BROWN MEDICINE

Volume 21 | Number 3 | Fall 2015

FACT/FICTION
What's behind the half-baked science of

MEDICAL MARIJUANA?

Page 38

PLUS:

LETTER FROM THE DEAN

A New Leaf

The start of a new school year feels like the beginning of another new calendar year. It's a time to set goals and establish positive habits—it's a fresh start.

On campus we've certainly been doing that. We've begun in earnest fulfilling the objectives put forth in the Division of Biology and Medicine's strategic plan, which you'll read about in this issue of *Brown Medicine*. We've been enlisting partners in the effort, establishing new collaborations, and making great progress on a number of objectives. It's going to be exciting to watch this unfold over the next several years.

I've also taken the opportunity of this new school year to recommit ourselves to our statement of institutional diversity. We know that the inclusion of multicultural perspectives in medicine contributes to greater access to care for patients with low incomes, racial and ethnic minorities, and non-English-speaking patients. In that way, diversity in the physician workforce helps to overcome health care disparities. As a community, we need to cherish all forms of diversity and be inclusive of others' experiences, perspectives, and ideas.

Right before going to press we received the results of the Association of American Universities Campus Climate Survey on Sexual Assault and Sexual Misconduct. This survey was conducted last spring and included medical and graduate students. The survey results were troubling and supported the conclusions of the Brown University Sexual Assault Task Force convened earlier this year. In response, the University has enacted a comprehensive policy addressing sexual assault and misconduct that applies to all Alpert Medical School faculty, students, and staff; created a new process for the receipt and investigation of complaints; established a Title IX office, and we have appointed a deputy Title IX coordinator for Alpert Medical School; and created a new website where all of the information related to these policies and procedures can be found easily.

Every incident of sexual assault or harassment is egregious and is a violation of our ethics and community values. The associate deans and I are meeting with our faculty leadership, medical students, and other parties who must work together to ensure a safe and welcoming learning environment for all of our students.

Sincerely,

Jack A Elias MD

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

SCOTT KINGSLEY

14


44


8

"In the future people may well say, 'Do you know at one time this lifesaving drug was illegal?'" —***James Crowley, MD,*** *Page 38*

INSIDE

BLAIR THORNLEY; SCOTT KINGSLEY; ISABEL CHIN

DEPARTMENTS

Cover: Medical marijuana plants grown by Ellen Smith P'05, photographed by **Erik Gould**

LETTER FROM THE EDITOR

That We Might Live

The only time my life has ever been in mortal danger was when I was diagnosed with preeclampsia.

Fortunately, it was late in pregnancy and my baby was fully cooked, no chance of prematurity. But I was pumped full of magnesium sulfate, the mysterious wonder drug that staves off seizures. It's also a muscle relaxant, however, which meant I was confined to the birthing bed and when the staff joyfully proclaimed "It's a girl!" all my unfocused eyes could see was a blurry, squalling blob. Despite the traumatic entrance, all turned out well for both us.

Naturally, when John Aurelio's article on preeclampsia was sent to me, I read it with particular interest. It helped that it came with the recommendation of former *New York Times* science editor Cornelia Dean '69. She had been John's nonfiction seminar professor and was highly impressed with his final project. Rightly so: John's piece is a taut examination of a disorder about which little is known, is unique to humans, and which causes an estimated 76,000 maternal and 500,000 infant deaths worldwide each year, making it a leading cause of pregnancy-related death.

When you read numbers like those and allow yourself to feel the grief and loss that accompany deaths that may be preventable, you can't help but get behind a push for more translational research at Brown. What we need now—for lung disease (another leading killer worldwide), for diseases of aging that contribute to disability and infirmity, for cancer—are better diagnostics, treatments, and cures, all of which can be generated when effort is placed on translating basic discoveries into human applications. In this issue you'll read about Dean Elias's strategic plan, which will increase this type of research at Brown.

It's a move whose time has come, for Alpert Medical School and for human health.

PLEASE SHARE

Send your letters, which may be edited for length and clarity, to:

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BROWN MEDICINE

Volume 21 | Number 3 | Fall 2015

The BEAT

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

STUDENTS

A NEW ERA
Medical students, including Faiz Khan '15 MD'19 (second from left), listen to a patient navigator at Clínica Esperanza.

MIKE COHEA

The Rookies

The new MD-ScM program enrolls its first class.

After years of planning, Alpert Medical School's first-in-the-nation Primary Care—Population Medicine dual-degree program became a reality in August with the arrival of its inaugural class of 16 students.

The program integrates traditional medical education with a new expertise to understand the transformation of the US health care system, says Paul George '01 MD'05 RES'08, director of the program and associate professor of family medicine. The system that remunerates doctors for treating a high volume of individual patients is giving way to one in which doctors not only provide personal care, but also account for the quality delivered to their entire patient population, he says. Physicians will lead and work in teams of different providers. They will measure quality and test ways to improve outcomes in the context of social determinants of health.

The students who have enrolled in the PC-PM program are looking to get ahead of these trends. Michelle Diop MD'19 of Boston, who studied anthropology at Columbia, applied because the program encompasses a broad, social context for medical practice. "When I become a doctor, I want to be an educator, I want to be a mentor, I want to be a social worker, and a health care provider who helps my patients holistically," she says.

Faiz Khan '15 MD'19 says he became excited about the PC-PM program as it emerged while he studied community health as a Program in Liberal Medical Education undergraduate. "I took a class on the US health care system," Khan says. "I got to see not just the science of medicine and how medicine is done, but whether it is actually working."

OVER HEARD

"This is not a popular political topic. Our goal here is not to make everybody in this room happy. Our goal is to cut down on overdose deaths."

—Professor of Medicine **Josiah Rich**, *MD, MPH, speaking about Rhode Island's new Overdose Prevention and Intervention Task Force, which the governor formed to address the state's opioid epidemic, in the* Providence Journal *on August 19, 2015. Rich is one of three Brown University public health experts who are advising the task force.*

AN INTEGRATED CURRICULUM

As in Brown's traditional MD program, the MD-ScM curriculum includes all the training—anatomy, genetics, pathophysiology, and so on—needed for serving patients' medical needs. But it also covers the science and patient experience of real-world health care delivery, as well as leadership, George says.

Unlike an MD-MPH program, PC-PM integrates material of both fields so that students who learn about an aspect of health care in classes or research will have immediate opportunities to apply their understanding in practice.

"The goal is to provide students with an integrated set of knowledge, attitudes, and skills that will allow them to care for individuals, families, communities, and populations when they become practicing physicians," says Jeffrey Borkan, MD, PhD, assistant dean for Primary Care-Population Health Program Planning and chair of family medicine.

In the first year, students will follow patients, helping them to navigate the health care system. In the third year, rather than rotating through six-week clerkships in various specialties, students will remain engaged in a nearly year-long longitudinal integrated clerkship where they will spend half a day a week with a mentoring physician in the community. Students will see how patients come in and out of the system and respond to treatment plans over a meaningfully long term. Two of the master's degree courses are embedded within this medical experience.

In addition, third-year students will be assigned a panel of approximately 30 patients to follow through the system from primary care through hospitalization, rehabilitation, or home care. If a patient is experiencing a major medical event, such as giving birth or undergoing surgery, that will take precedence over more routine classwork, which will be made up later, George says.

While PC-PM is a distinct program, key lessons about population medicine are integrated into the curriculum of all Alpert Medical School students.

"As initially envisioned, it was going to be a separate track, but as we were in the process of implementing the program, we realized that population medicine is something in which all graduating medical students need to have expertise," says Allan Tunkel, MD, PhD, associate dean for medical education. "We've moved to a model of integrating the important principles of population medicine across the curriculum with additional experiences for the students in this program."

