spine in the Yurt virtual reality theater, "clinicians inevitably say, 'This is awesome! What do you do with it?'" Merck says.

"The stage it's at now, it's a lot of hardware that goes into making it happen. It's analogous to back when computers filled an entire room," Oyelese says. If the images were projected in a VR headset like the Oculus Rift, it could change the game. "We've always tried to push the limit and see what we could come up with," he says of Collins, with whom he's worked in the operating room for many years.

Collins is also a longtime colleague of Damian Dupuy, MD, professor of diagnostic imaging and a pioneer in image-guided tumor ablation. Dupuy recently tapped Collins and Merck to work with him on a study of lung tumor recurrence in ablation patients. The procedure involves skewering the tumor with a small antenna to destroy the cancer cells with microwave energy. Follow-up CT scans, immediately after the procedure and then a month later and every three months after that, are performed to make sure all of the cancer cells are gone. The changes can be so subtle it can take a year or more before a radiologist can confidently say the tumor is back.

Dupuy wants to cut the wait time. Armed with longitudinal data from a couple dozen patients, Collins is creating 3-D models of their tumors and thermal ablations and manipulating them to see how they overlap. Merck, meanwhile, is bringing his "esoteric math" to bear to calculate an objective metric that could predict recurrence rate. Though the sample size is small, they say results so far are encouraging.



NOW SEE THIS
Collins uses imaging to visualize radiation therapy doses in patients.

> "We've always tried to **push the limit** and see what we could come up with."

Merck often says the 3-D lab forms a bridge—between the academic and clinical worlds, between medicine and computer science. He and Collins also bridge present and future, supporting clinical staff with day-to-day diagnostics and treatment planning while carrying out research projects and proof-of-concept jobs that could someday improve health outcomes.

"Three-D imaging is another way for the human brain to assimilate information that might change the way you approach treatment," Dupuy says. "It's like looking at the whole forest rather than a clump of trees." ***—Phoebe Hall***

JASON ROSSI

The BEAT

WHO KNEW?

Snake Alive!

A venomous strike creates a teachable moment.

It's not every day a Rhode Island doctor treats a copperhead bite. In fact, until last July, it wasn't any day. New England is home to only two venomous snake species, the timber rattlesnake and the Northern copperhead, neither of which had been recorded in the Ocean State in decades. So when an East Providence man showed up at Rhode Island Hospital with a severely swollen left hand and telltale puncture wounds, emergency physicians got a crash course in venomous snakebite management. First the doctors had to determine whether the limited vials of antivenin in the hospital pharmacy were even viable,

> Physicians got a **crash course in snakebite** management.

"because no one had used it in such a long time," says Tony Zhang, MD RES'17, corresponding author of a case report in the January issue of the *Rhode Island Medical Journal*. They then had to learn how to administer it—very carefully, as shaking the antidote renders it ineffective—while other providers called zoos and Boston hospitals to scrounge more vials, in case the patient didn't respond to the initial dose. After four days the man went home, healthier and surely wiser should he ever again meet an unfamiliar serpent. Zhang and his colleagues, who are better acquainted with the bites of ticks and dogs, were glad to gain some wisdom, too. "One of the most exciting parts of our job is being on the front line of these cases," Zhang says. "We need to be able to identify and treat a lot of these rare events." ***—P.H.***

ANATOMY OF A FINANCIAL AID EXPERT

Bank On It

As the reality of residency and their new careers settles on the graduates of the MD Class of 2016, so too, for many of them, does financial reality. Fortunately they've had Linda Gillette, the director of financial aid for Alpert Medical School, to prepare them for this moment. "Students pay a lot of money to go here. It's a very intense program, and the last thing they need to be stressing about is finances," she says. "By their fourth year they have the tools to go forward." About 70 percent of Alpert medical students receive some form of financial aid, including federal loans and need-based scholarships, and Gillette and her staff meet with all of them; they also counsel residents and recent alumni. "We are mentors to our students," she says. "We get to know them in ways other folks in the building might not. There are pretty intimate things they have to tell us because it's financial." Over four years, they get to know her, too. "It takes people a long time to know I have a sense of humor. I worry I won't be taken seriously," she says. "But it's my nature to laugh. If you don't have a sense of humor in this business, it can be pretty dry." ***—P.H.***

GLOBETROTTER
This coral from Cancún is just one memento from Gillette's many, many travels. "I'm always planning a trip," she says. "It's one of those things I'll splurge on."

MARK KOSTICH/ISTOCK PHOTO; ADAM MASTOON; COURTESY GILLETTE

MODERN LIVING
"We always owned antique homes, but they're a devil to keep up," says Gillette, who recently moved to a 40-year-old house. "For us it's like brand new. Windows that actually open and close!"

LIFE SKILLS

"You don't do a lot of math in this job. You do a lot of counseling," Gillette says. "Having put myself through college, I understand how to manage money."

DAILY GRIND

"Coffee for me is a religious experience," Gillette says. At home, "I make my own espresso or latte every morning."

TRÈS ÉLÉGANT

"Chanel is the only perfume I've ever worn," Gillette says, "and I've never bought it for myself."

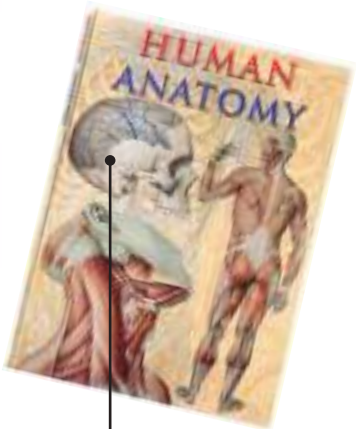
PICTURE PERFECT

Family photos dominate Gillette's office decor. "I feel like I was really blessed to grow up in such a close family," she says.

ADAM MASTOON (6); COURTESY GILLETTE

FOODIE IN THE FAMILY

Gillette's husband, John Edick, runs an award-winning catering company. "He learned to cook from watching his grandmother—thank God!" she says. "He's a great cook."



SERENDIPITY?

After she and her husband bought a house in Vermont last year, Gillette found this in one of the closets.

BUTTONED UP

"We're always trying to make things easy for the students," Gillette says. "The federal loan process is really complicated. Every now and then I actually hit it when I'm with a student."

The BEAT

FINDINGS

A Deadly Mix

Simultaneous cocaine and alcohol use is linked to suicide.

In a general sense, medical studies support the popular intuition—a staple of movies and literature—that suicidal behavior and substance misuse are linked. But the relationship between the two is not so simple. A new examination of hundreds of suicidal emergency department patients from around the US found that the significance of the link varied with age, gender, and race. Across the board, however, the use of cocaine and alcohol together was a red flag.

"One unexpected finding was that, when examined independently, alcohol use had no significant association and cocaine use had a borderline significant association," authors of the study wrote in the journal *Crisis*. "However, reporting both alcohol misuse and cocaine use was significantly associated with a future suicide attempt."

Led by Sarah Arias, PhD, assistant professor (research) of psychiatry and human behavior, the team examined 874 men and women who presented at emergency departments around the country between 2010 and 2012. All of that group had attempted suicide or had suicidal thoughts; of them, 195 people attempted suicide at least once in the year following the ED visit.

What Arias, who is also a research psychologist at Butler Hospital, and her colleagues found was that although people in the study reported misusing many different substances, including marijuana, prescription painkillers, tranquilizers, and stimulants, only cocaine and alcohol appeared to have a significant association with suicide risk. Of those using both, the chance of attempting suicide again was 2.4 times greater than among people in the study who were not.

The study does not say anything about whether substance abuse causes suicidal behavior because it only reports observations of associations. But Arias says she hopes the data will advance the understanding of how misuse of particular substances, among particular patients, may affect their risk of suicide.

"We're on our way to trying to identify factors that can be used to better assess and identify people who are at risk for suicide, and ultimately I think this is a step in the right direction to get a better picture," she says. "Patients who have potentially comorbid alcohol and cocaine use may be at a higher risk. Findings like these can be useful for informing suicide risk assessment." ***—David Orenstein***

"I think this [study] is **a step in the right direction to get a better picture.**"

SUICIDAL TENDENCY Cocaine and alcohol don't mix.

JAMES ANDERSON/ISTOCK

OVERHEARD

"I am a recovering department chairman. We knew how to code. But it didn't mean we were delivering better care."

—**ARTHUR L. KELLERMANN**, *MD, MPH, dean of the F. Edward Hébert School of Medicine at the Uniformed Services University of the Health Sciences, who delivered the AOA Visiting Professorship Lecture at Alpert Medical School on March 30.*

Ask THE EXPERT

For Richer, for Poorer

Low-income women have the fewest defenses against Zika.

The Zika virus has been in Africa since at least 1947, causing fever and other, usually mild symptoms in only 20 percent of infected people, and then apparently conferring immunity for life. Thus when it first showed up in Brazil a year ago, health professionals weren't immediately concerned; but startling increases in two rare disorders, microcephaly and Guillain-Barré syndrome, changed their tune. Now the Zika epidemic is overwhelming limited health care resources in parts of Latin America and the Caribbean, with a disparate impact on the poor. Maria Mileno, MD '84, associate professor of medicine at Alpert Medical School and an infectious disease specialist with an interest in travel and tropical medicine, explains.

BUG LIFE At press time, mosquitoes carrying Zika hadn't yet been found in the US.

Health is inextricably linked to education, economics, and social conditions. The mosquito vector for Zika thrives in areas with overcrowding and stagnant water, and people who live in those areas are less likely to have access to information about the disease, preventive measures, and health care. Meanwhile women in well-to-do areas are less likely to be bitten by the mosquito, and if wealthy pregnant women are infected they have access to more frequent ultrasounds and other tests to check how the baby is developing. These services are not available to poor women. This is true across the board with other diseases, like dengue, chikungunya, and malaria: people in poor, rural areas are more exposed to the insect vectors and have less access to care and less knowledge. If their children are born with microcephaly, they will need facilities that poor countries may not even have. It's a real tragedy.

People in wealthy nations have better access to information and prevention, and health care if they get sick. Travelers who come to my clinic are concerned about contracting the Zika virus. But it does not cause symptoms in everyone, and symptoms are usually mild. Most seriously it has been linked to Guillain-Barré syndrome, but with high-level ICU care those patients can recover.

It is a major concern for pregnant women. It's not a good time to risk travel to affected areas if you're pregnant. If a woman who wants to become pregnant does go, she should wait a full month before trying to get pregnant. Also, men who contract or are exposed to Zika may pass it through semen for up to six months after exposure, so those men should use condoms for six months if they have sex with pregnant women. Clearly more research is needed to understand the broad implications of Zika virus and how best to battle this threat.

—Edited by P.H.

> **Poor people** are more exposed to mosquitoes and **have less access to care.**

ROLF AASA/ISTOCK

The BEAT

STUDENTS

Biotech Boom

Expanded programs let students pursue medicine, tech, and engineering interests in one place.

During his first year at Alpert Medical School, Adam Eltorai ScM'16 MD'17 PhD' collaborated with two graduate students at Brown to develop a flameless lighter that tracks smoking behavior and helps people quit smoking. Their invention is in clinical trials and they've founded a company, Quitbit.

Eltorai, who worked in a lab developing antibodies for Alzheimer's disease when he was an undergrad at Washington University in St. Louis, knew he wanted to continue doing clinically applicable research as a medical student. The design aspect of the Quitbit work was even more gratifying, he says.

"I found the creativity of device development very satisfying, and wanted to add engineering tools to my armamentarium," Eltorai says. He decided to take a leave from medical school to pursue a master's degree in biomedical engineering, which he will receive in May; this fall, Eltorai will begin pursuing his PhD in biotechnology.

More and more students like Eltorai are finding an intellectual home at Brown, which is stepping up its biotechnology and biomedical engineering graduate programs to meet increased demand, says program director Jacquelyn Schell PhD'12, assistant professor (research) of molecular pharmacology, physiology, and biotechnology (MPPB). In 2012, the two programs enrolled only a dozen students combined; this year they boast 65. Graduates pursue industry careers, continue in academia, or go to medical school.

> **"They put so much work into these projects.** They are building the **research enterprise here."**

The graduate programs have many tracks to appeal to diverse interests. There is, for example, a courses-only Master of Arts track in biotechnology favored by some pre-med students. But most of those who enroll are attracted to the programs' strong research focus, which prepares them for doctoral programs or industry, Schell says. Of the eight required credits, students can fulfill three by writing a thesis based on work in a faculty adviser's lab. On average, each student has co-authored one peer-reviewed publication.

Students are encouraged to cultivate industry relationships while in the programs. In the last few years, Beth Zielinski-Habershaw ScM'93 PhD'98, an MPPB senior lecturer who directs industry outreach, helped to launch six-month paid co-op internships at 11 companies, and Schell and other faculty members have developed many new courses. They also launched a part-time degree for working students. The next development will debut in the fall: a track in biotechnology management for business-minded students.

Eltorai's current project is a reminder alarm that he hopes will boost patient use compliance of incentive spirometers. Clinical trials begin this summer. He intends to complete his MD and ultimately combine his interests by practicing orthopaedic surgery and directing a medical device development lab.

"These students become an integral part of the research here at Brown," Schell says. "They put so much work into these research projects and they accomplish a lot. They are building the research enterprise here."

—Josephine Benson '17 and D.O.

LIGHT A FIRE
Inventing this "smart" lighter inspired one med student to pursue a biotech degree.

COURTESY QUITBIT

HERE TO HELP Lindsay Orchowski offers guidance for medical students and faculty.

KAREN PHILIPPI

Until It Happens to You

The Medical School's deputy Title IX officer works to address sexual discrimination and violence.

As many as one in four college students is sexually assaulted and many more may suffer discrimination and harassment. Medical schools are not immune. Last year, Brown University created a Title IX office to track and prevent sexual assaults and gender-based discrimination. In October 2015 Assistant Professor of Psychiatry and Human Behavior (Research) Lindsay Orchowski, PhD, was appointed the deputy Title IX coordinator for Alpert Medical School.

What began as an undergraduate interest in helping fellow students who had been assaulted eventually led Orchowski to a doctorate in clinical psychology and academic research in gender studies, sexual assault prevention, and victim advocacy. She spoke to *Brown Medicine* about the professional expertise and guidance she offers for everyone—women, men, students, and faculty.

What is the mission of the Title IX Office?