The American Medical Association's Accelerating Change in Medical Education Consortium supports Brown's PC-PM program. As one of the inaugural 11 members of that expanding effort, Tunkel says, Alpert Medical School is in a position to work with the other consortium schools to provide a model for the future of medical education.

"We're going to determine whether the program we've developed has lived up to the goals and objectives that we expected," Tunkel says. "The follow-up is important and it really has to be long term."

Among the goals is whether students in the program pursue primary care careers, although that is not required; any physician can benefit from studying population medicine, George says.

—David Orenstein

ARTSY

Hidden Talents

An exhibit reveals the artistry of med students.

Two years ago, when Sam Klein MD'16 and Nick Nassikas MD'15 were feeling out an idea for an art exhibit at the Alpert Medical School building, they learned they weren't the only ones yearning for more inspiration from the space they call their intellectual home.

"We sent out a couple of surveys," Klein says. "The overwhelming response is the student body wanted to see a little more art in the building. We spend so much time here. They wanted it to serve as an inspiration, maybe a time for reflection and maybe just a break from what they are doing. We are fortunate to have the School administration's full support of our initiative."

I KNOW YOU: Students find familiar names at the opening reception.

The School has since hosted a few other exhibitions, but the one Klein and Nassikas spearheaded with Ali Rae MD'17 is the first to feature the work of medical students (and a few staff members).

"If you look at any cross section of the med school students, they really are an eclectic, creative, incredibly talented group of people," Klein says.

The Visual Arts Exhibition is organized along three themes: "Gravity and Weightlessness," "Potential Spaces," and "Breakdown." Each evokes medical ideas, Klein says, such as the emotional weight—or lightening—of delivering test results to patients, the structures and chasms within the body, and the fact that the body can fail.

A council of a dozen students juried the works, which include sculptures, blown glass, paintings, sketches and drawings, and photography. The exhibit will grace the second- and third-floor atria of the building through January 2016, while the first floor remains open for rotating exhibits. ***—D.O.***

DOTING DOCENT: Ali Rae MD'17 discusses "Rosebed," by James Eng '14 MD'18.

DAVID DELPOIO (2); JOSEPHINE BENSON

WHO KNEW?

Tree of Knowledge

At the 25th anniversary celebration of Brown's Medical School, in 2000, attendees received an unusual party favor—a tree sapling. They were the offspring of a plane tree outside of Arnold Lab, the home of the Medical School administration at the time; that tree, in turn, was purportedly a descendant of the tree under which Hippocrates taught in Kos, Greece, some 2,400 years ago. One of those gifts—a sapling no longer, at 8 feet tall—now has taken root at Alpert Medical School. Last spring Pardon Kenney '72 MMS'75 MD'75 RES'80, P'03 and his wife, Kendra P'03, donated one of their trees so that medical students may continue to learn in the shade of its storied boughs.

—Josephine Benson '17

FINDINGS

Hot Dog

Canine ancestors evolved with climate change.

Old dogs can teach humans new things about evolution. Fossil evidence suggests that, as North America's forests gave way to grasslands over millions of years, dogs adapted their hunting style to suit their changing habitat.

"It's reinforcing the idea that predators may be as directly sensitive to climate and habitat as herbivores," Christine Janis, PhD, professor of ecology and evolutionary biology, says. "Although this seems logical, it hadn't been demonstrated before."

Dogs are native to North America. Their ancestors 40 million years ago looked like mongooses and were well adapted to the warm, wooded environment of that time. Their forelimbs were not specialized for running, and had the flexibility to grapple with whatever meal unwittingly walked by.

But a few million years later, as the global climate began to cool and the continental interior dried, forests slowly gave way to open grasslands. By examining the elbows and teeth of 32 fossil canids, Janis and other researchers found clear patterns: as climate change opened up the vegetation, dogs evolved from ambushers to pursuit-pounce predators like modern coyotes or wolves.

"The elbow is a really good proxy for what carnivores are doing with their forelimbs, which tells their entire locomotion repertoire," Janis says. Dogs' front paws, which once could swivel to grab and wrestle prey, evolved to always face down, specialized for endurance running.

In addition, the dogs' teeth trended toward greater durability, all the better to eat prey that had been rolled around in the grit of the savannah, rather than on a damp, leafy forest floor.

The study, published in *Nature Communications* in August, suggests that predators don't develop forelimbs for speedy running simply because their prey run faster. Though herbivores were evolving longer legs, the canine evolution evident in the fossils tracked in time directly with the climate-related habitat changes. After all, Janis says, it wasn't advantageous to chase and tackle prey until there was room to run.

"There's no point in doing a dash and a pounce in a forest," she says. "They'll smack into a tree." ***—D.O.***

The BEAT

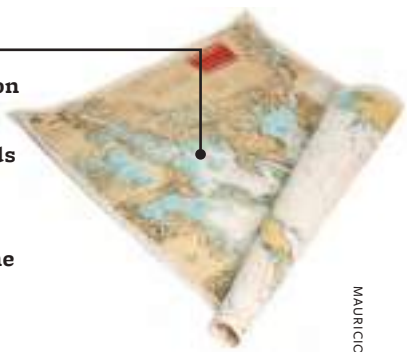
ANATOMY OF A HORTICULTURALIST

Rhythm and Roots

"Some guys go bowling," Plant Environmental Center Director Fred Jackson, MEd, says. "I play reggae." Once a month, the 65-year-old instructor of, among other courses, "Botanical Roots of Modern Medicine" sings and plays harmonica in Providence with the band Professor Roots for a small but dedicated crowd that often includes colleagues and students. But he doesn't need a stage to entertain. Jackson's conversation has the freeform flow of a '60s jam band; salty like a sailor one moment, misting up like a sentimental grandpa the next—for he is both of those things—he strings together a life story that itself seems improvised. A self-taught harmonica player and lifelong performer, he always wanted to be an artist, but when he didn't get into RISD he bummed around Europe and Hawaii until the draft pushed him to go to college. Work as an estate caretaker got him interested in horticulture; he taught prisoners to grow plants, he sold seeds, and he started an interior landscaping business before taking root at Brown 23 years ago. Jackson's job has grown with the years, from greenhouse manager to teaching-award-winning faculty member to medicinal plant researcher. In 2011, he found a greenhouse engineer to design the high-tech replacement for his old digs. "I miss my old place a lot," he says of the vintage conservatory. But as he shows off "all the bells and whistles" in the rooftop space at 85 Waterman St., which opened last year, he adds, "We're in a $5.5 million facility. What's not to like?" ***—Phoebe Hall***

OLD SALT

A longtime sailor, Jackson restored a 25-foot Cape Dory to take on weekends and overnights around Narragansett Bay. "Salt water is in my blood," the Ocean State native says.



INTO THE WOODS

Jackson built much of his cabin in Maine, where he goes every summer. He plays music in the village green with the locals: "It's like something out of *Yankee Magazine*."

MAURICIO ANTON; ADAM MASTOON; COURTESY FRED JACKSON

SUMMER OF LOVE

Soon after they met, Jackson and his future wife rode his motorcycle to Woodstock, NY, to check out some big music event; but he turned around when he learned police had closed the roads. "My wife is still mad at me to this day," he says. "I don't really think I missed anything."

ROOT DOWN

In the 1970s Jackson was living in Florida when he "first heard Bob"—Marley, that is. These days he performs with the reggae band Professor Roots.

WIND AT HIS BACK

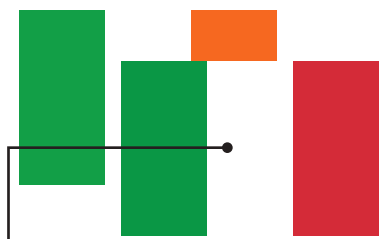
When he's not sailing, Jackson rides his bicycle and cross-country skis. "I've always liked non-competitive sports," he says. "Both my sons were jocks."