The goal of the Title IX Office is to ensure that all survivors of sexual- and gender-based harassment and assault receive appropriate resources, to oversee ongoing prevention and education activities, and to connect students to their options for pursuing the on- and off-campus complaint processes. The establishment of a Title IX office at Brown helps to ensure that all students receive this information, by directing all reports to a central location. It is important that institutions are tracking any kind of systemic patterns of harassment and violence, and also ensuring that they are doing their duty to protect students from harm.

Last year, the Sexual Assault Task Force and Association of American Universities' campus climate survey found important differences in the types of gender-based harassment occurring among medical students and graduate students compared to undergraduate students at Brown. Can you tell us more?

Certainly—similar to undergraduates—sexual violence is happening in a peer-to-peer context among medical and graduate students. But the report raised awareness regarding the incidents of gender-based harassment being perpetuated by near-peers such as residents, supervisors, or faculty in the Medical School. These occurrences influence both personal and professional development, and can create an environment where individuals do not feel respected or safe.

I think it is important to recognize that the context of harassment and assault for graduate and medical students can vary from that faced by undergraduates. If discrimination, harassment, or assault is perpetrated against you by someone in your professional community, it is not uncommon for individuals to worry that reporting could result in retaliation. Your career is on the line. You may not want to destroy professional relationships or worry about retaliation within a professional context. These factors make it even more important to create a network of protection and support for grad and medical students.

> "Individuals ... worry that **reporting could result in retaliation.** Your career is on the line."

You describe these issues of harassment and sexual assault as a pyramid, with sexual assault as the tip and harassment as the foundation. Can you explain?

Sexual- and gender-based discrimination takes many forms. The most frequently occurring forms of discrimination and harassment are often less visible, or less likely to be labeled as problematic. This could include behaviors, comments, jokes, or subtle microaggressions. Everyday sexism sets the stage for gender-based harassment to occur. Recently, I've been thinking about this as a form of "slow violence," in that gendered inequalities are often routinized, dispersed, and therefore go unrecognized or unmarked as violence. Yet, these inequalities are no less problematic because they are out of sight or naturalized.

I believe that it is those subtle forms of violence that we need to garner more support to work against. It isn't reasonable to expect that as a bystander, we can always be there to step in during risky situations. They happen behind closed doors at times. But by tackling the bottom levels of the pyramid, or the outer levels of our social ecology, we can create a climate, community, and culture that fails to tolerate sexual and gender inequalities.

What other barriers are there to reporting an assault?

There are powerful personal, social, and institutional systems at play. At a personal level, individuals may recognize that something wrong happened to them. However, there are many reasons that someone might not label their experience as sexual assault or rape. First, there is the stigma that the label holds and what it may mean for our identity. Then, we have to consider social, institutional, and societal factors. Supporting survivors' agency and autonomy also means recognizing that not everyone wants to report, or participate in that process.

Who should individuals contact to talk about a problem?

Confidential resources at Brown are the SHARE Advocates, the Sexual Assault Response Line (401-863-6000), counseling and psychological services, and the chaplain's office. Of course, individuals can come to me or other members of the Title IX Office at any time. However, like others designated as a "Responsible Employee" through Title IX, it's important to know that I am not a confidential resource, but I can recommend to them someone who is. All of the resources are listed on the Brown Title IX website.

What are your hopes for the Medical School community?

The establishment of a deputy Title IX coordinator for the Medical School recognizes that these issues are central to the personal and professional well-being of medical students. In the first year of establishing this office, I hope that by talking more about the commonality of sexual- and gender-based harassment, we can start by raising awareness. As a community, I hope more people speak out that they are bothered by it, identify it as a problem, and do not want to tolerate it. In the years to come, I want to see training, prevention, and education regarding sexual and gender equity, discrimination, harassment, and assault grow at the Medical School.

Personally, it is very important for individuals to know that I care very deeply about the issues of sexual violence, working toward justice for survivors, and ensuring survivors get the support that they need and want. I also believe deeply in taking serious evidence-based steps toward violence prevention. ***—Teresa L. Schraeder, MD***

For Information and Help

To learn more about sexual assault and gender-based discrimination, visit Brown's Title IX Office website:
www.brown.edu/about/administration/title-ix.
For confidential crisis support and information, call the **Sexual Assault Response Line at 401-863-6000.**

Teresa L. Schraeder *is the director of the Physician as Communicator Scholarly Concentration at Alpert Medical School.*

The BEAT

RESIDENTEXPERT

BY LAURA MERCURIO MD'14 RES'18

Cultural Shifts

Have duty hour restrictions improved the resident experience?

BLAIR THORNLEY

Click. I hit my alarm and roll out of bed. It's dark, very dark. What day is it? Doesn't matter.

Throw my clothes on, grab my lunch from the fridge, and make my way to the car. As I drive to work, a pink sky bleeds into gray clouds. Is it rising or setting?

Again, frivolous question. What matters is that work starts in T-30 minutes. If you're on time, you're late—a modus operandi I acquired from my military spouse.

Swipe. Park. Lock car. Walk. A gush of sterile wind blows back my hair as I trot through the sliding doors.

> Will these changes **really prevent medical errors?**

Go.

Lights, sounds, smells, and clinical information hammer at the doorway to my senses.

Move faster.

Watching my brain at this moment reminds me of staring at the AOL icon as the internet tries to load. Frustrating, to say the least.

The key is focus. Identify the task at

RESIDENT EXPERT

hand and execute. Check your work, and execute again. Now the real test: patient interaction. You know your emotions are down there somewhere, like that thought that sits at the tip of your tongue but just won't come. You mold your face into a resting smile, double-check the name, inhale, and knock.

Resident work hour restrictions were formally put into place in 2003, and further revised in 2011 by the Accreditation Council for Graduate Medical Education (ACGME). Twenty-eight-, 30-, or 36-hour shifts? Experts agreed that peak function—or even adequate function—cannot reasonably be maintained. Hence the birth of the 80-hour week, the 16-hour shift limit for first-year trainees, and the eight-hour minimum between shifts. Yet many clinicians expressed concern about continuity of care. Who will have ultimate ownership over these patients? Patient care hand-offs are ripe for error. Will these changes really prevent medical errors?

The medical community responded with the FIRST trial, a randomized "non-inferiority" comparison of standard ACGME work hours versus flexible work hours that was published in the *New England Journal of Medicine* in February. Participants included general surgical residencies and their affiliated hospitals. They measured outcomes including: the 30-day rate of postoperative death or serious complications (primary outcome); other post-op complications; and resident perceptions and satisfaction regarding their well-being, education, and patient care. The study found that the residents working flexible hours were more likely than the standard policy group to report improved experiences on several measures, including continuity of patient care, acquiring of operative skills, and professionalism.

According to principal investigator Karl Bilimoria, MD, of Northwestern University's Feinberg School of Medicine, "Residents in the flexible duty hour group did not work more hours; rather, they worked more effectively by rearranging their hours." At the very least, the authors concluded that "less-restrictive duty-hour policies for surgical residents were associated with non-inferior patient outcomes and no significant difference in residents' satisfaction with overall well-being and education quality."

We can't balance our lives, we can't appropriately **handle the stress,** we can't **keep up during long shifts.**

The sample size was good, the survey was carefully crafted. And yet, these results do not sit well with me.

KNOW THYSELF

Individuals who go into medicine are all, to some degree, perfectionists. We thrive on performance, we push limits, and we have high expectations. The very lens through which we understand reality is inherently biased toward these goals. In many ways, we come to understand our own dissatisfaction as a personal failure—we can't balance our lives, we can't appropriately handle the stress, we can't keep up during long shifts. As such, I begrudgingly admit that we may not be the best judges of our own well-being. Thus mental illness and suicide continue to rise among residents and physicians.

So now what? The debate over work hours and hand-offs, while well-intentioned, somewhat misses the point. I am a trainee in a pediatric medical residency, and would argue that each specialty has its own, unique ecosystem within the medical biome. We need to think larger, and more about process. Helen Darling, CEO of the National Business Group on Health, put it succinctly: "Hospitals and medical schools should use business process reengineering to change the wasted tasks on which residents currently spend their time."

How can we make residents more productive? How can we remove the systemic barriers to rapid and effective communication, order verification, patient information, and documentation? How can burgeoning IoT (Internet of Things) technologies enable these tasks?

Answering these questions will violate duty hours, indeed.

Laura Mercurio *is a second-year resident in pediatrics at Hasbro Children's Hospital/Alpert Medical School. Her interests include global health, digital medicine, and organizational change in health care.*

POETRY

BY CARLOS RODRIGUEZ-RUSSO MD'18

Procedure

We need to place a bloom of wires
under the white awnings of her face
into her neck
between white curtains of hair
under white wrinkles
To better access her heart, of course.

This is how I meet her
So she seems so frail, small,
unwell—so she seems—

Until she speaks to me

About the fish
her sons used to catch for her
each a different color;

About the day years ago
they brought her a yellowfin tuna
so fresh and perfect
she could have never afforded it;

How she cooked the rosy meat so carefully
in garlic and pepper
and ate in small bites
so that she would remember even today
the red tang, the lovely rush—

She calls her boys' arms Strong,
those arms and faces she herself raised up above her,
above the father who loved bottles more;
She raised high, those arms, long ago
to catch the all-colored sea.

They are here now, waiting beside her
And before it happens
before the wires come
before her heart is accessed,
Strong arms move close to the window;

Each son places a scarlet bloom
under the white awnings
into the vase
between white curtains
under white
To better access her heart, of course.

Carlos Rodriguez-Russo, *a native of Centerville, MA, earned a bachelor's in human developmental and regenerative biology at Harvard University. He has written poetry and other short works since grade school; his other interests include studying the health outcomes of long-term care structures, composing music, and performing as a founding member of the Brown MEDrigal Singers.*
This poem originally appeared in the Annals of Internal Medicine, *December 1, 2015, issue. Used with permission.*

ZOOM

BY PHOEBE HALL

Walking the Walk

She says she's not a superwoman, but she's using her power for good.

Elizabeth Harrington, PhD, cherishes her friends and her family, even her dog who eats rocks and racks up astronomical vet bills. But she's a scientist through and through, so much so that a friend once teased that she needs a scientific study to prove how important friendships are.

She lets out a delighted laugh as she tells this story. "I like to surround myself with funny people because I'm not funny," Harrington says.

Maybe she's not a standup comedian, but she has a ready smile and a sparkle in her eye—a healthy counterpoint for someone whose work is so pivotal, and so broad. She's the associate dean for graduate and postdoctoral studies in Brown's Division of Biology and Medicine, a professor of medicine (research), the principal investigator or co-PI on numerous grants ranging from her studies of acute lung injury to programs that support students from backgrounds underrepresented in the life sciences, and deputy director of a five-year cardiovascular and pulmonary research grant.

A nationally respected researcher in her field, she's held key positions in various professional organizations, including the American Thoracic Society and the American Heart Association, and she's an associate editor of *Lung*. She's trained MDs and PhDs, travels often for conferences and visiting professorships, and manages a lab at the Providence VA Medical Center.

But that's not all. At home in Hollis-ton, MA, are her husband (and college sweetheart), Mark, who works at Boston University, and their children, William, 15, and Emma, 13. "There are crunch times and there are freedom times," Harrington says. The family spends that down time enjoying New England life: skiing, beaches, fishing off their Boston Whaler. "Your kids are only young once," she says.

CLEAR TRAJECTORY

A Pennsylvania native, Harrington moved to Rhode Island in high school when her father, a radiologist, took a job at Cranston General Hospital. She always liked science and math, and majored in biology at St. Joseph's University, in Philadelphia, but didn't want to follow her dad and her brother, a pulmonologist, into medicine. After working for two years as a research technician at Boston University Medical Center, "I realized to be a boss," she says, "I needed my PhD."

She returned to Philadelphia to earn her doctorate in biochemistry at Hahnemann University, and then was back in Boston for her postdoc, studying heart vasculature with a Harvard cardiologist. "I loved it," she says, but when she was looking for a new research position, in 1997, her brother urged her to talk to Sharon Rounds, MD, a professor of medicine and of pathology and laboratory medicine at Brown who studies pulmo-

TRANSLATOR
Beth Harrington has collaborated with physician-scientists since graduate school. "I always wanted to keep my research clinically relevant," she says.

KAREN PHILIPPI

nary circulation and lung injury and disease.

"We were very lucky," says Rounds, a staff pulmonologist at the VA. "Beth's brother was here in Providence practicing pulmonary. … [He] recommended she talk to me. We talked and I said, 'You're hired,' on the spot.

"It's been a very, very mutually productive relationship," Rounds says.

Within a year Harrington had landed career development funding and a faculty appointment. ("She just blasted away," Rounds says.) She focused her research on the role of proteins in pulmonary endothelial cell function and how they regulate response to injury. In 2001, Rounds invited James Klinger, MD F'91, a pulmonologist at Rhode Island Hospital who studies pulmonary hypertension and how natriuretic peptides affect endothelial cell integrity, to join her Vascular Research Laboratory at the VA. Within a few years, he says, "Beth and I started putting our ideas together to see if natriuretic peptides had an effect on [blood vessel] leakage into the lungs. … It worked pretty well." They published their first paper together in 2006 and have been collaborators ever since.

In addition to a National Heart, Lung, and Blood Institute (NHLBI) research project grant on natriuretic peptides in acute lung injury, of which she's co-PI with Klinger, Harrington is PI or co-PI on two NIH training grants; manages the Vascular Research Laboratory core lab; and is deputy director, core PI, and mentor on the CardioPulmonary Vascular Biology Center for Biomedical Research Excellence (COBRE), which Rounds directs. "It's fantastic because

ZOOM

she brings organizational skills that I just don't have," Rounds says. "We've really complemented each other."

Rounds continues: "As our relationship has matured, she mentors me as much as I mentor her—scientifically of course, but also from the point of view of organizing, management techniques. … It's definitely one of colleagues, and not mentor-mentee. It's gotten to the point I'm actually flattered if she asks my advice."

LEVEL THE PLAYING FIELD

In 2010 Nancy Thompson PhD'86 retired as associate dean for graduate and postdoctoral studies, and Rounds encouraged Harrington to apply for the job. "I'd been doing research here for 13 years, and it was a nice complement to the science I was doing," Harrington says. "I was ready to learn something different."

Associate Dean of Biology Edward Hawrot, PhD P'14, who supervises Harrington, says, "I'm very grateful to Sharon." Under Harrington, Hawrot has seen an uptick in faculty involvement in training grants, professional development workshops, and the Responsible Conduct in Research course, which is required for all doctoral students. He also credits her office for increasing external training grant and predoctoral fellowship funding, which last year allowed the division to bring in 44 PhD students—"the highest number ever," he says, even as peer schools, due to funding uncertainties, are holding or even reducing their admissions.