BLUES MAN

Seeing Paul Butterfield play the electric harmonica at the 1965 Newport Folk Festival "really changed my life," Jackson says. Among other bands, he's played with Rhode Island's legendary Roomful of Blues.

GREEN THUMB

Jackson grows all the flowers for Commencement and helps the Grounds Department choose what to plant around campus, like this cleome. But at home, he says, "the last thing I want to do is work in the yard."



ALL IN THE FAMILY

Jackson's wife has Irish and US citizenship; he's half Italian. "My relatives live in the mountains in central Italy," he says. "They collect edible plants in the mountains."

ROAD SCHOLAR

After the teenage Jackson read Kerouac, he flew to Europe, bought a cheap motorcycle, and traveled the continent. "That was my education out of high school," he says.

ADAM MASTOON (4); STEFAN SIEBERT; COURTESY FRED JACKSON

POLITICS

MEET AND GREET: Students hear state officials speak at the Medical School.

Town-Gown Relations

Med students get to know their elected officials.

When Aaron Shapiro MD'18 moved to Providence before his first year at Alpert Medical School, he did many of the usual things: unpacked, learned the streets, changed his official state of residency. When he realized a local election was fast approaching, Shapiro registered to vote, read up on the issues, and set up a meeting with his representative to clarify details.

Shapiro grew up in Washington, DC, and says that although he was only peripherally involved in politics there, he tried to be informed and form relationships with his local elected officials. So he says he was "shocked" by how little people outside of the nation's capital engage in politics.

"Political speakers were always around me growing up, and I don't think I realized ... until I moved out of DC that most people don't talk about politics with their local elected officials," Shapiro says. "And that didn't sit well with me."

His culture shock led him to found an organization, Citizen Physicians, with 15 other medical students. "[Citizen Physicians] is nonissue-based and nonpartisan," Shapiro says. "We want to get future health care providers more engaged in politics and more competent and comfortable in engaging in politics."

> **"We want to get** future health care **providers more engaged in politics."**

Citizen Physicians has hosted several events, including a "nuts and bolts" training on the basics of civic engagement, a lecture by state Sen. Chris Ottiano on the importance of doctor participation in politics, and a meet and greet that was attended by numerous political staffers and community members, 43 medical students, and 12 Rhode Island elected officials, including Secretary of State Nellie Gorbea. "I expected politicians to show up, shake a few hands, stay for five minutes, and then leave, but a lot of people stayed the full two hours," Shapiro says.

The group also aims to increase voter registration, and provides voter registration cards at most events. At the orientation for new medical students in August, Citizen Physicians helped 24 of Providence's newest residents register to vote. "Even if we're only here for the four years that we're in medical school, we're here now, so we should be engaged in what's happening now," Shapiro says.

"It's really beneficial that Rhode Island is a small state, so that everyone has the ability to engage in these processes," he adds. "It's just a matter of making sure that everyone knows how to access [their elected officials] so that they can actually effect change." ***—J.B.***

www.citizenphysicians.org

DANCE FEVER

Keep On Moving

At first glance, dancing and Parkinson's disease seem antithetical. One is ordered, purposeful movement, the other a disorder affecting movement. Julie Strandberg, senior lecturer in theatre arts and performance studies, is bringing them together in a series of workshops, "Dancing for the Aging Population," for people with Parkinson's or other neurological diseases. Her students Isabel Chin '17 MD'21 and Jason Vu '17 filmed the artistic power and grace of the elderly dancers; watch their video and read more at brownmedicinemagazine.org. *—J.B.*

DAVID DELPOIO; ISABEL CHIN

DOCTOR TO DOCTOR

Top Doc

An alumna and faculty member takes the helm at the Department of Health.

Nicole Alexander-Scott, MD F'09 MPH'11, assistant professor of pediatrics and medicine, was unanimously approved by the state Senate as the director of the Rhode Island Department of Health in May. Originally from New York, Alexander-Scott completed an infectious disease fellowship in medicine and pediatrics at Brown and then her MPH at the Brown School of Public Health.

Do you remember a particular experience that inspired you to pursue a career in public health?

During the first year of my fellowship in Rhode Island, we were treating a beautiful 4-week-old baby who was subsequently found to be HIV positive and extremely ill. That bothered me because in New York, where I did my med/peds residency, the law was that every pregnant woman should be tested for HIV. If a baby was born and the mother had not been tested, you could automatically test the baby at the time of delivery and start antiretroviral treatment right away if necessary. Because we did not have that law in Rhode Island, that baby missed the opportunity and by 4 weeks of age she became very sick very quickly. I knew this could have been prevented.

I worked with Brian Alverson, MD, associate professor of pediatrics, and Rhode Island state Sen. Charles Levesque and Rep. Eileen Naughton to pass legislation so that, today, 100 percent of moms and babies have been tested for HIV at birth in Rhode Island since 2009. This law has made a big difference in the health of our babies and our moms.

Do you think medical students understand and appreciate the importance of public health?

Medical school is one of the best times and opportunities for us to make sure that students understand public health. Becoming a physician is not just about the boards you are studying for or the prescriptions you have to write. Addressing the social and environmental determinants of health are really the keys to being able to make sure your patients are healthy. You can write the prescription but you have to know that patients can read it, and they have transportation to get to the pharmacy, a safe home where they can keep their meds, electricity so they can refrigerate and store their meds, a family support system, adequate education, and adequate food. All of those elements have to be considered for you to be an effective physician.

Nicole Alexander-Scott

COURTESY RHODE ISLAND DEPARTMENT OF HEALTH

What kind of relationship would you like to develop between the Medical School, the School of Public Health, and the Rhode Island health department?

We would love to initiate public health research programs so that we could provide opportunities to partner with academic departments that are studying and dealing with the community needs that we want to meet and serve. It would be ideal to develop and conduct our program activities so that faculty and staff can get involved with projects over time and provide longitudinal educational opportunities for interested students. As part of my strategic priorities for the state, I have created a Rhode Island Department of Health Academic Center to strengthen the integration of scholarly activities with public health.

How will you know if you have been successful?

The med/peds in me and the public health mindset with these priorities have made it so I have appreciated that infectious disease is important, but I will have to go beyond that if I want to be an effective public health leader. I know the key will be forging relationships and being a collaborator. The only way we are going to address determinants of health and promote health equity is through partnerships with people who are just as committed.

> "I know **the key will be** forging relationships and **being a collaborator.**"

Making sure our communities, particularly among our underserved and our vulnerable populations, are positively affected is going to be the best way to know if we have been successful.

—Teresa L. Schraeder, MD

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

The BEAT

PSA

Think Before You Swipe

Are dating apps conduits for STDs?

Online dating has exploded in popularity in recent years. So, too, have rates of sexually transmitted diseases. Coincidence? Maybe not, Rhode Island health officials say.

Thanks to dating apps and websites, millions of people are hooking up every day—some seeking love and companionship, but others for casual or anonymous sex. Now the smallest state is facing what its Department of Health calls an "epidemic" of STDs: from 2013 to 2014, gonorrhea cases in Rhode Island jumped 30 percent, HIV diagnoses went up 33 percent, and infectious syphilis soared an eye-popping 79 percent.

"This trend reminds us that we cannot become complacent," says health department Director Nicole Alexander-Scott, MD F'09 MPH'11, stressing the importance of sex education and access to testing and treatment.