"She's good on an individual, one-on-one basis with students," Hawrot adds. "She also does a great job with postdoctoral fellows." That advocate role is one of the responsibilities that Harrington says attracted her to the deanship. She helps match students with faculty advisers, ensures they get the training they need to succeed, and acquaints department directors with University resources available for students who need extra support.

Postdocs are more of a challenge, Harrington says. They're not students, but they're not faculty either. "They tend to focus on the job at hand in the laboratory, rather than have a strong tie to the University," she says. Her office started a travel award program to help postdocs attend conferences and present their work, and encourages them to take advantage of professional development and teaching seminars and opportunities to mentor undergrads. "I'm very much looking for them to develop their skill set outside of bench work because it's very important to their career trajectory," she says.

Rounds saw that dedication to students and trainees early on, when she asked Harrington to work with an undergraduate in her lab as part of Brown's Leadership Alliance Summer Research-Early Identification Program. Funded by the NHLBI since 1992, the program offers paid internships with faculty mentors for underrepresented students interested in pursuing research doctorates. Of the 230 students who have participated in the program, 82 percent have gone on to graduate school, says Harrington, who is now the training grant PI.

That experience, as well as her everyday work as a mentor to grad students and postdocs, made her a natural fit to become codirector of the BioMed Initiative to Maximize Student Development (IMSD), in 2012. The program offers research training for doctoral students who are underrepresented in the life sciences, including additional career and skills development, stipends, and conference travel funding. Harrington and her IMSD codirector, Andrew G. Campbell, PhD, associate professor of medical science, identify matriculated students for program support, based not only on factors such as race, ethnicity, and gender but also where they earned their bachelor's degree.

"Science classes are among the most expensive classes to run," Campbell says, so students coming from under-resourced colleges may not have adequate training in "early gatekeeper courses," such as physics, to keep up when they get to Brown. "We have modules to teach that gap," he says. "The only difference [between IMSD and non-IMSD students] is resources, opportunity, and access, and we're trying to correct that."

Since its founding in 2008, the IMSD has supported 47 PhD students, 40 percent of whom have completed their degrees. Campbell and Harrington work together to build a strong peer network among the students, match them with advisers, and support faculty mentors as well. "Beth is very good at recognizing a student's needs," Campbell says, and she's "the first line when mentors and students are trying to figure out their relationship."

Most of the graduate programs in BioMed have recruited more diverse student bodies in recent years, what Campbell calls "the IMSD effect." In

2014, Brown was ranked 11th in the US for the number of African Americans who earned PhDs in the biological sciences. The University, seeing the success of the IMSD, is now hoping to expand the program to the other STEM fields (science, technology, engineering, and math) and public health. Campbell and Harrington will draw on the data they've gathered on the IMSD (they're co-PIs of the NIH training grant that funds it) to ensure the model will work beyond BioMed.

"We've identified best practices of how to recruit and retain so students are as competitive post-grad school as any other student," Harrington says. "To accommodate the expansion into the additional STEM programs, where needs are lacking from undergrad, we need to develop additional modules geared toward this cohort to bring them up to speed."

"The institution recognizes Beth and I as resources, and they will support our efforts to implement a program that works to serve everyone," says Campbell, who in July will become the dean of Brown's Graduate School. He adds of his IMSD partner: "She doesn't just talk the talk. This isn't just some administrative function. There's more to it than that for her."

BENCH TO BROADSIDE

Harrington's colleagues marvel not only at the breadth and depth of her professional achievements, and at her warmth and heart on the job, but that she's able to balance it all with a great personal hardship.

Both Rounds and Klinger remember vividly the day in 2009 when they got the news. "I read it as I was getting on an airplane—a message from Beth about her daughter," says Klinger, the pulmonary hypertension expert. "I had to wait until I was off the plane until I could call her and find out what was going on."

Emma, then age 6, had collapsed as the family walked to church, unable to breathe. Her parents rushed her to Boston Children's Hospital, where doctors found the blood pressure in her lungs was dangerously high. Harrington understood immediately what it was: pulmonary hypertension. "It was really a kick in the stomach," she says.

Pulmonary hypertension is a rare disease in which the arterioles and capillaries of the lung are abnormally narrow or blocked, building up blood pressure and taxing the right side of the heart. When it's diagnosed in children, their circulation systems are still growing—the heart is developing, the lung is adding blood vessels. Though kids don't usually outgrow it, their prognosis is better than adults', Klinger says. But there is no cure.

"It was a sudden and unfair way of sharing this disease between Beth's daughter and our research," Klinger says. By then they'd been investigating pulmonary endothelial cells, which seem to grow abnormally in pulmonary hypertension, for a few years. The coincidence was often a cause for comment. "A lot of people said to me, that's interesting," Harrington says. "I said, there's nothing interesting about it. It stinks."

Emma has responded well to treatment, which usually bodes well for the long term. She takes daily medication and is using oxygen only at night now, and her physicians at Boston Children's are optimistic. She dances and plays with friends, though she does tire quickly. "We hope, as time goes by, that kids with the disease now will have a better prognosis," Klinger says. "We hope to find a cure."

The diagnosis hasn't altered Harrington's research focus. "I haven't changed my model because I'm so established in acute lung injury," she says. "But I'm more critical of the literature, the drugs, and the action of the drugs now."

> **"She doesn't just talk the talk.** ... There's more to it than that for her."

Nor has it changed her dedication to her work. "If she has to go home because Emma fainted at school," Rounds says, "you know she's going to be online and working."

Harrington says people often ask her how she does it all. "I don't know. I just do it," she says. "What am I going to do at home, just sit there and be sad? ...

"One of the things I think is really important is to serve as a role model to the next generation," she adds. "You don't have to be superwoman, but you don't have to compromise your career to have a home life. I try to tell them it's doable."

The Big Dance

Students and residency programs pair off on Match Day 2016.

INTERVIEWS BY PHOEBE HALL AND JOSEPHINE BENSON '17
PHOTOGRAPHY BY DAVID DELPOIO

More Alpert Medical School students than ever—a total of 113—learned on March 18 where they will enter residency training. Of the record-breaking class, at least 10 will stay within the Brown fold with residencies at affiliated hospitals in Rhode Island. Another 38 are sticking around New England in Boston, New Haven, and elsewhere.

We spoke to a dozen or so graduating students about how they arrived at this day—their passions, their personal lives, and the paths they've set themselves on. Match Day is the culmination of all of that preparation; the destination listed within the red envelope is where they are committed, no backing out, no decisions to make. Judging by the smiles and whoops of joy, most seemed satisfied with that destiny.

—***Kris Cambra***

For more photos and student interviews, go to brownmedicinemagazine.org.

QUEEN FOR A DAY
Amber Clark MD'16 is no stranger to tiaras—she was Miss Black Rhode Island 2013.

MATCHDAY

ON THE MAP: Students pinned their headshots on their destinations.

MARIE DELUCA
Detroit Medical Center/
Wayne State University
PAUL HERMAN
Johns Hopkins Hospital/
Johns Hopkins University
School of Medicine
JEFFREY KIMM
Jacobi Medical Center/Albert
Einstein College of Medicine
ANDREW LOFTUS
Detroit Medical Center/
Wayne State University
JOHN LUDWIG
University of Washington
Affiliated Hospitals/UW
School of Medicine
EDWARD RE
Hospital of the University of
Pennsylvania/Perelman

The List

• ***Anesthesiology***

MICHAEL ALLEN
St. Vincent's Medical Center/
New York Medical College
(Medicine-Prelim)
NYU School of Medicine/
NYU School of Medicine
THERESA LII
Stanford University/
Stanford University School
of Medicine (Transitional)
Stanford University/
Stanford University School
of Medicine

• ***Dermatology***

MARIAM AMIN
St. Mary Medical Center/
Dignity Health
(Medicine-Prelim)
Emory University School of
Medicine/Emory University
School of Medicine

• ***Emergency Medicine***

THEODORE ALBRIGHT
SUNY Upstate Medical
University/SUNY Upstate
Medical University
SHIHAB ALI
Rhode Island Hospital/
Alpert Medical School
WILLIAM BERK
Icahn School of Medicine
at Mount Sinai/Icahn
School of Medicine at
Mount Sinai
JASON BOWMAN
Massachusetts General
Hospital, Brigham and
Women's Hospital/Harvard
Medical School
**CHRISTOPHER
DEFREITAS**
UF Health Shands Hospital/
University of Florida College
of Medicine

THERESA LII '12 MD'16

"I think [applying to the PLME] was a gamble, even though at that time it didn't feel like it. I knew … I wanted a career where I could help others through direct patient care or through medical research. … I feel fortunate that I ended up really liking most of medicine. It was a fantastic decision."

RESIDENCY: Anesthesiology, Stanford University School of Medicine

School of Medicine at the University of Pennsylvania

RAVI SARPATWARI
Rhode Island Hospital/Alpert Medical School

AMY WALKER
University of Washington Affiliated Hospitals/UW School of Medicine

ELISA WING
Advocate Christ Medical Center/University of Illinois College of Medicine

• *Family Medicine*

CRAIG ERICKSON
Saint Joseph Hospital/SCL Health

SARAH KRAMER
University of Washington Medical Center/UW School of Medicine

KERANI MCCLELLAND
PeaceHealth Southwest Medical Center/University of Washington School of Medicine

MINOO RAMANATHAN
Memorial Hospital of Rhode Island/Alpert Medical School

MILAN SATCHER
Boston Medical Center/Boston University School of Medicine

STANFORD TRAN
Hunterdon Medical Center/Rutgers Robert Wood Johnson Medical School

DOMINIC WU
Cambridge Health Alliance/Harvard Medical School

• *Medicine*

KATHERINE BROOKS
Brigham and Women's Hospital/Harvard Medical School

AMANDA DOWDEN
NYU School of Medicine/NYU School of Medicine

SRINIVASA GOPALSAMY
Emory University School of Medicine/Emory University School of Medicine

TIFFANY HSU
Santa Clara Valley Medical Center/Stanford University School of Medicine

PETER KAMINSKI
University of Colorado School of Medicine/CU School of Medicine

BRITTANY KATZ
NewYork-Presbyterian/Columbia University Medical Center

OLIVIA LINDEN '12 MD'16

"Radiology encompassed what I loved most in the study of medicine—anatomy and embryology, and how they relate to pathology and disease."

RESIDENCY: Radiology, UCSF School of Medicine

PATRICK LEC '12 MD'16

"When starting medical school I had all but ruled out a surgical career, but over the last few years I have been fortunate to have phenomenal mentors to convince me otherwise."

RESIDENCY: Urology, David Geffen School of Medicine at UCLA

SQUAD GOALS: Emily Viggiano '12 MD'16 (second from left), John Ludwig MD'16 (center), and friends check where their classmates are headed.

MATCHDAY

A TOAST: From left, Andrew Loftus '11 MD'16, Tiffany Hsu '12 MD'16, and Marie DeLuca '12 MD'16.

I KNOW, RIGHT? Mayuree Rao MD'16, left, and Mary Kao MD'16 celebrate their good news.

JOVIAN YU '12 MD'16

"Fourth year has been filled with wedding planning [with fiancée Joy Liu '11 MD'15] and the Match, in addition to my final rotations as a medical student. Looking forward to celebrating and going on one last vacation before starting residency!"

RESIDENCY: Internal medicine, Yale School of Medicine

HANNAH LEVAVI
Icahn School of Medicine at Mount Sinai/Icahn School of Medicine at Mount Sinai

HAIYAN RAMIREZ BATLLE
Brigham and Women's Hospital/Harvard Medical School

NICOLETTE RODRIGUEZ
Yale-New Haven Hospital/Yale School of Medicine

CARMEN SHULMAN
Rutgers Robert Wood Johnson Medical School/Rutgers Robert Wood Johnson Medical School

REBECCA SLOTKIN
Yale-New Haven Hospital/Yale School of Medicine

JASMINE WASHINGTON
Duke University Medical Center/Duke University School of Medicine

ZOE WEISS
Rhode Island Hospital/Alpert Medical School

JOVIAN YU
Yale-New Haven Hospital/Yale School of Medicine

• ***Medicine-Pediatrics***

AMI BELMONT
Yale-New Haven Hospital/Yale School of Medicine

MATTHEW ERLICH
Yale-New Haven Hospital/Yale School of Medicine

SARAH RHOADS
Rhode Island Hospital/Alpert Medical School

KELSEY RIPP
Hospital of the University of Pennsylvania/Perelman School of Medicine at the University of Pennsylvania

BURTON SHEN
Rhode Island Hospital/Alpert Medical School

CHANDLER VILLAVERDE
Hospital of the University of Pennsylvania/Perelman School of Medicine at the University of Pennsylvania

• ***Medicine-Primary***

CYNTHIA ELEANYA
Johns Hopkins Bayview Medical Center/Johns Hopkins University School of Medicine

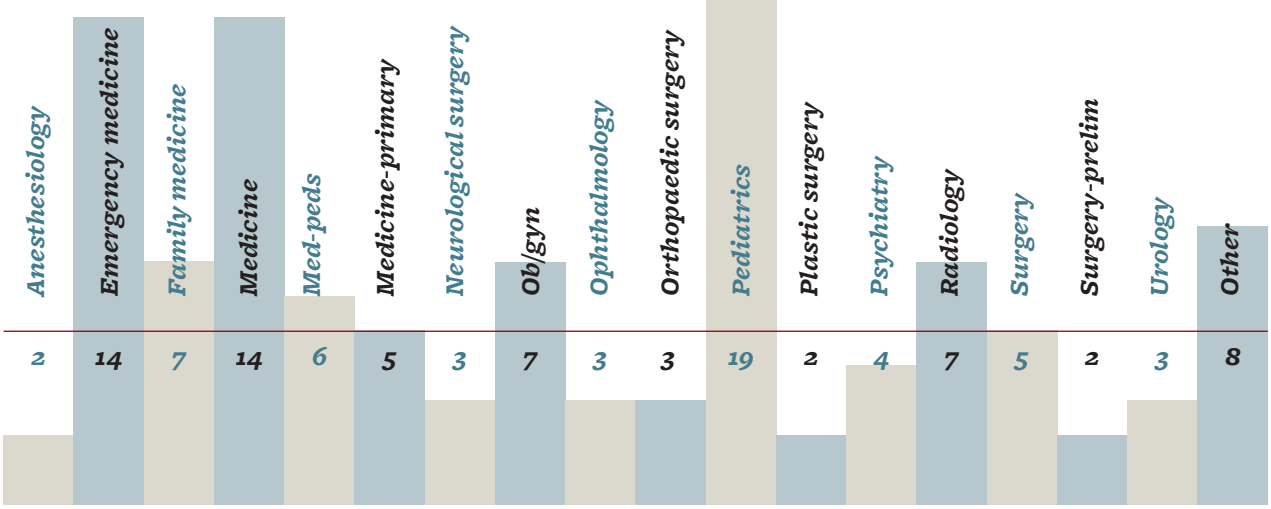
WILL MANGHAM MD'16, *pictured with his wife, Mary Martha Gantt, and their sons, Pickens, 2, and Ira, 2 months*

"During my time in the Marines, I did several combat deployments to Iraq and Afghanistan, so I do not consider myself a stranger to adversity. Residency is going to be extremely challenging … but my past experiences give me confidence that I can do it."

RESIDENCY: Neurological surgery, University of Tennessee College of Medicine

FOLLOW THE TRENDS

The number of MD'16 students entering each field of medicine. "Other" represents specialties, such as pathology and vascular surgery, in which only one student matched.



MATCHDAY

DEBORAH LEE
Cambridge Health Alliance/ Harvard Medical School
DAVID LIEBERMAN
Hospital of the University of Pennsylvania/Perelman School of Medicine at the University of Pennsylvania
MAYUREE RAO
University of Washington Affiliated Hospitals/UW School of Medicine
CAROLINE WUNSCH
Brigham and Women's Hospital/Harvard Medical School

PROOF: Atin Saha MD'16 is headed to Yale for radiology.

• *Neurological Surgery*

JONATHAN LEE
Houston Methodist Hospital/Weill Cornell Medical College
WILLIAM MANGHAM
University of Tennessee College of Medicine/ University of Tennessee College of Medicine
DAVID SEGAR
Brigham and Women's Hospital/Harvard Medical School

• *Neurology*

ALEXANDER BAUMGARTNER
Beth Israel Deaconess Medical Center/Harvard Medical School (Medicine-Prelim)
Beth Israel Deaconess Medical Center/Harvard Medical School

• *Obstetrics/ Gynecology*

ARABA AMONU
Inova Fairfax Hospital/ Virginia Commonwealth University School of Medicine
RACHEL BLAKE
Beth Israel Deaconess Medical Center/Harvard Medical School
FEI CAI
Women & Infants Hospital/ Alpert Medical School
DANIELLE CHAU
Johns Hopkins Hospital/ Johns Hopkins University School of Medicine
OSMAN CHAUDHRY
Indiana University School of Medicine/Indiana University School of Medicine
MARY KAO
University of Wisconsin Hospital and Clinics/ University of Wisconsin School of Medicine and Public Health
ELIZABETH RUBIN
Hospital of the University of Pennsylvania/Perelman

RACHEL BLAKE MD'16

"I remember doing a history project on our public health system, and decided at that point that I wanted to be a doctor. I realized that I wanted to combine my interest in science with my desire to help people during the most vulnerable times in their lives."

RESIDENCY: Ob/gyn, Harvard Medical School

LIZ RUBIN MD'16 (left)

"I bounded out of bed during my ob/gyn clerkship knowing that we would perform a hysterectomy, deliver a baby, and place an IUD all before noon. I admired my attendings as they executed careful planning with technical precision, all while serving as advocates for their patients."

RESIDENCY: Ob/gyn, Perelman School of Medicine at the University of Pennsylvania

NATASHA COLEMAN MD'16

"I am not sure anything could fully prepare me for this unique roller coaster of emotions surrounding the Match. No one gets a job this way! But I have been fortunate to be surrounded by a strong and steady source of love and support in my family and friends."

RESIDENCY: General surgery, Columbia University Medical Center

GOOD BONES: Future orthopaedic surgeon Greg Walker MD'16.

School of Medicine at the University of Pennsylvania

• ***Ophthalmology***

FAITH BIRNBAUM
Steward Carney Hospital/Tufts University School of Medicine (Transitional)
Duke University Medical Center/Duke University School of Medicine

ALANNA TISDALE
Mount Auburn Hospital/Harvard Medical School (Medicine-Prelim)
Boston Medical Center/Boston University School of Medicine

BENJAMIN YOUNG
Roger Williams Medical Center/Boston University School of Medicine (Medicine-Prelim)
Yale-New Haven Hospital/Yale School of Medicine

• ***Orthopaedic Surgery***

LINDA CHAO
Wake Forest Baptist Medical Center/Wake Forest School of Medicine

DAVID LEE
Rutgers Robert Wood Johnson Medical School/Rutgers Robert Wood Johnson Medical School

GREGORY WALKER
University of Washington Affiliated Hospitals/UW School of Medicine

• ***Pathology***

JEFFREY HOFMANN
University of California, San Francisco/UCSF School of Medicine

• ***Pediatrics***

EMMA ANSELIN
University of California, San Francisco Medical Center/UCSF School of Medicine (PLUS Program)

MORGAN CONGDON
Children's Hospital of Philadelphia/Perelman School of Medicine at the University of Pennsylvania (Global Health)

ANNA COSTELLO
Children's Hospital of Philadelphia/Perelman School of Medicine at the University of Pennsylvania

MATCHDAY

CROWNING ACHIEVEMENT: Morgan Congdon MPH'12 MD'16 dons Children's Hospital of Philadelphia swag.

MINOO RAMANATHAN '11 MD'16

"My earliest memories of aspiring toward a career in medicine were during my trips to my dad's hometown, Erode in India. … I was always moved by the power of his training to assuage their fears and provide support during such a vulnerable time in their lives."

RESIDENCY: Family medicine, Alpert Medical School

NAN DU
Yale-New Haven Hospital/ Yale School of Medicine

ALLYSON GARCIA
University of Michigan Hospitals/University of Michigan Medical School

TATIANA GELLEIN
UCLA Medical Center/David Geffen School of Medicine at UCLA

JUSTIN GLAVIS-BLOOM
Children's Hospital Los Angeles/Keck School of Medicine of USC

DAVID GREENKY
Emory University School of Medicine/Emory University School of Medicine

JENNA KAHN
Massachusetts General Hospital/Harvard Medical School

STEPHANIE LEE
University of California, Irvine Medical Center/UC Irvine School of Medicine

ZACHARY MARCUS
University of California, San Francisco/UCSF School of Medicine

CAITLIN NAURECKAS
Massachusetts General Hospital/Harvard Medical School

NICOLE NORONHA
Tufts Medical Center/ Tufts University School of Medicine

ELIZABETH PERZANOWSKI
Massachusetts General Hospital/Harvard Medical School

LEAH RAPPAPORT
University of Michigan Hospitals/University of Michigan Medical School

MADELEINE SCHRIER
Rhode Island Hospital/ Alpert Medical School

EMILY SHELKOWITZ
University of Colorado School of Medicine/CU School of Medicine

EMILY VIGGIANO
University of Washington Affiliated Hospitals/UW School of Medicine

UNIKORA YANG
Children's Hospital Los Angeles/Keck School of Medicine of USC

- ***Peds/Adult/Child Psychiatry***

LIANNA KARP
Massachusetts General Hospital/Harvard Medical School

- ***Physical Medicine and Rehabilitation***

AMBER CLARK
Baptist Health System/ Baptist Health System (Medicine-Prelim)
University of Alabama Medical Center-Birmingham/ University of Alabama School of Medicine

- ***Plastic Surgery***

AUSTIN HA
Barnes-Jewish Hospital/ Washington University School of Medicine

VICKRAM TANDON
University of Michigan Hospitals/University of Michigan Medical School

- ***Psychiatry***

MARIA AGUILERA NUNEZ
Semel Institute for Neuroscience and Human

Behavior/David Geffen School of Medicine at UCLA

JOHN ALVAREZ
University of California, Irvine Medical Center/UC Irvine School of Medicine

JESSICA BORRELL
Alpert Medical School/ Alpert Medical School

SANDEEP NAYAK
Johns Hopkins Hospital/ Johns Hopkins University School of Medicine

• *Radiology*

ALICIA CHEN
Roger Williams Medical Center/Boston University School of Medicine (Medicine-Prelim)Mayo School of Graduate Medical Education/Mayo School of Graduate Medical Education

YOSEF CHODAKIEWITZ
Tripler Army Medical Center

KIMEYA GHADERI
MedStar Harbor Hospital/ MedStar Health (Transitional) Beth Israel Deaconess Medical Center/Harvard Medical School

BRIAN JOO
Mount Auburn Hospital/ Harvard Medical School (Medicine-Prelim) Rhode Island Hospital/ Alpert Medical School

OLIVIA LINDEN
Cambridge Health Alliance/ Harvard Medical School (Transitional) University of California, San Francisco/ UCSF School of Medicine

ATIN SAHA
Greenwich Hospital/ Yale School of Medicine

A JOB WELL DONE: Chandler Villaverde '11 MD'16, left, and Michael Allen '11 MD'16 congratulate each other.

(Medicine-Prelim) Yale-New Haven Hospital/ Yale School of Medicine

MATTHEW SHALVOY
Lemuel Shattuck Hospital/ Tufts University School of Medicine (Transitional) Beth Israel Deaconess Medical Center/Harvard Medical School

• *Surgery*

VANESSA BARATTA
Yale-New Haven Hospital/ Yale School of Medicine

NATASHA COLEMAN
NewYork-Presbyterian/ Columbia University Medical Center

SAMUEL KLEIN
Dartmouth-Hitchcock Medical Center/Geisel School of Medicine at Dartmouth

SCOTT LEVIN
Boston Medical Center/ Boston University School of Medicine

JANANI VIGNESWARAN
University of Chicago Medical Center/University of Chicago Pritzker School of Medicine

• *Surgery-Prelim*

MOHAMMED ELSAYED
University of California, San Francisco Medical Center/UCSF School of Medicine

JUAN PABLO ZHEN LIO
Rhode Island Hospital/ Alpert Medical School

• *Transitional*

AMADEO DELUCA-WESTRATE
Walter Reed National Military Medical Center

• *Urology*

ALEXANDRA BERGER
Brigham and Women's Hospital/Harvard Medical School (Surgery-Prelim) Brigham and Women's Hospital/Harvard Medical School

PATRICK LEC
UCLA Medical Center/David Geffen School of Medicine at UCLA (Surgery-Prelim) UCLA Medical Center/David Geffen School of Medicine at UCLA

HARI VIGNESWARAN
University of Illinois College of Medicine/University of Illinois College of Medicine (Surgery-Prelim) University of Illinois at Chicago/ University of Illinois College of Medicine

• *Vascular Surgery*

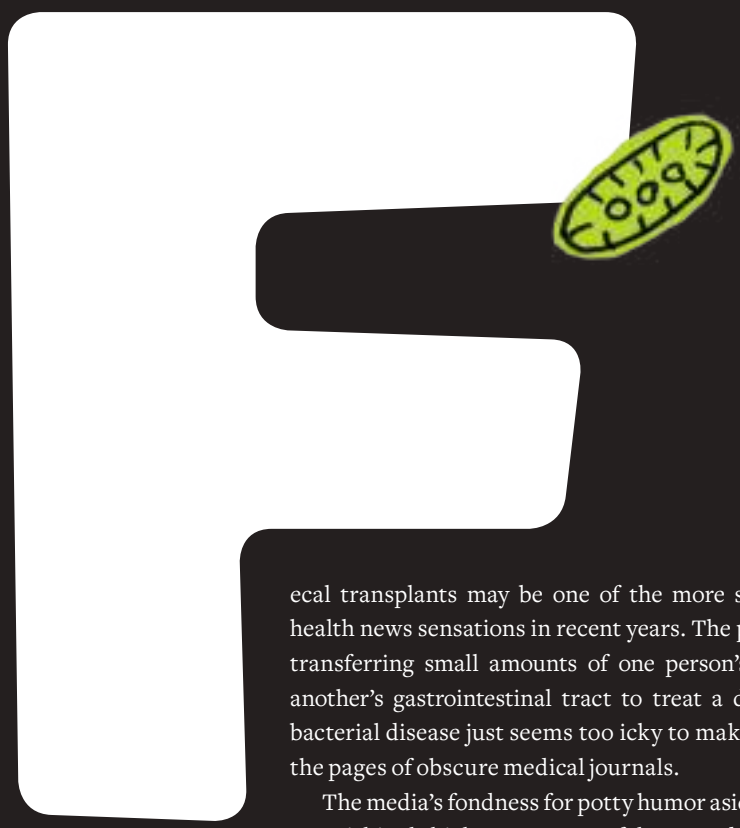
CLAY WISKE
NYU School of Medicine/ NYU School of Medicine

COLOR THE MICROBIOME
Upload your picture to Instagram and tag #alpertmedicalschool.

BE OUR GUEST

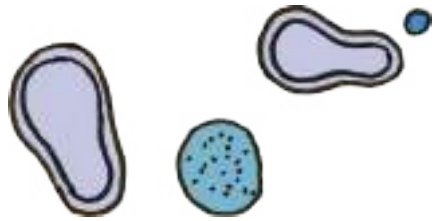
How can we provide a good home for our microbiomes, so they'll keep us healthy?

BY PHOEBE HALL
ILLUSTRATION BY SIGRID KNEMEYER



Fecal transplants may be one of the more surprising health news sensations in recent years. The process of transferring small amounts of one person's stool to another's gastrointestinal tract to treat a dangerous bacterial disease just seems too icky to make it out of the pages of obscure medical journals.

The media's fondness for potty humor aside, it's the astonishingly high success rate of the procedure in curing severe *Clostridium difficile* infections—as high as 90 percent in some studies—that has the public, and many physicians, excited about its potential. But fecal transplants also happen to dovetail nicely with that other media darling, the microbiome.



"I have patients who come to see me all the time who don't have *C. diff.*—they have fatigue, bloating—and they're insisting their microbiome is disrupted and a fecal transplant would help," says Colleen Kelly, MD F'06, assistant professor of medicine and one of the nation's, if not the world's, foremost researchers and practitioners of the procedure.

Kelly's patients can be forgiven for believing the microbiome holds the answers to life's most vexing medical questions. Whatever the malady, from allergies and obesity to stress and low IQ, someone has declared the microbiome plays a role, some news outlet has breathlessly reported it, and most of the public ends up hopelessly confused.