Nationwide, after years of stable or declining numbers, rates of syphilis, gonorrhea, and chlamydia all have gone up. Though "it's more of a correlation than a causation at the moment," says Thomas Bertrand, MPH, chief of the Rhode Island health department's Office of HIV, STDs, Viral Hepatitis, and TB, social media isn't off the hook. "When people do meet up online, it's sometimes common to not share too much contact information. So if they are infected, they can't let their partners know." ***—P.H.***

STAT SHEET

Welcome, Students

The largest class ever begins their medical careers.

The 144 matriculants in the MD Class of 2019 were selected from the largest applicant pool in Alpert Medical School's history. This class includes the inaugural cohort of the MD-ScM combined-degree program, which received 789 applications and yielded 16 students representing all four routes of admission. (See story, page 3.) They joined 129 colleagues enrolled in the MD and MD/PhD programs.

These men and women have earned degrees in more than 46 different degree programs at 50 US or Canadian colleges and universities. They hail from 29 states and the District of Columbia. They've worked for Teach for America, the Peace Corps, the World Health Organization, and Partners in Health, as well as Bain and Boeing. They include a methadone clinic cofounder, a documentary film producer, and a feminist bookstore owner. MD'19 has EMTs and wilderness first responders, marathoners and triathletes, an equestrian, martial artists, boxers, hip-hop dancers, an adaptive ski instructor, and a therapy dog owner.

TOTAL APPLICANTS

(including MD-ScM) **10,293**
TOTAL APPLICATIONS CONSIDERED* **8,317**
ADMIT RATE **3.2%**
TOTAL MATRICULANTS **144**
Female (52%) **75**
Male (48%) **69**

ROUTES OF ADMISSION

AMCAS (Standard route of admission) **82**
Program in Liberal Medical Education **48**
Postbaccalaureate **11**
Early Identification Program **3**

AGE RANGE **21-38**
Average age **24**

UNDERGRADUATE INSTITUTIONS **50**
Public **10**
Private **40**

UNDERGRADUATE MAJORS

Physical and Life Sciences **50%**
Humanities **37%**
Applied math, computer science, biomed engineering **9%**
Independent and/or combined concentrations **4%**

* BASED ON *US NEWS* CATEGORIES: THE DIFFERENCE IS THE NUMBER OF COMPLETED SECONDARY APPLICATIONS RECEIVED IN THE AMCAS ROUTE.

FACULTY

Power of the Pen

With reflective writing, med students learn to combat stress and burnout.

The third year of medical school launches students into a new world, when the realities of their chosen profession, and the weight of their responsibilities, settle on their shoulders. The demands of the work can be overwhelming, and many don't know how to deal with the stress.

"Medicine has for a long time had a cultural component of 'suck it up and move on,'" Aaron Kofman MD'14 says. His third-year family medicine clerkship took a different tack: students were encouraged to dwell on their challenges, by writing about and sharing them with each other.

"It was a big deal to have that opportunity then, because you're so busy, there is so much to talk about, and usually you don't have a chance to do it," says Kofman, now a resident at the University of California, San Diego School of Medicine. "It is an incredible way to form professional identity, to grow as a clinician and stay healthy while doing so."

Reflective writing is a formal part of the curriculum at many medical schools, but its role in professional identity formation—helping students to hold on to their values and guard against cynicism and burnout—may be unique to Alpert Medical School.

"We are thinking right from the beginning [preclinical years] through retirement as professional identity formation," says Hedy Wald, PhD, clinical associate professor of family medicine. "Guided reflective writing is a vehicle for that."

Wald, a clinical psychologist, came to Brown in 2005 to teach students in the preclinical Doctoring course and quickly became enamored with the reflective writing portion of the curriculum. "It's not just journaling," she says. Becoming a physician is an emotional process, and learning to understand and reflect on those emotions—in writing as well as guided small-group discussions—rather than push them aside helps students build long-term resilience while maintaining sensitivity toward their patients.

"Where reflection ends up being important is that it encourages you to think about, to reflectively self-assess where things are going," says David Anthony, MD, MSc RES'00, associate professor of family medicine, who in 2009 worked with Wald to incorporate reflective writing into the family medicine clerkship curriculum.

"When an experience doesn't go well, rather than sallying forth and forgetting about it, if you have the habit of mind to say, 'That didn't feel good; how can I think about this in a different way, how could I have said something differently, how could I not let this bother me as much as it has?'—it helps prevent doctors from becoming burnt out and jaded," he says.

> **Learning to** understand and reflect on emotions helps students **build long-term resilience.**

"In the third year students are already starting to feel like they have to calibrate their emotions and empathy," Wald says. "They're realizing that lack of calibration can deplete their fuel tank," and must learn to appropriately distance themselves emotionally from their patients, without sacrificing empathy.

Working off formal prompts, students may write about a challenge they faced, a positive clinical experience, or a patient interaction. A few will volunteer to read their reflections aloud to a small group of classmates; guided by Wald or another facilitator, the students discuss their shared experiences. After class the facilitators read the reflections and, using a rubric that Wald developed, provide formative written feedback.

Each step in the process helps different students in different ways: while some may find catharsis in the actual

DAN VAILLANCOURT

PERSONAL AND PROFESSIONAL: Through guided reflection, Hedy Wald helps med students focus on career goals.

writing, others appreciate having the time to talk through their experiences with their peers. "Med school can be very isolating. You can feel like you're the only person struggling," Joanna Sharpless '10 MD'15 says. "Having the bravery to turn to someone and say, 'I am miserable, I feel so lost and confused,' and having them be there for you—as long as you feel there are things in medicine that excite you, you can tolerate those moments of misery."

Sharpless, who began her family medicine residency at Albert Einstein College of Medicine in July, says the reflective writing, group discussions, and instructor feedback ultimately reinforced her choice of specialty. "It made me feel more like I was among my people and at home," she says.

Anthony says professional identity formation has turned out to be a residual benefit of the reflective writing curriculum at Alpert Medical School. "We don't tell [students], 'Now it's time for some professional identity formation,'" he says. But as he and Wald have analyzed student narratives over the past couple of years, "we've really seen this entire curriculum in a slightly different lens—as a chance for them to develop their identity. I might not have known that was why we were doing it initially, but that's what they're getting out of it."

As the necessity of fostering professional resilience becomes more accepted, the Medical School—and Wald—are at the vanguard of a shift in medical education. Wald leads faculty workshops nationally and internationally on the use of guided reflection to boost resilience, and she was the guest editor of a theme issue of *Academic Medicine* on professional identity, in June. But research is needed to explain whether, and how, reflective writing and other techniques help health professionals and, ultimately, patients. "That's the bottom line," Wald says. "I hope [students] can take this with them, because suffering patients need them." ***—P.H.***

The BEAT

Ask THE EXPERT

Not Safe for Humans

Will the ban on trans fats help make us healthier?

In June, the US Food and Drug Administration announced that partially hydrogenated oils, the primary source of artificial trans fat in processed foods, are not "generally recognized as safe" for use in human food and gave manufacturers three years to remove the offending substances from their products. Mary Flynn, PhD, a research dietitian, clinical associate professor of medicine, and the founder of the Olive Oil Health Initiative of The Miriam Hospital at Brown University, studies relationships between foods and chronic diseases. She explains what's wrong with trans fats and why more needs to be done.

Trans fatty acids have been linked to increasing risks of heart disease and cancers. Found mainly in commercial baked goods and snacks that require a solid fat, trans fats are made by adding hydrogen to a source of polyunsaturated fat—a vegetable oil such as corn, soybean, or safflower—to solidify the fat to make margarine or shortening and increase shelf life. Like saturated fats, trans fats raise levels of unhealthy LDL (low-density lipoprotein) cholesterol, but they also lower the healthy HDL (high-density lipoprotein) cholesterol. This can clog arteries, increasing risk of heart disease; some studies also have linked trans fat consumption to breast, colorectal, and other cancers, as well as type 2 diabetes.