But the field of microbiome research is so new that not everyone even agrees what "microbiome" means. So anyone who states definitively what our microbial fellow travelers can and can't do for our health is probably peddling snake oil.

"We know it's important. We know there's a lot of research that needs to be done," Jason Shapiro, MD RES'08 F'11, assistant professor of pediatrics and of medicine (clinical), says. "But how it affects the day-to-day treatment of our patients? We're not there yet."

That's also what makes the microbiome so exciting to study. "It's uncharted waters," Kelly says. "It's kind of fun to do things that haven't been done a zillion times before."

PATH OF RESISTANCE

"This isn't in your textbook," Peter A. Belenky, PhD, assistant professor of molecular microbiology and immunology, told his Introductory Microbiology class one afternoon in late March. He was about to deliver a lecture on the microbiome, but, he cautioned the hundred-plus undergraduates before him, "the science is being done now, so anything I say could change."

Here's what (most) scientists agree on: the human microbiome is the trillions of microbial cells—bacteria as well as fungi, viruses, and archaea—and their individual genomes that have coevolved with us over millions of years. Most of our microbiome's members are benign or beneficial: they help with digestion and vitamin production, prevent pathogens from establishing themselves and doing harm, and play roles in metabolism and immune function.

About 1,000 species of microbes call *Homo sapiens* home, and have adapted to many different communities, including the gut, mouth, skin, lungs, and virtually every other bodily surface, inside and out. The microbiome gets its start when we're born—though whether we come into the world vaginally or by C-section changes its initial makeup—and it grows and diversifies until we're toddlers, then stays remarkably stable for the rest of our lives. Estimates of how many microbes there are in an adult body vary wildly, from 10 times the number of human cells to a 1-to-1 ratio that tips in our favor with each bowel movement. Regardless, it's a lot, making it all the more remarkable that the study of the microbiome is only a few decades old.

So now that they know it's there, scientists are asking: how do all those cells function in concert with our own? What happens when the microbiome's delicate balance is upset, a condition known as dysbiosis? How much does that affect our health, and which afflictions does it cause? How can we hone our treatments to protect ourselves, as well as our microbiomes?

Belenky is trying to understand, at a genetic level, microbial response to external stressors, like antibiotics, and the role that plays in antibiotic resistance and disease. The problem, he says, often begins when we use broad-spectrum antibiotics to target one, specific pathogen. "But with the microbiome, you actually target 1,000 organisms," he says. "We mostly know how [an antibiotic] affects the target bacteria, but not the other 999."

Bacteria are able to share genes by taking up DNA directly from their environment. While they most commonly swap genes with fellow microbes, any genetic material that can aid a bacterium's survival is fair game for uptake. "They can take up DNA from a mammoth bone," Belenky says.

Gene transfer has a community benefit much of the time—in response to environmental changes, our microbes' genomes can adapt much more quickly than ours can. But that ability also aids antibiotic resistance: if a microbe has a gene that can protect it from a drug, other members of the microbiome will take it up, including those that cause disease. That's why "the toxicity [of antibiotics] to nonpathogenic organisms is just as important as the toxicity to pathogenic organisms," Belenky says.

"In the impending antibiotic crisis—or it's already here, depending on who you talk to—our current antibiotics will no longer be functional," he says. Nor is there much likelihood of new antibiotics being developed, given the exorbi-

tant costs and the bleak reality that they, too, would quickly lose effectiveness. So why not work with what we have? "I want to identify ways to use our current arsenal better," he says—perhaps by combining different drugs, playing with duration of treatment and dosage, or other variables.

At Rhode Island Hospital, Belenky is recruiting inpatients to spit into vials so he can study how narrow- and broad-spectrum antibiotics affect the oral microbiome. It's tricky because he needs a no-treatment baseline, yet most patients receive a dose of antibiotics soon after arrival in the emergency department, he says; "so we have infectious disease docs sitting in the ER for us and following patients." After three days they collect another saliva sample, to see how the microbial community has changed.

"We're using the oral microbiome to look at transcriptional profiles because while most research is done on the gut, on fecal samples, transcriptional changes happen in minutes or seconds," Belenky says. "It takes food six or seven hours at a minimum to move through the gut, so [fecal] samples are too old. Oral samples show exactly what happens at the second we collect the sample. It's essentially a freeze frame."

His research is possible thanks to the latest technological advances that allow him to sequence an entire genome in hours, for relatively little cost, and gather data on transcriptional, metabolic changes. "We weren't able to do that before," Belenky says. But scientists still can't culture most of the microbiome's members because they seem to depend on each other, as a community, to grow, he adds.

For the past decade the revolution in sequencing technology, coupled with the realization that our bodies housed many more microbes than we could grow in a petri dish, meant that most microbiome research was descriptive and correlational, Belenky says. Papers described what species were present, and how microbial communities differed in people with disease. But the bar for publication has been raised. "Articles now are much less descriptive," he says. "Now you need to do real science. You need to figure out, why are changes occurring, related to health outcomes?"

Few, if any, of those "whys" have been answered definitively. Even the premise of much of Belenky's research—that overuse of antibiotics is harming us—is a strong but as yet unproven theory. "Statements that say, we should maintain microbiome diversity, reduce antibiotic use, use probiotics, are most likely true on a total population level," he says. "But when it comes to making this decision for a specific patient, it becomes a lot harder. We simply don't have the studies to provide concrete guidance to physicians about risk-benefit assessment of withholding therapy.

> "Physicians know that **overuse of antibiotics is a problem,** but they don't have all the tools at their disposal to address it."

"This puts physicians in a difficult situation," Belenky adds. "They know that overuse of antibiotics is a problem, but they don't have all the tools at their disposal to address it."

MICE IN A BUBBLE

Deep in the bowels of the BioMed Center, research assistant Irina Maglysh dons a full complement of personal

protective equipment—gown, shoe and hair covers, gloves, face mask—and swipes into a large, white room. In the middle, on waist-high tables, are several large, rectangular bubbles, inflated with sterilized air, each with a half-dozen clear plastic boxes inside them.

These are the sterile living quarters of about 50 germ-free mice, so called because, since birth, not a single microorganism has inhabited their bodies. Everything in their isolated enclosures—food, water, bedding—has been autoclaved; and every two weeks, Maglysh collects and tests some of the cleanest feces on the planet to confirm their aseptic state.

This is one of only about a dozen germ-free mouse colonies in the US, a technological development that, along with affordable, rapid genome sequencing, has accelerated microbiome research in recent years. "In my lab, [these advances] let us ask how a single bacterial species interacts with a host, to really delineate the role of keystone species in the gut environment," says Shipra Vaishnava, PhD, assistant professor of molecular microbiology and immunology. This allows her to zero in on genetic changes and larger health impacts when microbes are added or eliminated.

"Bacteria can influence many aspects of host physiology," Vaishnava says. "But how do we go from changes in the bacteria in the gut to having [a disease]? What are the key molecular pathways?" Vaishnava has a particular interest in the cells that line our intestines, and the role they play in host-microbe interaction. She wants to figure out what bacteria live where within our guts, to understand how that might influence our health.

"Scientists haven't really thought about bacteria in the gut as, 'Where are they with respect to host tissue?'" she says. "Maybe some diseases [occur] because bacteria are in the wrong place. But these differences wouldn't come out if you look at the feces for who's there."

To tease out this biogeography, Vaishnava tailors the microbiomes of her germ-free mice by introducing into their guts the bacteria she wants to study, a science known as gnotobiotics. Her team then dissects sections of mouse intestines and, under microscopes and with lasers, isolates cells for sequencing to determine each species' location. Armed with that knowledge, they can then tag the bacteria with fluorescent probes and see what effect antibiotic treatment or infection have on the location and abundance of these bacteria.

The research could someday answer many questions about our microbes and our health, Vaishnava says: "how the epithelial lining is regulating our gut microbiome, how it's negotiating these [host-microbe] interactions, what are the mechanisms that help us maintain a peaceful relationship—and if you don't have the mechanism, what is the physiological outcome?"

> "**Nothing is all good.** Are there people who would become worse after a fecal transplant?"

Defects and other disruptions in the gut epithelial lining have been observed in many diseases, from Crohn's to liver cirrhosis, but it's too early to say whether the cause is genetic, environmental, or lifestyle factors, or some combination of the three. "The diseases we are studying are so complex," Vaishnava says. "It hasn't been figured out, but I think it's just a matter of time."

EVERY BREATH YOU TAKE

Though most research and knowledge of the microbiome is related to the gut, our bodies house billions of microbes

specialized to other locations, including our hair, nostrils, and urogenital tract; our skin is home to many distinct communities, from our hands to our eyelids to our navels. Dependent on pH, moisture, and other factors, our microbial populations are as different, and as specialized, as the ecosystems of a reef and a desert.

Just a few years ago, Amanda Jamieson, PhD, assistant professor of molecular microbiology and immunology, became one of the first people to focus her research on the lung microbiome. "The first Human Microbiome Project left out the lung because it was thought to be sterile," she says, referring to a five-year NIH push to identify and map our bodies' microbial residents and find relationships between the microbiome and disease.

Jamieson was at the University of Vienna at the time, studying bacterial pneumonia, which can arise when a small amount of pathogenic bacteria infects someone recovering from influenza. "I thought, there has to be bacteria [in the lung] because we breathe it in all the time," she says. "So I asked if bacteria in the lung could be causing it. … I did a PubMed search and got nothing."

It's well known that flu suppresses the immune response, and Jamieson wants to know if our lung microbiome influences that response, how it changes with infection, and whether it can be manipulated to improve outcomes. In September she won a Defense Advanced Research Project Agency (DARPA) Young Faculty Award to further that work.

Because lung microbiome research is many years behind that of the gut microbiome, it's still in the descriptive phase, Jamieson says—collecting samples, sequencing genomes, and identifying what's there. She also has to tease out the permanent residents from the visitors: which bacteria are there because they were inhaled, and which are part of an established community?

She is conducting some of that descriptive work on nasopharyngeal swabs collected from flu patients, to see if there's a correlation between illness and bacteria. But getting samples from a living human's lung is difficult, and uncomfortable, requiring insertion of a bronchoscope and then scraping or washing cells from the airway.

Jamieson's lab uses mouse models, though that has its own challenges. "Culturing bacteria straight out of the lung is very difficult," she says. "The intestine has a stratified, much more organized structure than the lung, which has a lot more nooks and crannies." So after they painstakingly identify what bacteria are present, they culture strains ordered from a scientific supplier to test immune response to influenza and whether changing the amount of bacteria makes the flu worse or better.

In vitro research is unlikely to paint a full picture of the lung microbiome, however. "In human patients, there is no evidence of bacterial pneumonia in culture—but is there something there, and we just can't culture it?" Jamieson says. "A lot of people with symptoms don't have diagnosable bacteria." The lung microbiome is smaller and less diverse than that of the gut; there is evidence in mice that low levels of harmful bacteria in the lung will cause problems.

Ultimately Jamieson hopes her lab's focus on the role of bacteria in co-infections will lead to better patient outcomes. But she's wary of the lessons learned from broad-spectrum antibiotics; treatments must be mindful of all systems in the body, she says. "We're trying to develop ways to affect the lung microbiome without affecting the intestinal microbiome," she says.

CAUSE AND EFFECT

***C. difficile* infection** is one of the most clear-cut examples of the importance of our microbiome to our health. The disease nearly always arises from a course of antibiotics that wipes out much of the gut's biodiversity, allowing *C. difficile*, a normally benign resident of the intestine, to flourish. It can cause severe diarrhea, colitis, dehydration, and worse; according to the CDC, of the nearly half a million people sickened by *C. diff.* in 2011, about 15,000 died.

In the most serious, recurrent cases that don't respond to standard treatment, fecal microbiota transplants have been remarkably successful at restoring patients' gut microbiomes, and their health. Kelly, a gastroenterologist at the Women's Medicine Collaborative in Providence, has led several studies in which about 9 in 10 patients were cured, with few side effects. But she cautions that more research is needed; only a few small randomized controlled trials have been done to date, and there's little long-term safety data.

Also, though donors are rigorously screened before their stool is accepted for transplant into a *C. diff.* patient, there's still a risk of other, unforeseen complications. Kelly says the FDA has shown interest in establishing a fecal transplant registry, like that for bone mar-

row. It would be funded by the NIH and follow 5,000 patients for up to 10 years after a fecal transplant. "It would be really helpful to the field, to get that safety data," she says. Patients suffering from other disorders of the GI tract could be helped, too. "Our next hope is moving into these other diseases associated with alterations in gut bacteria," such as irritable bowel disease (IBD), Kelly says. She's cautiously optimistic about small studies done so far. But she adds: "Nothing is all good. Are there people who would become worse after a fecal transplant, or would it trigger another problem?"

A more standardized approach, in the form of a pill, could prove safer than fecal transplants in the long term. Kelly is taking part in a phase II trial of a capsule containing just a few bacteria, derived from human stool, to treat *C. difficile* infection. Other companies are trying to design fully synthetic formulations; if successful, Kelly says they may be able to apply that knowledge to the treatment of other diseases associated with dysbiosis. "I'm a believer this is going to happen," she says.

So is Shapiro, a pediatric gastroenterologist at Hasbro Children's Hospital, though he thinks such therapies are "years away." Many of his young patients suffer from IBD, the rate of which is increasing across the US and the world, he says. "This is proof of concept of how important the study of the microbiome is," he says. "The diversity of [gut] flora in the US is really low relative to those in developing countries. While we don't have to deal with parasites or poor sanitation, we are seeing an overall increase in chronic diseases such as IBD. … Is it causative?"

Shapiro may have the data to figure that out. Since he was a resident in pediatrics at Hasbro, he's been involved with the Ocean State Crohn's & Colitis Area Registry (OSCCAR); he took over as PI last year. The group annually collects blood, urine, and stool samples from more than 400 patients in Rhode Island and is examining the longitudinal data for specific microbiome signatures and how they change over time. "Are these biomarkers of disease or potential therapeutic targets?" Shapiro says. "How does the microbiome change with treatment? Analyzing the samples from OSCCAR represents a great opportunity to complete a variety of meaningful microbiome studies."

OSCCAR began data collection in 2008, and already has a massive amount of it. In addition to sequencing patient and bacterial genomes in blood and fecal samples (they haven't started examining the urine samples yet), they're looking at protein signatures, and layering that with patient metadata, such as age, sex, and type of disease. "You need a mathematician now to do this," Shapiro says. "To integrate and analyze these huge datasets while making it clinically relevant is exceptionally challenging."

But he believes that down the line all of that data will help them refine treatments. "Now the way we treat IBD is such a shotgun approach from an immunologic standpoint. While our current medications work, they are not without risk, including the rare chance of developing a secondary malignancy," he says. "You're treating a disease by wiping out an entire neighborhood, but it would be nice to find the exact house."

The future of personalized medicine, in which therapies are tailored to individual patients, will likely depend on better understanding of the microbiome, which appears to be more individual than even our genome; humans are more than 99 percent similar to each other genetically, while our microbiomes show considerably more variability. Even identical twins can have significantly different microbiomes, due to everyday differences in diet and other environmental and lifestyle factors. But Shapiro cautions that the potential to develop individualized treatments for conditions such as IBD by manipulating the microbiome has "yet to be determined."

"The more we understand, the more we can treat [patients] with a targeted approach," Shapiro says. "Hopefully, 10 to 20 years from now, that's where we're going."

DIRTY LIVING

Understanding the microbiome has big implications beyond treatment of individual patients: it is critical for the health of the population. Antibiotic resistance has brought us not just *C. difficile* infections but an ever-growing list of terrifying pathogens, including methicillin-resistant *Staphylococcus aureus* (MRSA), New Delhi metallo-beta-lactamase-1 (NDM-1), and multidrug-resistant tuberculosis (MDR-TB). Many gain a foothold among already weakened patients in health care facilities, but others are infecting healthy people: MRSA, for example, is known to spread among athletes who play contact sports.

"As a society we have a responsibility

to limit antibiotics in conditions where they are not absolutely indicated," Shapiro says. Antibiotics play an important role in medicine, to be sure, and in some patients they offer the only hope for recovery. But the CDC reports that up to half of antibiotics prescribed are unnecessary or aren't taken as directed.

Alexander Fleming, the discoverer of penicillin, saw this coming. In his acceptance speech for the 1945 Nobel Prize in Physiology or Medicine, he warned, "there is the danger that the ignorant man may easily underdose himself and by exposing his microbes to nonlethal quantities of the drug make them resistant."

This is precisely what is occurring in US agriculture today: farmers give cattle, pigs, chickens, and other animals low doses of antibiotics preventively and to promote growth; statistics suggest that up to 80 percent of the antibiotics sold in the US is used for livestock, and despite FDA rules stipulating otherwise, investigators have found that many are sold over the counter. Pigs carry MRSA and spread it to farmworkers; it even has been found in pork for sale in supermarkets. In 2013 the CDC estimated that of the more than 2 million annual cases of antibiotic-resistant infections, 1 in 5 originated in food and animals.

Antibiotics given to the youngest patients have potential to cause long-term harm. Because the microbiome is still developing until we are between 2 and 3 years old, antibiotics may permanently alter its diversity; though, again, nothing is certain, long-term problems possibly related to a stunted microbiome range from allergies to IBD to celiac disease. This theory is of a piece with the "missing microbe hypothesis," advanced by Martin Blaser, MD, a microbiologist at the NYU School of Medicine, who suggests that the overuse of antibiotics has ushered in modern-day Western "plagues" like obesity, asthma, and type 1 diabetes.

And then there's the "hygiene hypothesis," which states that a lack of exposure to infectious agents early in life—like the germs passed around in day cares, on playgrounds, and by animals—suppresses the immune system, in which the microbiome plays some as-yet unclear role. We are, essentially, too clean. "Keeping your kids dirty might be good," Belenky says. Pulling up data plots of microbiome diversity in infants, he notes, "If you have pets, your early microbiome looks like your pet's."

Is that a good thing? Does it make those kids healthier adults? No one knows; at this point, it's merely an observation, just as any implied connection between antibiotics and diabetes is correlative at best. To state otherwise is to give desperate patients false hope. But even though we don't yet understand the mechanisms of the microbiome, we are certain it needs protecting, and many of the ways we think we can do that are harmless at worst, and who knows—they may help.

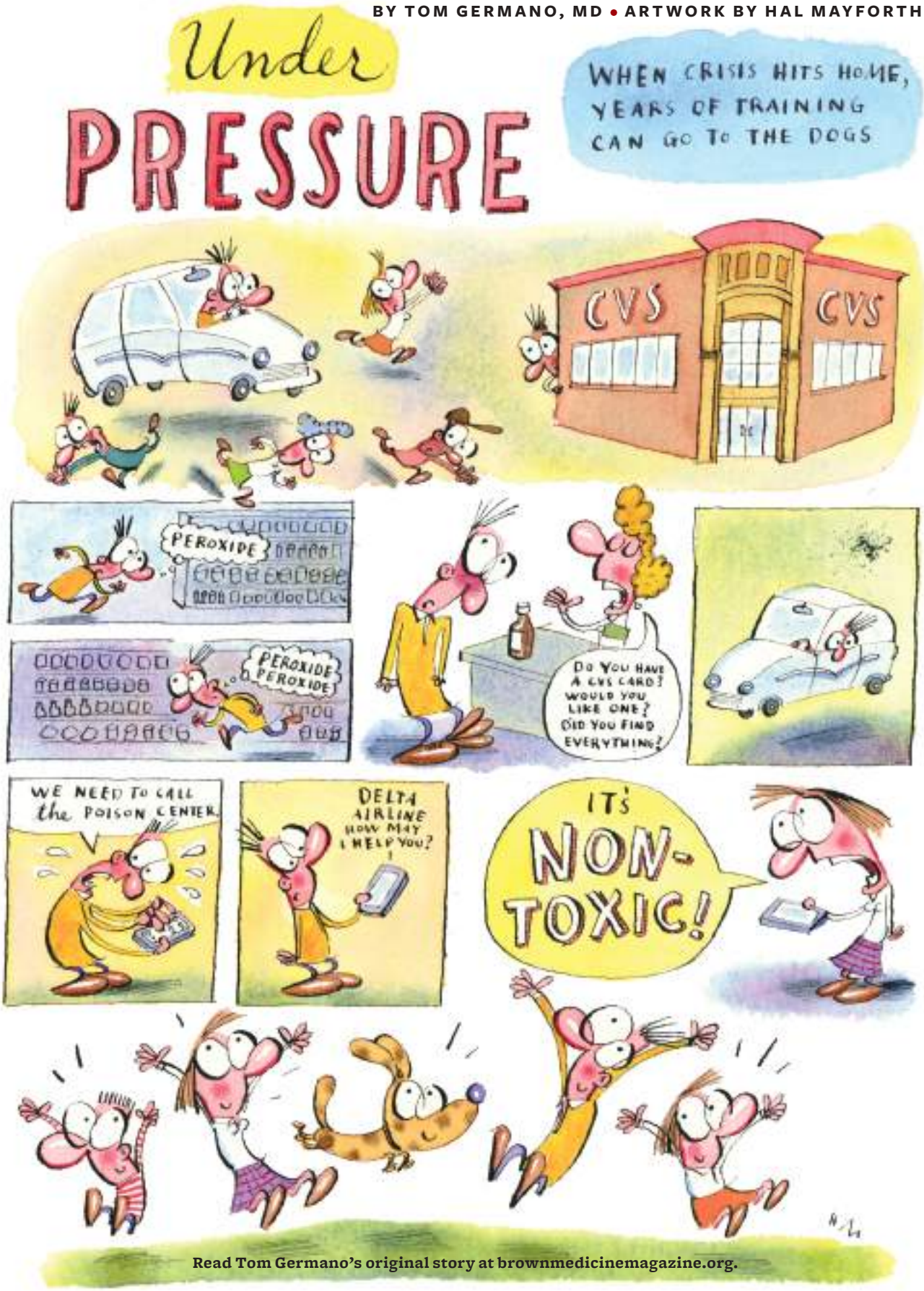
> "You're treating a disease by wiping out an entire neighborhood, but **it would be nice to find the exact house.**"

Since she began studying the microbiome, Shipra Vaishnava, whose kids are 4 and 7, says she's made some lifestyle changes to nurture her and their inner microbes: she lets them dig in the dirt, avoids antibiotics and processed foods, schedules their vaccinations, and once in awhile she eats without washing her hands.

Eating better, playing outside, getting preventive care—sounds like a prescription for good health for all of our cells, human and microbial.


COOL
ANTS
ANT HILL
SHE'S GOT SOMETHING.
OH NO!!
I'VE KILLED my KIDS' DOG
We NEED PEROXIDE !!!! IT MAKES HER VOMIT
I KNOW IT'S HERE SOMEWHERE...

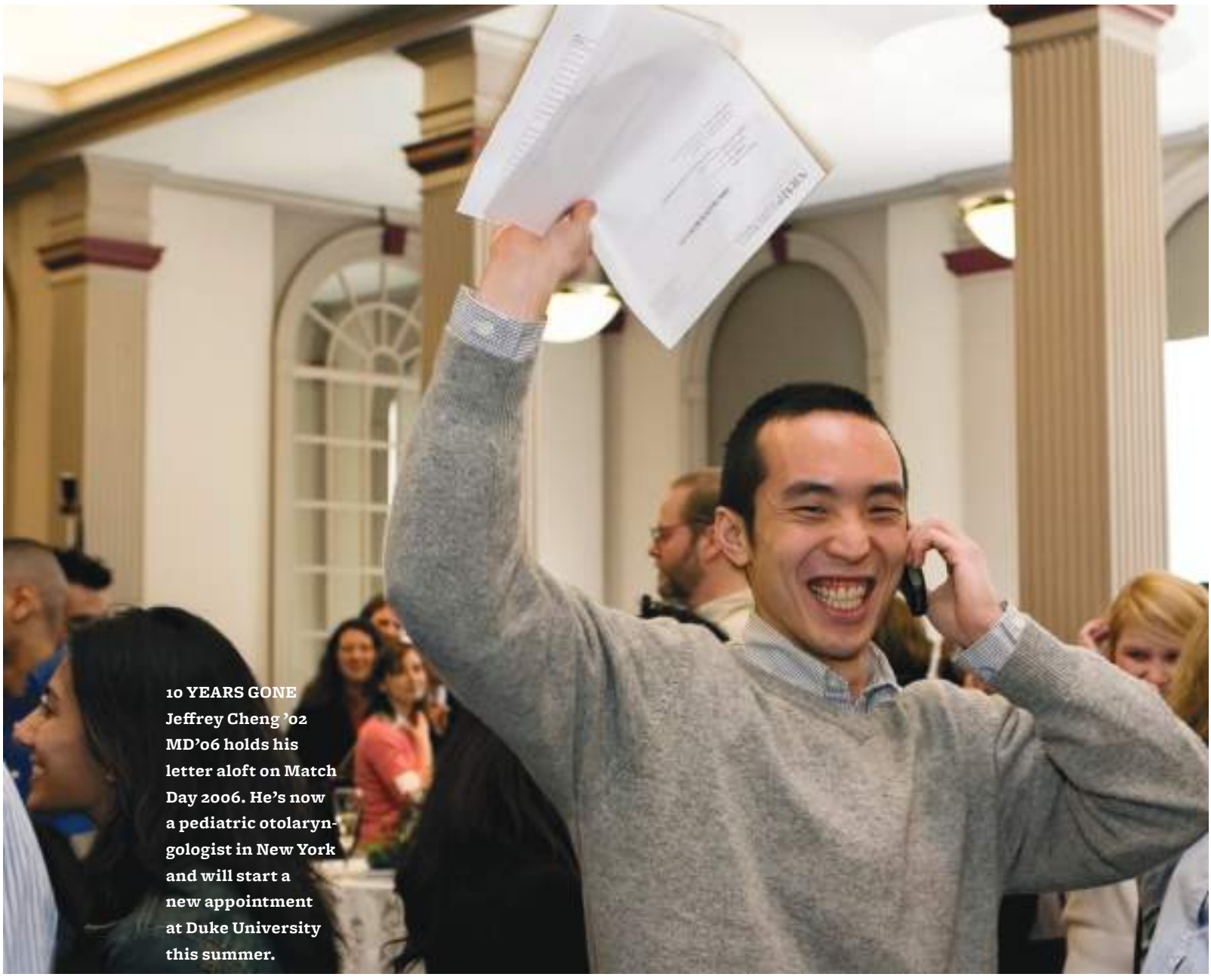
BY TOM GERMANO, MD • ARTWORK BY HAL MAYFORTH



Read Tom Germano's original story at brownmedicinemagazine.org.

ALUMNI ALBUM

CHECKING IN WITH BROWN MEDICAL ALUMNI



10 YEARS GONE Jeffrey Cheng '02 MD'06 holds his letter aloft on Match Day 2006. He's now a pediatric otolaryngologist in New York and will start a new appointment at Duke University this summer.

CLASSNOTES

ALUMNI

1980

Peter P. Yu '77 has been named physician-in-chief of Hartford HealthCare Cancer Institute in Hartford, CT.

1981

Richard Migliori '78, executive vice president of medical affairs and chief medical officer for UnitedHealth Group, has been named to the list of "Top 10 Most Influential Healthcare Leaders" for 2016 by *Modern Healthcare*.

1985

Scott A. Triedman '82, a clinical assistant professor of radiation oncology at Alpert Medical School, travels to Rwanda with the Dana-Farber Center for Global Cancer Medicine and the nonprofit organization Partners In Health to train and support local clinicians to treat patients at a cancer center in northern Rwanda.

1988

Rafael Padilla, a clinical assistant professor of surgery (anesthesiology) at Alpert Medical School and an anesthesiologist at Memorial Hospital of Rhode Island, was elected to a two-year term as president of the Rhode Island Society of Anesthesiologists. He will also serve on the Rhode Island Medical Society Council. He lives in Portsmouth, RI.

1991

Manuel DaSilva, a clinical assistant professor of orthopaedics in the Division of Hand, Upper Extremity, and Microvascular Surgery at Alpert Medical School, is the principal of S2S Surgical, an East Greenwich, RI, company. He is partnering with Rhode Island College's Langevin Center for Design, Innovation and Advanced Manufacturing to create prototypes for bone implants thanks to an innovation voucher from the state's Commerce Commission.

1993

James Lando, MPH '88, a regional health administrator for the US Department of Health and Human Services, was promoted to rear admiral in February. An assistant surgeon general in the US Public Health Service Commissioned Corps, Jim is the chief federal spokesperson for Region V, which comprises Illinois, Indiana, Michigan, Minnesota, and Wisconsin. He is board certified in general preventive medicine and public health, and is a fellow of the American College of Preventive Medicine.