But I don't see how banning trans fats will significantly improve health. It is a small first step in a very long walk. Trans fats are not in foods we need; instead of banning trans fats, I like the idea of people not buying products that contain them, so they will eventually go off the market. Physicians tell their patients to eat more fruits and vegetables, and that's nice; but they could say to patients who want to have dessert, once or twice a week you can have an appropriate serving size of something high quality—think full-fat ice cream, cheesecake, frostings made from butter—which would be more satisfying than commercially prepared versions, so they would likely eat less. Doctors have more influence than most health professionals, including nurses and dietitians. They can discourage consumption of commercial baked goods. But if people are aware that commercial desserts and snack foods are unhealthy and they still eat them, that's their prerogative.

ESSAY

BY BREANNA JEDRZEJEWSKI, MPH MD'17

Anonymous Gifts

Who donates their bodies for anatomical dissection?

Anonymity serves as a cornerstone of the institution of whole body donation. While donors agree to relinquish autonomy of their remains for the purpose of medical dissection and study, the maintenance of anonymity throughout the process acts as a way to preserve the integrity of their humanness long after the departure of their human form. For first-year medical students, the anonymity of the donors functions to preserve a part of them as well—an emotional shield to ease the feelings that come with confronting the deceased, often for the first time.

Age, sex, occupation, cause of death: that is all we know. For some, even this superficial disclosure is too much. Others must accept it as enough, despite feeling compelled to know more. With four students assigned to each body, a first-year student at Alpert Medical School will encounter the remains and demographic information of about 30 donors. With such a small sample from which to glean data, it becomes difficult to characterize the donors as a population and to explore their humanity within the boundaries of their established anonymity. Inspired to know more about the individuals who so generously gifted their bodies to us, I gathered demographic and occupational data from the records of the 491 people who donated their bodies to Brown through the Anatomical Gift Program during the last decade. I hoped to provide an opportunity to learn more about the posthumous community that contributes to our medical knowledge and to enhance our understanding of what remains.

In the past 10 years, individuals who have donated their body to Brown have self-identified predominately as white (98 percent), without any discrimination to sex. As donation programs are often advertised in assisted living facilities, this may reflect a lack of diversity within the resident populations of these facilities. The absence of ethnic minorities in the donor population also may suggest a culture of distrust toward the medical community acquired through generations of health disparity and marginalization.

More than half of all donors opted for the return of their cremated remains to their families, a practice normally carried out upon request no more than three years after donation of the body. Civil status did not seem to influence whether or not donors wanted their remains returned. While it might seem as though only donors with congenial and robust family relations would request that their remains be returned, one donor explicitly documented his decision not to do so because he "did not want [his] family to mourn [him] twice."

As for occupational histories, the largest contribution came from working-class individuals representing industry (23 percent) and office work, hospitality, and retail employment (24 percent). Individuals from health care-related professions comprised 7 percent of the donor population, with nurses accounting for 49 percent of donations from this sector. Of the 491 individuals who donated their bodies, two were physicians.

In addition to characterizing Brown's donor population, I sought to assess the attitudes of medical students toward whole body donation. When I surveyed my colleagues to ask whether they believed that cadaver dissection has benefited their medical education, their average response was overwhelmingly positive. Moreover, they affirmed that cadaver dissection had benefited their medical education in such a way that models, animal specimens, or electronic applications could not have replaced it.

The positive light in which Alpert medical students viewed whole-body dissection made me reconsider the representation of physicians in the donor population data. While the number of physicians in the donor population is proportional to the number of physicians in the US population, one might anticipate greater participation from a constituency that intimately appreciates the value of donors' gifts. Ideally, the characterization of Brown's whole-body donor population in the last decade and the affirmation of students' positive attitude toward the value of cadaver dissection will provoke further discussion about the context in which we practice anatomical dissection and reflection on the population of human beings who make this medical rite of passage possible.

Los Angeles native **Breanna Jedrzejewski** *graduated from Yale University with a bachelor's degree in fine art photography and an MPH in global health.*

RESIDENTEXPERT

BY ANUM SAEED, MD RES'16

BLAIR THORNLEY

Open Letter

A veteran offers advice for those just starting residency.

Dear Intern,

I love potassium. And allow me to tell you why you, too, will possibly come to love it by this time next year.

You see, on June 24, 2013, I was the intern. And 31 minutes into my internship I encountered my first "real doctor" moment. I vividly remember making my way out of my patient's room after pre-rounding on her when I was suddenly halted by a yellow sheet of paper and a nurse's alarmed face very close to mine.

"Here." My gaze went up from the paper to her face. I am certain she viewed my expression as a big question mark.

She waved the paper again and said, "Um, it's a critical value; her K is real low, it's 2.1. What do you want me to do, Dr. Sayyeeeed?"

My mind was racing, faintly aware of the fact that she did not pronounce my name right and more conscious of the fact that perhaps, for the first time in my life, someone had addressed me as a doctor and expected me to tell them to do something.

"I think we need to give her potassium then, right?" I managed to respond after an awkward, what-seemed-like-forever, nine-second pause.

"Okkaaaayyyyy, so can you write for it then?" Clearly she was getting annoyed with me.

"Sure." I pretended to turn around to the chart and concentrate on writing for potassium. In reality, my mind was a blur and I was standing there with my pen ready to put my thoughts in ink and my PGY1 stamp in my pocket.

"HOW ON EARTH DO YOU GIVE POTASSIUM? Give her BANANAS?"

My mind struggled to bring back images from the one week of orientation

we had prior to starting the floors as interns. Could I recall a time someone had repleted potassium in front of me? I found nothing there.

The intern handbook! I reached into my white coat pocket and realized there was no book there because my copy was still not printed yet.

With my inherent inability to multitask, I scrolled down my phone's call list. I had to ask for help. They said ask for help.

"This is so dumb, you don't even have the intern handbook. The nurse is still looking at you. Wow," my inner voice said.

Finally I scrolled past my resident's name: Amrita John. Ohmygosh, the relief.

"Well, do you want me to get an EKG at least?" the nurse said.

"Yes, of course. Thank you." I smiled. A smile can do wonders usually, but I was sure that this nurse smirked in response. At me.

And off she went.

Amrita's voice came to life on my phone and I felt safe again.

"Um, hi, Amrita. I think I need to ask you a question …"

THE RIDE OF YOUR LIFE

Needless to say, since then I have learned (among several other things) to write "10 meQ of KCl in 100 cc of sterile water" with ease.

When people say internship is like a roller coaster ride, they are lying. It is a roller coaster. In terms of the ups and downs of your emotions, knowledge, competency, physical strength, and sanity, it is inflexible; you deal with it, mold yourself around it.

For now I know appropriately filling out an insulin sheet, or wondering how to cycle troponins, or trying to helplessly gauge out a plan of action for your patient while juggling all of the paperwork, or getting the hang around a delta wave when you really see one on an EKG are all gigantic and overwhelming. But you will move on from these small (yes, small) hurdles and soon be taking steps to get the feel of the big things, like learning to deal with (hold your breath) BiPaps and ventilators and becoming comfortable with the idea of putting in central lines and a variety of other milestones.

A smile can do wonders usually, **but I was sure that this nurse smirked** in response. **At me.**

There will be times where you feel anger and frustration while you are put on hold at the primary care physician's office in an attempt to make a follow-up appointment; there will be times when someone else will easily outshine you and you may not get credit for the long hours you put in; there will be times when you will want to question your resident who is making you write the respiratory sheet the third time over. It is expected of you to feel slightly insecure and wonder why others can do the same task in half the amount of time it takes you to do it. It may also dawn upon you during intern year (and several times that is) that maybe, just maybe, you're not doing the right thing with your life.

But the day you see that you closed an anion gap in the right time frame, the day you realize you were able to predict and save a patient from going into avid delirium tremens, and the day when you are able to start the sepsis protocol in time and hit the right bug and see your patient turn around … you will be so satisfied. Your faith in what you do and how you do it will be restored that day. And there will be several of those days, I promise.

For now, take pleasure in this year you have kick-started. You are an intelligent young physician, starting to live out your dream. You worked incredibly hard to get this far. And just like everything great we have achieved in our lives, this year will not be easy. You are adequately equipped to deal with what may come—and if you're not, then you will pick up the gear along the way. Seek help when you need it, and don't be ashamed; we all need help! Be kind and compassionate; try, even if it doesn't come to you naturally. Be true to your patient's care. Often you will find relief in your patient's comfort. Read, make friends, take meaningful walks, talk to your loved ones, and take good coffee breaks. You will need solace wherever you can find it during the next few months. You see, intern year is unbreakable … but then again, so are you.

With love,

An Ex-Intern

Anum Saeed *is a third-year internal medicine resident at Memorial Hospital of Rhode Island. A native of Pakistan, she loves traveling, baking, coffee-tasting, and being near nature.*

OPINION

BY ELIZABETH TOLL, MD

SCOTT KINGSLEY

Welcome Back, Patients

The newly insured are returning to the fold.

The last few months have been filled with wonderful surprises. Old friends are returning to primary care. We have taken care of many of them since elementary school in our urban academic primary care clinic, and last saw them around their 19th birthdays, just before their medical insurance expired. I remember the 11th-hour calls for those appointments. Now these patients are in their early 20s and by and large doing very well, though I would hesitate to group them with the "Invincibles." They are the ones who crossed over the minefield of adolescence in the inner city and made it safely to the other side. Their reward? Medical uninsurance.

Over the years, there has been the occasional medical report from an urgent care center or request for immunization records, but we haven't seen these patients in person. We've continued to care for their younger siblings and parents and had assumed they'd gone on to other primary care settings. Almost no one has ever mentioned their lack of insurance, shame being one important

reason for this secret. Across a generation of managed care I've learned not to take doctor switches too personally and hadn't really focused on the medical whereabouts of these young adults even when I inquired about them. Until now. Now that they're back.

There have been lots of exciting developments. As their doctor, I'm so proud. He's passed 6 feet. She's lost 40 pounds. He's got a steady girlfriend, and they're using reliable contraception! She's swimming every day and dancing salsa on the weekends. He's lifting weights and just ran a 5K. She stopped eating fast food and loves vegetables and fruit. He is openly gay and making wise health choices. So is she. That couple got married and have two adorable kids. They head to the playground every weekend.

A few patients have taken up smoking and want to quit. Others have rising BMIs. One may be drinking too much. Another wonders if daily marijuana use is a problem. One patient quit pot cold turkey and confessed that he'd missed all those teen appointments because he felt too embarrassed to show up stoned. None is in legal trouble.

Sure, I'm their doctor. But I also feel like some long-lost aunt. My compliments are genuine. There are the superficial ones: You've got a great sense of style. That is an amazing tattoo. Others are quite profound: You're raising a child and will soon be a kindergarten teacher! You're already a manager at that factory? You're a medical assistant! You're in college? You're a barber! You're working in a licensed day care? You're a chef! You're in the National Guard? You're a dad!

Our visits all begin the same way. Big smiles. Bear hugs. I say: "It's so wonderful to see you. How have you been? You look great."

To a person they reply with comments like: I need a physical. My Pap is overdue. I have a list of things I want to ask you about. I haven't been in because I didn't have insurance. But now I do. The relief is palpable.

Call me indulgent or pie-in-the-sky. I believe health care is a human right. Just like food, water, housing, safety, heat, electricity, and legal documentation. I understand why others argue these are privileges and pass judgment on governments that provide these services to individuals who, whether able bodied or vulnerable, could shoulder more of the responsibility for securing the basics. I have my moments, too.

But over the years, patients have taught me about violence. And substance use. Missing fathers. Crime. Incarceration. Deportation. And sexual abuse hiding in families. These are the forces that shape physical and mental health and perpetuate poverty, school failure, hopelessness, and helplessness in our urban neighborhoods. My patients' stories have left me less ready to pass judgment and more compelled to consider what we as a society and profession, and I as a primary care physician and human being, can do to heal these ills so that parents and children and families might move ahead into sunnier days.

My patients' stories **have left me less ready to pass judgment** and more compelled to **consider what we can do to heal these ills.**

The return of these young adults to medical care has been one ray of light. Against all odds, they have stayed in school or finished equivalency programs. They are in the workforce. By reporting on time and bringing home paychecks, they are heading toward the future. Reconnecting with them, one by one, and enjoying the shared pleasure of how well they are taking care of their lives, and now their health, has fueled my shame and outrage that, for all these years, our society has deprived so many people of the basic right of health care.

It's time to let that go. In spite of all the snafus of the rollout and the political hullaballoo surrounding the Affordable Care Act, these patients and many, many others can once again access basic health care. Thank you, Obamacare. Welcome back, patients.

The author would like to thank patients JC and FV, as well as those whose life details have been altered to protect anonymity, for their help in preparing this manuscript.

Elizabeth Toll, *clinical associate professor of pediatrics and medicine, is an attending physician at Lifespan's Medicine Pediatrics Primary Care Center in Providence.*

ZOOM

BY KRIS CAMBRA

Room to Breathe

A lung researcher takes over as pediatrician-in-chief.

Even though she comes from a family of physicians, Phyllis Dennery wasn't necessarily convinced she'd become a doctor. She considered being an architect, a fashion designer, or a geneticist.

The daughter of Haitian immigrants to Canada, Dennery did find her way into the family business. At the Howard University College of Medicine, she took interest in newborn and premature babies. "I just thought they were so fascinating, so resilient yet so small and fragile. That made me want to practice neonatology," she says.

Dennery arrived at Brown and Hasbro Children's Hospital in April to become chair of the Department of Pediatrics and the Sylvia Kay Hassenfeld Professor of Pediatrics. She came from the Children's Hospital of Philadelphia and the University of Pennsylvania, where she was chief of the Division of Neonatology and Newborn Services. In that role, she learned more about running larger organizations and strategic planning. She started thinking she might like to do that job at the department level.

"I wasn't particularly thinking I wanted to come to Brown," Dennery says. But she did know Jack A. Elias, MD, dean of medicine and biological sciences, from various pulmonology societies. "We have similar research interests, and I admired the work he has done and I was fascinated by the idea of coming to a place where I could be part of that as well as run the Department of Pediatrics."

Rhode Island itself was part of the draw. There's "the promise of what could be done in a state like Rhode Is-

SO HONORED: Phyllis Dennery received the Distinguished Alumni Award from the Office of the Dean of the Howard University College of Medicine, which recognizes distinction in leadership, teaching, clinical care, and research.

WILLIAM MURPHY/LIFESPAN

ZOOM

land, where you have one children's hospital, one health department, one [major] birth hospital," she says. "This is a place where you can make a big difference with statewide impact."

THE BABY LUNG

Dennery also was determined to continue her research on neonatal lung injury. Though moving and establishing her lab on the Brown campus came with some challenges, "I was fortunate to meet longtime Brown research employees, who are marvelous resources, who help you find your way around," she says. "The community is small enough and friendly—people want to help each other out."

Her lab studies the mechanism of lung injury caused by high levels of oxygen. When babies are born prematurely, their lungs are underdeveloped. It's not that it's a small lung, Dennery explains. Their lungs are missing key elements that make them function like lungs should.