Gretchen Green is on the board of directors of the **National Women's History Museum** in Washington, DC.

1995

Atul Butte, PhD '91 MMS'95, a professor of pediatrics and director of the Institute of Computational Health Sciences at the University of California, San Francisco, has been named to the scientific advisory board of uBiome, a San Francisco-based microbial genomics company. Daniel Kraft, MD '90 also serves on uBiome's advisory board.

1999

Gerardo Carino PhD'99 RES'02 F'05 and his co-authors received the 2016 Innovation in Fellowship Education Program Award from the American Thoracic Society for their abstract "A Novel Electronic Rounding Tool to Assist in ICU Fellow Training in Quality." Gerardo is director of the ICU at The Miriam Hospital, program director of the Critical Care Medicine Fellowship, and assistant director of graduate medical education at Rhode Island Hospital. He is an associate professor of medicine (clinical) at Alpert Medical School. Gerardo completed the internal medicine residency and fellowship in pulmonary and critical care medicine at Brown.

2000

Valerie Danielson '96 is a primary care physician at Core Physicians in Epping, NH. She completed her residency at Tacoma Family Medicine in Tacoma, WA, and is board certified in family practice.

Gretchen Green '96 MMSc'98 was a finalist for the 2016 North Carolina Doctor of the Year award. Gretchen is a director and partner at Greensboro Radiology and a founding partner of Canopy Partners, which provides IT, billing, and data services to physician practices. She is also vice chair of

WHAT'S GOOD?

Career news, weddings, births—your classmates want to know. Go to **med.brown.edu/alumni** and click on "Updates and Class Notes."

ALPERT MEDICAL SCHOOL ARCHIVES

the board of directors of the National Women's History Museum in Washington, DC.

2003

Gary Pien '95 PhD'02 RES'06 is an allergist-immunologist at Summit Medical Group in Berkeley Heights, NJ, where he is the director of research and has been the principal investigator on several research trials. He has published widely on topics including asthma, anaphylaxis, and diagnostic testing and management of immune deficiencies. His many accolades include the Vitals Patients' Choice Award and *New Jersey Monthly* Top Doctor, and he has appeared on NBC's *Today* to talk about food allergies. His son, Jason, is attending a pre-college program at Brown this summer.

2004

Julie Roth '99 is the director of women's neurology at Rhode Island Hospital and an assistant professor of neurology at Alpert Medical School. She lives in Providence with her family.

2005

Justin Wheeler is vice president of clinical services at Clinica Family Health in Lafayette, CO, which serves an urban, predominantly Spanish-speaking population. He says his clinical rotation at Memorial Hospital of Rhode Island influenced his career path. "Being able to offer health care to patients regardless of their ability to pay has been a real honor and privilege," he says. "I feel responsible for providing care to as many people as I can." A National Health Service Corps scholar, he completed his residency at Oregon Health & Science University.

EYE ON ALUMNI

It's Humanly Possible

A health center cares for its at-risk community by linking health and human services.

Myechia Minter-Jordan, MBA '94 MD'98 was practicing at The Dimock Center in Roxbury, MA, when one of her long-time patients admitted that she had begun drinking heavily. She felt she couldn't leave her dangerously abusive relationship for fear of ending up on the streets. With a phone call, Minter-Jordan got her patient admitted to Dimock's inpatient detox program, which was next door.

Minter-Jordan joined Dimock in 2007 as chief medical officer, and took the helm as CEO in 2013. She says her mother, a nurse for 30 years, inspired her to want to help vulnerable populations in her career, one patient at a time. Today, she says, that patient who entered Dimock's detox program—and went on to receive job training at one of the center's residential programs—is employed and has her own home. Whenever she sees Minter-Jordan, she tells her, "Dimock saved my life."

Minter-Jordan enjoys seeing patients, but in her role as CEO, she says, she is "making a larger impact on the system and helping many more patients and clients." After completing the Sinai Hospital Program in Internal Medicine at the Johns Hopkins University School of Medicine, Minter-Jordan was an attending physician and instructor of medicine at Johns Hopkins Medical Center. She then completed an MBA at the Johns Hopkins School of Professional Studies in Business and Education, an experience that taught her "to look at quality improvement and processes in order to improve care," she says.

The Dimock Center has 400 employees serving more than 17,000 clients in four economically disadvantaged suburbs of Boston. Dimock defines health care more broadly than many institutions; for example, it considers education a key component of successful long-term outcomes. Its Early Head Start and Head Start programs serve almost 400 children, and each year some 200 adults earn GED diplomas.

All patients seen by a pediatrician or internal medicine physician are screened for substance or mental health issues. Dimock offers "the full continuum of substance abuse services," both inpatient and outpatient, Minter-Jordan says. Because behavioral health services are fully integrated and colocated, "we have better outcomes and better patient and provider satisfaction," she says. "We can take care of your diabetes better, because we are taking care of your depression."

Myechia Minter-Jordan

COURTESY THE DIMOCK CENTER

Dimock runs on a combination of federal funds, reimbursable health care transactions, and donations; one of Minter-Jordan's near-term goals is to gather the data to demonstrate its value to stakeholders. She says Dimock's outcomes exceed those of state and national institutions on prenatal care, childhood immunizations, asthma management, cancer screening, HIV linkage to care, and a number of other important indicators.

Attracting and retaining dedicated physicians is another ongoing challenge, especially in light of the salary requirements of those with large medical school loans to pay. As a federally funded institution, Dimock offers a physician loan repayment program, and there are other rewards, Minter-Jordan says. "What drives many of our physicians is the ability to practice in a team-based environment," she says.

> "What drives **many of our physicians** is the ability to **practice in a team-based environment.**"

Minter-Jordan lives not far from Dimock, in West Roxbury, with her husband, Lawrence, a high school special educator, and their two daughters, ages 8 and 10. She credits Lawrence with making it possible for her to balance work and family life. "I would not be successful in my career without having a husband who is an excellent father and whose schedule is more flexible and consistent than mine," she says.

—Mary Stuart

2007

Sarah Marie Hyder '03 RES'14 is a clinical assistant professor of medicine at Alpert Medical School and gastroenterologist at University Medicine in Providence, where, as director of endoscopic ultrasound, she leads the use of endoscopic ultrasound equipment to detect and treat cancers of the digestive tract. Sarah specializes in conducting therapeutic biliary endoscopic procedures.

2010

Emily McElveen '04 married Joel Limerick on August 29, 2015, in Norfolk, VA, where she practices as a US Air Force pediatrician. Alums in attendance included **Geraldine Abbey-Mensah** '06 MD'10, **Jasmine Bauknight** '06 MD'13, and **Lloydia Reynolds** '06 MD'10.

2013

Brenna Brucker '09 will marry Erik Turgeon, PharmD, in July in Pittsburgh. Brenna is an emergency medicine resident at Vanderbilt University Medical Center in Nashville, TN, where Erik is an investigational oncology clinical pharmacist.

GET SOCIAL!

Visit **www.brownmedicinemagazine.org/blog/connect** to follow Alpert Medical School on our social media networks.

ALUMNI ALBUM

EYE ON ALUMNI

Ideas into Action

An alumna is changing the world, one mother at a time.

Tara Shirazian

You might call Tara Shirazian '99 MD'03's office in midtown Manhattan a little cluttered. From wall to ceiling are boxes of birth kits, prenatal vitamins, and medical supplies donated to Saving Mothers (savingmothers.org), the nonprofit she cofounded in 2009 to help prevent women in the developing world from dying in pregnancy and childbirth.

As the organization's president and medical director, Shirazian travels about six weeks a year to the three countries where Saving Mothers operates: Guatemala, the Dominican Republic, and Kenya. When she's stateside, she's soliciting donors for funding, medical supplies, and equipment; persuading colleagues to join short-term medical missions; and handling staffing, budget issues, and other day-to-day concerns.

She's also an assistant professor of obstetrics and gynecology and director of Global Women's Health at NYU Langone Medical Center.

"As you might imagine, my hobbies are sleeping and taking care of my kids," says Shirazian, the mother of two young children. She met her husband, Michael Schwartz '99 MD'03, at Brown. (Her brother, Shayan Shirazian '01 MD'05, followed her into the Program in Liberal Medical Education.)

Born in Baltimore to parents who emigrated from Iran to work as immunologists at Johns Hopkins Medical Center,

COURTESY SHIRAZIAN

Will Perez '08 and Sabatino Giordano had their dream wedding in Newport, RI, on December 6, 2015. Will writes: "Our family and friends from around the country joined us for an unforgettable weekend. We were married in a small chapel in downtown Newport before heading to the Ocean Cliff mansion to dance the night away." In attendance were Will's former ballroom dance partners from Brown, Savonya McAllister, MD '08 and **Kezia Spence** '08 MD'13, and good friend **Michelle Bravo** '08 MD'13. He and Sab want to move back to the East Coast once Will finishes his family medicine residency at Oregon Health & Science University next year.

RESIDENTS

1988

Nitin S. Damle, MD, MS, FACP was named president of the American College of Physicians. He is the founding and managing partner at South County Internal Medicine Inc. in Wakefield, RI, and past president of the Rhode Island Medical Society. He is a clinical assistant professor of medicine at Alpert Medical School and completed his internship and residency training at the Brown University Affiliated Teaching Hospitals. He has been a fellow of the ACP since 1992. He and his family live in Jamestown, RI.

Shirazian discovered her passion for service as a 19-year-old in the PLME. For her Emergency Medical Systems course, she observed daily operations in Rhode Island Hospital's emergency department. She realized that medical care was compromised by language barriers between providers and patients from local immigrant communities, where as many as 50 different languages were spoken.

For a class paper, she proposed using Brown students to launch an Interpreter's Aide Program at the hospital. She brought the idea to the dean of the Medical School; the program continues to this day, and interpretation for hospital patients is now required by Rhode Island law.

"I know it sounds cliché, but that taught me that you really can change the world," she says. "It also propelled me into medicine and made me feel passionately about health care for those without access. Saving Mothers is essentially born out of those principles."

During residency Shirazian traveled to Honduras for a medical mission, but was "troubled by the idea that there were no systems in place to continue to care for these women after we were gone, and that we were just putting a Band-Aid on the problem," she says.

Believing that health care in developing countries needs to be long term and sustainable, she and a colleague, Nichole Young-Lin, MD, MBA, founded Saving Mothers. They first worked in Guatemala when a mudslide destroyed a hospital. "The idea was to focus on what we knew best: birth and the after-care period," Shirazian says. "A large part of the challenge is that many of the caregivers we train and pay have either limited or no language and literacy skills."

Since it began, Saving Mothers has trained more than 300 birth attendants and performed nearly 2,000 gynecological surgical procedures free of charge. They are providing ob/gyn subspecialty training for a physician at a rural hospital in Kenya. This hospital—which serves more than 300,000 women—does not have an ob/gyn on staff, so the training could vastly improve the quality of care for women in the region.

"I know it sounds cliché, but that **taught me that you really can change the world."**

With 350,000 women dying in childbirth every year worldwide and 99 percent of maternal deaths occurring in developing countries, Shirazian wants Saving Mothers to become the global maternal experts for everyone. "We don't need to be in 100 countries, but we'd like to say to nongovernmental organizations in other countries that we can help you set up low-cost, high-impact interventions," she says.

Shirazian says she's often asked if she thinks that her time and effort on behalf of Saving Mothers is making a difference. "My answer is that I know it makes a difference," she says, "because I've seen it." ***—Bill Glovin***

1993

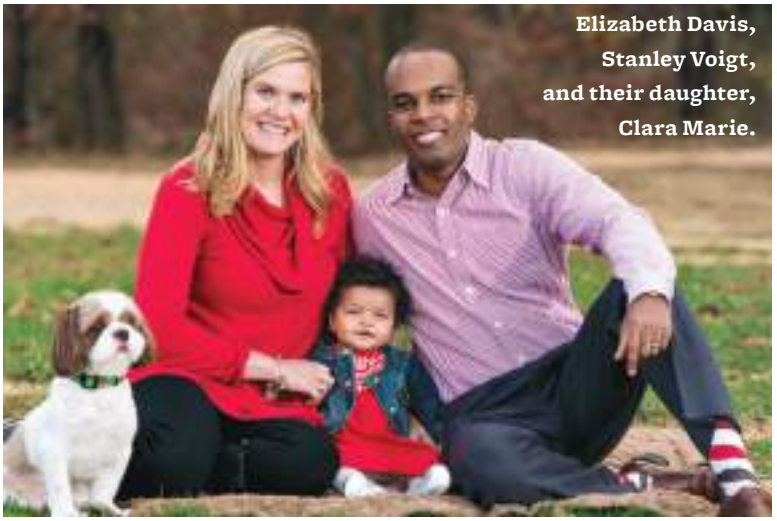
Reginald Gohh, MD F'95 received the 2015 Annual Milton Hamolsky Outstanding Physician Award from the medical staff at Rhode Island Hospital. A kidney specialist in University Medicine's division of hypertension and kidney diseases and Rhode Island Hospital's division of organ transplantation, he was recognized for his work in developing the kidney transplantation program and moving it forward. Reginald is also an associate professor of medicine at Alpert Medical School. He is a former recipient of the Young Investigator's Award of the American Society of Transplant Physicians.

1998

David Holub, MD, received the Distinguished Physician Award of Highland Hospital in Rochester, NY. The family medicine physician is associate director of the University of Rochester Family Medicine Residency and assistant professor of family medicine at the University of Rochester School of Medicine and Dentistry. He and his wife, Eva Galka, MD, a surgical oncologist, live in Fairport, NY, and have two children.

2002

Suzanne McLaughlin, MD, was voted president-elect of the Medicine-Pediat-



Elizabeth Davis, Stanley Voigt, and their daughter, Clara Marie.

EYE ON ALUMNI

Roots Down

A young doctor finds his way.

A few months after finishing his residency, Stanley Voigt '06 MD'10 moved to Fairfax, VA, and spent his first few weeks on the road, driving to meet the physicians in the community he would call home. Voigt, 31, is an ear, nose, and throat specialist who joined his first practice, Associates in Otolaryngology, outside of Washington, DC, in August 2015. Now he's balancing his ambitions to grow as a young physician with building a new life for his family.

In his early years of medical school, Voigt could not tell you what otolaryngology was. The oldest medical specialty in the US, physicians in this field specialize in the medical and surgical management of diseases affecting the head and neck—a broad palette of conditions ranging from hearing loss and tonsillitis to mouth and neck cancer. In the course of a day, ENTs can peer into a voice box or remove malignant tumors from a jugular vein. For Voigt, it was the perfect blend of surgery and internal medicine.