"When they are born we have to give them supplemental oxygen. We breathe room air, which is 21 percent oxygen; some of these babies need at times 100 percent oxygen," Dennery says. "Put that together with a vulnerable, small, immature lung, you have a recipe for problems."

The lungs take signaling cues from the toxicity of the oxygen and begin growing abnormally. They become distended, and they don't have the right amount of cells to make them expand appropriately. "This is a big problem," Dennery says, "because it's a lifelong problem." Lungs develop during the first six years of life, so if that development is distorted, it can create difficulties that last an entire lifetime.

What happens when one of those babies becomes a smoker at age 20? Or lives in a highly polluted area? Will they develop chronic obstructive pulmonary disease early on? Dennery says because neonatology is a relatively young science, not enough time has elapsed to study the lasting effects of prematurity into adulthood. The first ventilators for babies were introduced in the late 1960s, meaning the oldest survivors are just now in their 50s.

And the damage is not confined to the lung. When babies are on a ventilator, in the hospital environment, they miss the typical cues and experiences that foster healthy brain development. "[They're] just worried about breathing!" Dennery says. "That's the big picture and to me that's why this work is so important. What are the changes that are associated with high levels of oxygen that may make the lung change its pattern of development? Is there a way to change that so you can establish a more normal repair pattern?"

COMMUNITY FOCUS

It's questions like those that Dennery advises her students to pursue in the lab.

Clyde Wright, MD, assistant professor of pediatrics at the University of Colorado, met Dennery when he applied for the neonatology fellowship at CHOP. He shared her interest in oxygen toxicity.

"I remember interviewing with Phyllis and being so impressed by how her laboratory studies were driven by clinical questions raised in the intensive care unit. It was an easy choice to make, and I elected to join her lab for my fellowship," Wright says.

"She taught me that questions in the lab should keep you up at night, always thinking, and always referred back to the patients we have been trained to take care of. I can attest to this being her practice, being the beneficiary of many, many emails that arrived well past midnight in response to a question I had or regarding a new thought about what we were doing in lab," he says.

As a mentor, Wright says Dennery never gave "false encouragement or credit, but when it was due, was incredibly supportive and motivating. Training with her, and being guided by her mentorship, without a doubt has been the singular most important aspect of my career in science."

That encouraging and supportive nature will serve Dennery well as she works toward her goals for the Department of Pediatrics. While it's a place where people have always valued education and clinical care, she says, there has not been as much focus on scientific research and publishing discoveries. "I think there are so many good things going on and more to come as we build that we really need to foster a culture of research and academic work here," she says.

She's quick to point out that research doesn't just mean that which is done at the lab bench. Referring back to Rhode Island's compact size and tight community, Dennery says there is great potential for population studies, understanding trends, and identifying hotspots of disease.

Dennery will be able to carry out that work as part of the leadership of the Hassenfeld Child Health Innovation Institute, established in September through a $12.5 million gift from the Hassenfeld Foundation. The institute will bring to-

gether a broad coalition of Alpert Medical School and Brown School of Public Health faculty with community partners, nonprofit organizations, and Rhode Island families in a collaborative effort to address the health needs of children in the state.

With that focus on community, Dennery is excited by Jack Elias's strategic plan that will bring translational medicine to the Brown academic medical center. She describes her participation in a committee convened by the Institute of Medicine (of which she is now a member) to study the clinical translational science centers across the country. In research, the implementation of a discovery or a new drug or intervention is the hardest part, she says.

"If you find this great new drug, but no one knows about the drug or nobody changes what they're doing, then you haven't succeeded," she says. "You need a plan for implementation and dissemination and sustainability. That's really the spectrum of research."

THE PATIENT CONNECTION

Dennery is also gratified to be a member of the Brown Investigators of Respiratory Diseases (see *Brown Medicine*, Fall 2014). BIRDs researchers, roughly 45 in all, study varying aspects of respiratory disease. Their meetings and seminars have already led to collaborations and are making Alpert Medical School a leading research center in the field.

"At most places they talk about neuroscience or the genome, but the lung is something that people don't care as much about," Dennery says. "It's really refreshing to be in a place where that's an important focus."

That's because what happens to your lungs doesn't just affect your lungs. Researchers have only scratched the surface of conditions such as sleep apnea, which involves breathing but also has detrimental effects on the brain. Dennery recently became interested in how circadian rhythms influence more than just our sleep cycles.

> **"Questions** in the lab **should keep you up at night,** always thinking, and always **referred back to the patients."**

"Researchers started noticing that in people who are chronically jet lagged, their lung function is impacted. If you model that in a mouse, you can show that a mouse that is jet lagged will have deterioration of lung function," she says. The clock that was thought to be a central system is actually ticking in each tissue, each cell of the body, and it regulates function throughout the day.

Another example is asthma: any emergency medicine physician will tell you that more people come into the hospital with asthma attacks at night.

"We started looking at these clock genes to see if they are altered by high oxygen, by other external cues," Dennery says. "We're better about it now, but in the NICU, sometimes people don't think to cycle lights on and off. Could that make the lung more susceptible to injury and worse function?"

Though an administrator and researcher, Dennery is a neonatologist at heart. Clyde Wright saw the "baby doctor" side of her when he became a father for the first time. "Phyllis came to visit us in the hospital after our daughter was born. I had not seen her in this environment, but she was so incredibly warm, gentle, and loving. It was just so obvious that she truly cared about us and our new little family," he says.

Dennery's own family consists of her husband of 28 years, Gregory Mundy, and two children. Ariana, 24, is an early education specialist in Philadelphia and Miles, 21, is a senior at Pomona College in California. There are also "two rescue mutts from Puerto Rico (a long story), aged 12 years ... oh, and a granddog named Basil," she says.

In her research, it's those fragile, resilient beings that she first set out to help that continue to motivate her.

"My interest in lung injury isn't just because of the lung," Dennery says. "It's because I know there's a clinical, real problem associated with that." She sees babies who suffer from lung disease and have significant life changes, who stay in the hospital a long time, and have a cascade of problems.

"Sure, it's fun and exciting to be in the lab," she says. "But if I could find something to help babies do better and have fewer issues with lung disease, wouldn't that be even more exciting?"

FIELDNOTES

NATASHA RYBAK MD'07 RES'11 F'16

JESSICA DEANE ROSNER

A Dark Cloud

The fight against TB carries on in Ukraine.

The twins ran up to me, dressed identically in blue plaid shirts and tan shorts, excited to see a new face. They took turns counting to 17 in English, skipping numbers and laughing, eager to show off their skills to a native speaker. I asked them how long they had been in the tuberculosis hospital and they weren't sure, but agreed it was a long time, and they were going home on Friday!

Later that day the medical team told me the 5-year-old boys had been in the hospital for more than five months. One boy was admitted and subsequently diagnosed with active tuberculosis disease, prompting his brother to be admitted and evaluated for TB. He was determined to have latent TB infection, which means his body was exposed to TB but he was not sick from it. However, he remained in the hospital with his brother for the full five months, as it was the safest place for him; their family members at home were deemed infectious or unsuitable caregivers.

These boys were just a few of the children I met at a Ukrainian pediatric TB hospital. Other children had been there longer: one 16-year-old boy admitted 20 months earlier was finishing up a lengthy treatment for multidrug-resistant tuberculosis (MDR-TB), which he acquired from his uncle. On the playground—where the children go every day at 11 a.m. while the hospital is disinfected with ultraviolet light, tinging the halls an eerie blue—I chatted with two giggling little girls as they shared a small bench swing. One had been diagnosed with HIV and active TB after both of her parents died of those diseases; thankfully, she is doing well now.