Voigt comes from a family of physicians: his father is a psychiatrist; his brother, Clifford Voigt '05 MD'09, is an orthopedic surgeon; and his sister, Niesha Voigt '14 MD'18, will soon join their ranks. Medicine was infused in his household, and he still remembers beaming at his father when he was growing up. "I was enthralled by what he could do," Voigt says. "He'd come home with a stethoscope and that would drive my imagination."

After residency at Tufts Medical Center, Voigt has seen the gamut of conditions ENTs encounter and has even brought novel techniques, like video-stroboscopy, to his practice. Video-stroboscopy turns the movement of a patient's vocal cords into a slow-motion movie. Doctors place the strobe on the neck and pulse light at the vocal cords in steady intervals, slightly behind the speed of the vocalization. When projected on-screen, these pulses of light form a detailed picture of the voice box, and allow ENTs to see subtle pathologies that would otherwise be blurred by the movement of the vocal cords. Although the technique has been in use for many years, it is scarce in private practices. Voigt sees many patients with voice disorders, and offering this technique saves them a trip to another specialist.

> "As a surgeon, you can be **forced into quick encounters,** but even a bit of **rapport is important."**

COURTESY VOIGT

His patients reflect the breadth and challenges of the field. "In ENT, you can feel like a primary care provider," Voigt says. But he is careful not to take this routine care for granted: "We can lose sight of the impact we have. Something as simple as earwax removal gives people back their hearing, and can be a life-saving measure against diseases like meningitis," he says.

Voigt also faces issues that span beyond the walls of his clinic. When he cares for patients with cancer he is often fighting an uphill battle against smoking. Despite the challenges, he cherishes the road to recovery with his patients. "As a surgeon, you can be forced into quick encounters," he says, "but even a bit of rapport is important."

Elizabeth Davis, DVM '06, Voigt's wife, says: "Stan always calls his patients the night after performing surgery. He is always available for them." The two met as freshmen in Perkins Hall, and were married a few days after Voigt finished medical school and Davis finished veterinary school. Their daughter, Clara Marie, was born five days after Voigt finished his residency.

"Before, I was so devoted to residency, but things are slowing down," Voigt says. He plans to give that devotion back to his community. "The senior partner in my practice has cared for generations of patients," he says. "I want people to say that about Dr. Voigt." ***—John Aurelio '14***

rics Program Directors Association. She will serve one year as president-elect, one year as president, one year as immediate past president, and a final year as past president. She is the director of the Internal Medicine/Pediatrics Residency Program at Alpert Medical School and an assistant professor of pediatrics and medicine.

"We were married in a small chapel in downtown Newport before heading to the Ocean Cliff mansion to **dance the night away."**

Brett S. Stecker, DO, was named the 2016 Community Clinician of the Year by the Bristol (MA) North District Medical Society. In addition to his primary care practice and hospital duties, Stecker is the rehabilitation medical director at Life Care Center at Raynham, MA. He is a graduate of the family medicine residency program at Memorial Hospital of Rhode Island and a clinical assistant professor of family medicine at Alpert Medical School. A fellow of the American Academy of Family Physicians, Stecker has been a member of the Massachusetts Medical Society since 2008 and is a member of its house of delegates and its committee on nominations.

2008

Megan Ranney, MD F'10 MPH'10, assistant professor of emergency medicine at Alpert Medical School, led a study, published in *General Hospital Psychiatry* in February, that found that nearly half of teens visiting the emergency department of Hasbro Children's Hospital in Providence reported experiencing peer violence or cyberbullying, and almost one-quarter reported symptoms consistent with PTSD. In a hospital press release, Megan said she hopes the study will lead to greater attention to these problems and to standardized mental health evaluations.

FELLOWS

2007

Rami Kantor, MD, was invited to serve as a US Department of Health and Human Services panel member of the Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents—A Working Group of the Office of AIDS Research Advisory Council. He completed the infectious disease fellowship and is an associate professor of medicine (infectious disease) at Alpert Medical School.

2010

Sonali Pandya, MD, is a breast surgeon in the Breast Health Center of the Program in Women's Oncology at Women & Infants Hospital. Previously a surgeon in Boynton Beach, FL, she completed her general surgery residency at Albany Medical Center and the Society of Surgical Oncology Breast Disease Fellowship at Women & Infants.

OBITUARIES

ALUMNUS

ANTHONY J. MIGLIACCIO, MD RES'64

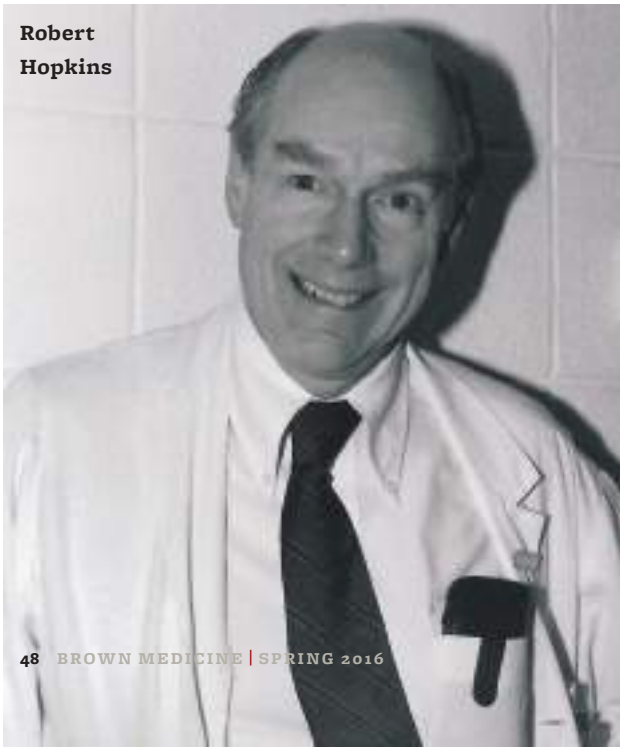
Anthony J. Migliaccio, 83, died March 13 in Tiverton, RI. Tony graduated from Dartmouth College in 1954, and from New York Medical College, with distinction, in 1959. He completed his internship and surgical residency at Rhode Island Hospital, and was elected in 1968 as a fellow of the American College of Surgeons. His commitment to ensuring better outcomes led him to write and publish a book focused on better health, *Fitness and Expectations*. Tony was a clinical assistant professor of surgery at the Brown University School of Medicine. He was a partner with Northeast Health Care helping to pioneer a cost-effective alternative to emergency room services. In addition to being a coastal and offshore sailor and woodworker, he was an accomplished photographer whose work was featured in many art shows. A staunch environmentalist, he was a past president of Save the Bay. He is survived by his wife of 60 years, Paula, four children, 13 grandchildren, and one great-grandchild.

FACULTY

ROBERT W. HOPKINS, MD

Robert W. Hopkins died February 22 at his home in Milton, MA. He attended Harvard College and Harvard Medical School, then followed his father and grandfather into surgery, completing his residency at Massachusetts General Hospital. He was a lieutenant in the US Navy in Korea, where on the hospital ship USS Repose he earned a Medal of Commendation. As a civilian he was a surgeon and instructor at the University of Pennsylvania Medical School, Cleveland Metropolitan General Hospital, and Case Western Reserve University School of Medicine before Fiorindo Simeone, MD '29 ScM'30 recruited him to help develop Brown's new medical program. In addition to his work as surgeon-in-chief at The Miriam Hospital and professor of medical science at Brown, Robert was the medical director of the Miriam's Non-Invasive Vascular Laboratory; performed the first kidney transplant in Rhode Island, in 1973; was a surgical consultant at Rhode Island Medical Center and Roger Williams General Hospital; and served on numerous medical societies. Upon retirement he was honored as professor emeritus at Brown, and the Miriam renamed his lab the Robert W. Hopkins Non-Invasive Vascular Laboratory. He is survived by his wife of 56 years, Ann, and two daughters and two granddaughters. Gifts in his memory may be made to Doctors Without Borders, 333 7th Avenue, NY, NY 10001-5004; or to Harvard Medical School, Landmark Center, 401 Park Drive, Suite 22W, Boston, MA 02215.

> Dr. Hopkins performed **the first kidney transplant** in Rhode Island.



Robert Hopkins

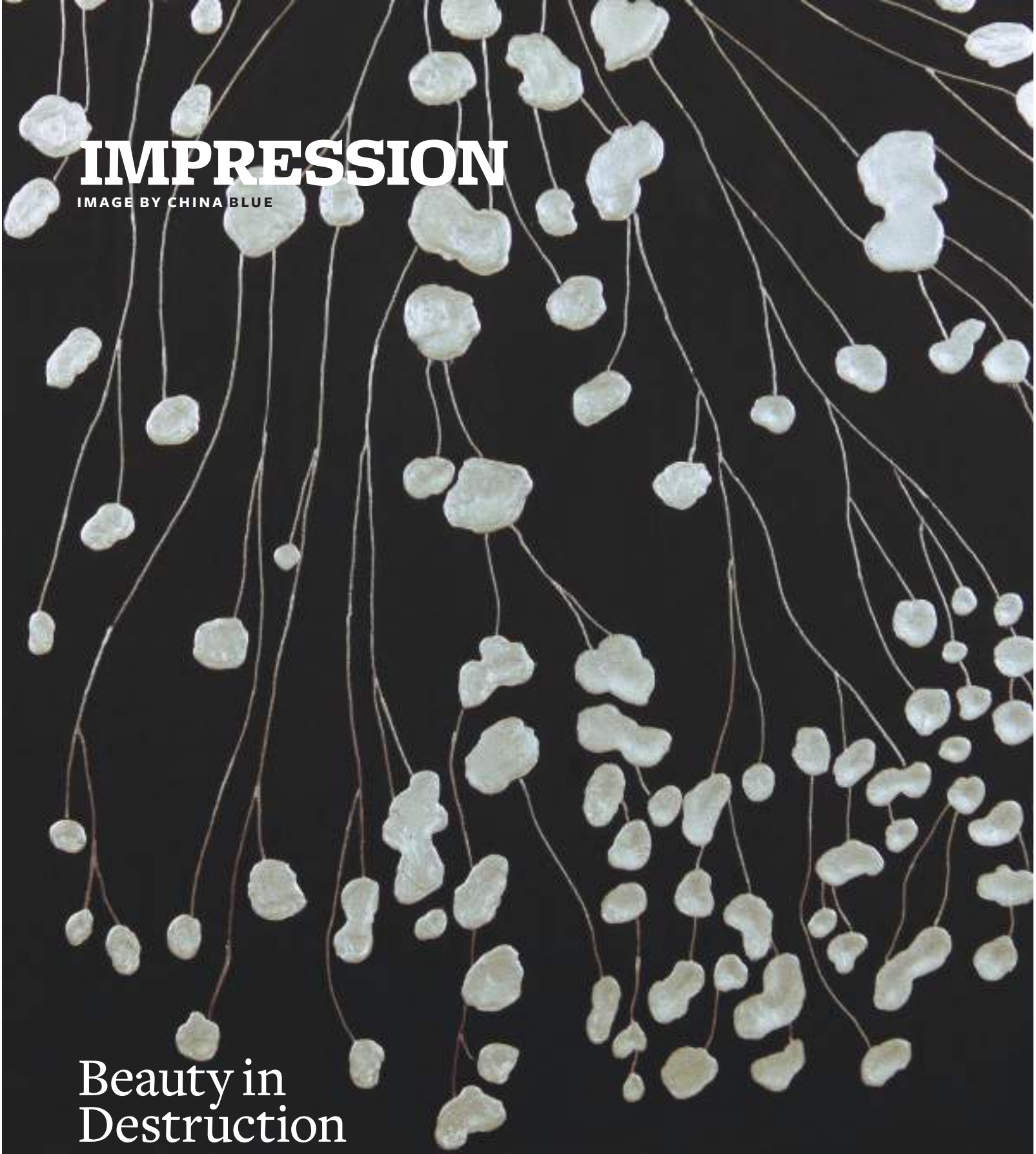
ALPERT MEDICAL SCHOOL ARCHIVES

FREDERICK G. MURPHY, MD

Frederick G. Murphy, 69, died at his home in Orleans, MA, on March 21, after a two-year battle with acute myeloid leukemia. He graduated from Assumption College with a degree in languages (French and Russian). He enlisted in the Navy, attending Officer Candidate School in Newport, RI, followed by a year on a landing ship tank in the Mekong River as a line officer. Remaining in the reserves after his tour of duty, he obtained a master's degree in biochemistry from Boston University and then his MD from UMass Medical School. After an internship at the Faulkner Hospital, he pursued the specialty of anesthesia at Tufts New England Medical Center. He was director of Neuro-Surgical Anesthesia at Rhode Island Hospital and assistant professor of medicine at Brown and UMass Medical School. He is survived by his wife, Barbara. Proud of his service in Vietnam, Fred requested donations in his memory go to Homes for Our Troops, 6 Main St., Taunton, MA 02780.

IMPRESSION

IMAGE BY CHINA BLUE



Beauty in Destruction

In her series "Memory Networks," artist China Blue investigates the idea of linking and preserving memories in web-like structures reminiscent of neural networks. Her paintings are made with hand-fabricated paint infused with aluminum, which was once thought to be the source of Alzheimer's disease. Blue is the artist-in-residence at Rhode Island Hospital's Norman Prince Neurosciences Institute. A collection of 17 paintings, "Memory Networks" was exhibited at Alpert Medical School in conjunction with Brain Awareness Week in March. See more of her work at chinablueart.com.

—Kris Cambra

BROWN
Alpert Medical School

Brown University
Box G-R220
Providence, RI 02912

"Medical students want to worry about their patients, not their debt. By investing in my future, you have given me the opportunity to choose my career based on my passion so that I can focus on paying it forward instead of paying it back." —Emily MacDuffie MD'19

Your support of the Brown Medical Annual Fund makes an Alpert Medical School education possible for students like Emily.

TODAY'S STUDENTS / TOMORROW'S DOCTORS

Make your gift today at www.gifts.brown.edu.
Visit http://bmaf.brown.edu for more information.

Questions? Contact Carolyn Popovic,
associate director of annual giving, at 401-863-6762
or Carolyn_Popovic@brown.edu.
Office of Biomedical Advancement
Box 1889, Providence, RI 02912

BROWN TOGETHER