Pediatric tuberculosis patients are a barometer for the success of a country's TB program. Children under age 1 have about a 50-percent risk of becoming ill with active tuberculosis if exposed. They are infected with the strains around them, often from caregivers, and in Ukraine these strains may be multidrug resistant. The treatment for MDR-TB can last two years and cause severe side effects, including hearing loss. Young patients spend many critical months of normal development in a hospital, taking multiple crushed and measured pills and receiving painful injections. And this is the best of scenarios for those who have access to lifesaving anti-tuberculosis medicines.

TAKING THE HISTORY

Ukraine is geographically the largest country in Europe, and has 45 million people. It's a country of passionate and resilient people living within a transition zone between Russia and Europe, living up to the name "Ukraina," which is sometimes translated as "border country." It became independent from the former Soviet Union in 1991, and since then it has struggled to maintain independence and succeed economically. Over the last two years, mismanaged government and widespread corruption fomented revolution and now war in the eastern regions with Russia. This situation, layered over a weak and crumbling health care system, has taken a significant toll on the health infrastructure of Ukraine.

Ukraine is one of the world's highest-burden MDR-TB countries. Its antiquated Soviet health care system allows little cooperation between multiple specialized hospitals, making it impossible to navigate for many patients. TB management is very vulnerable in this setting, as it requires strict adherence to multiple drugs for a minimum of six months. When some of the drugs are not available or patients are not supported through the length of treatment, drug resistance starts to develop. MDR-TB can be very difficult and expensive to treat, sometimes costing 25 to 100 times as much as sensitive TB.

The Brown University Ukraine Collaboration, which includes Timothy Flanigan, MD, professor of medicine; Boris Skurkovich, MD, clinical professor of pediatric infectious disease; and Mariya Bachmaha MPH'16, aims to bridge research expertise in the US with colleagues in Ukraine, to improve that country's HIV and TB clinical research capacity, in hopes it will translate to improved patient outcomes and contribute to the foundation of a new generation of researchers and caregivers.

I liken our collaboration to a snowball rolling down a hill, picking up speed and size. We have gathered a remarkable group of researchers and clinicians, such as Allyson Garcia MD'16, who was a Peace Corps volunteer in Ukraine and joined our collaboration as a first-year medical student. She is one of many Alpert medical students to have participated in projects in Ukraine through our collaboration.

The **treatment for MDR-TB** can last two years and **cause severe side effects,** including **hearing loss.**

There is a long road ahead, but I am certain that snowball will eventually knock out the burden of TB in Ukraine.

Natasha Rybak *is in her fourth year of the Combined Adult and Pediatric Infectious Diseases fellowship at Alpert Medical School. She first traveled to Ukraine as a Rotary Exchange Student in 1993, and has been working with the Brown University Ukraine Collaboration since 2010. She plans to pursue research work in Ukraine and specialize in infectious diseases, with a focus on TB management.*

BIG SHOT

IMAGE BY BRIAN KIMBLE, MD

Slant of Light

A physician captures nature's beauty.

Brian Kimble, MD, a clinical associate professor of medicine and pulmonary/critical care physician at the Providence VA Medical Center, captured this scene at Swan Point Cemetery in Providence. The surreal colors of this photo taken in infrared lend an otherworldly beauty to the peaceful atmosphere of this quiet and reflective location.

Kimble took up photography during his intern year in 1995. "I didn't become serious about it as a hobby until I bought a Nikon D70 around 2005, though I had been using a digital point-and-shoot for several years before this," he says. The transition to digital helped him to learn about photography, as there was instant feedback. "Digital made it much easier to learn from my mistakes."

Kimble's interests in photography and photographic subjects are quite varied. "Sometimes something just catches my eye—lines and patterns being the usual culprits," he says. "More recently with the birth of my son, I have shifted to people as subjects—with a preference for candid shots that capture a fleeting expression."

Four of Kimble's photos have been published in the *New England Journal of Medicine* on their "Photo Fillers" pages, and several others have been accepted but not yet published. ***—Kris Cambra***

The Path

THE DIVISION'S STRATEGIC PLAN SKETCHES THE NEXT 10 YEARS.

BY KRIS CAMBRA

WHEN DEAN OF MEDICINE and Biological Sciences Jack A. Elias, MD, arrived at Brown in September 2013, he was charged with crafting a strategic plan that would fill out key areas of President Christina Paxson's *Building on Distinction: A New Plan for Brown*. Thus began 18 months of assessing, researching, and planning to chart a course for the Division of Biology and Medicine.

The process included a frank assessment of the Division's existing strengths and challenges. Among the strengths are foundational research programs that could be expanded and capacity to build new programs. Other positives include a superb medical education program; a highly competitive medical school and state-of-the-art facility; and committed faculty who value teaching.

But the challenges are significant: with a financial structure different from most US counterparts, Alpert Medical School does not have many revenue streams to support research and educational investments. The existing research structure at Brown also includes little team science, translation, or commercialization. Other challenges are external, such as the fact that National Institutes of Health funding is at historic lows.

As a result, the strategic plan needed to address those issues while maximizing chances for success in a grant funding environment that emphasizes translational research—research that is used to create therapies or diagnostics that improve patients' lives. After discussions with faculty, leadership, and advisory groups, Elias became convinced that they could create a structure in which translational medicine would thrive at Brown.

"Our dream is that we make discoveries, take them into the clinic to understand disease pathogenesis, and then we can work within our means or with companies and venture capitalists to make them into therapies," Elias says. "Developing new therapies for disease is a wonderful thing."

The plan calls for investments in physician-scientists, new research initiatives, expanded medical education programs, and, possibly, a new research facility. What follows is a breakdown of the plan.

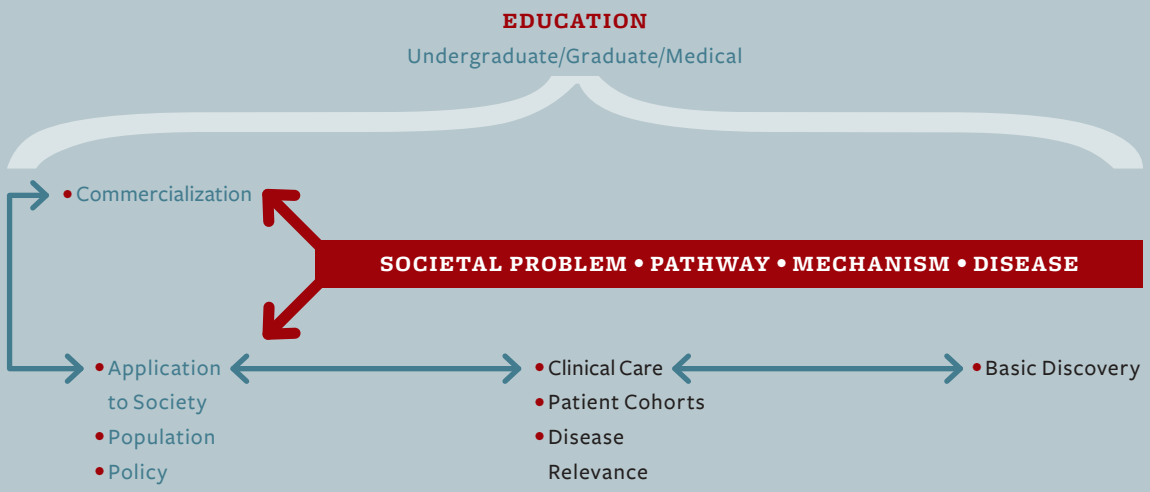
Forward

From Theory Into Practice

Investigators work together to find practical applications for their discoveries.

THE CORNERSTONE of the strategic plan is the Brown Institute for Translational Science. BITS builds on Brown's existing strengths in areas of societal importance, embraces the University's culture of interdisciplinary collaboration, and harnesses the potential of clinical partnerships and the state of Rhode Island's unique demography to accelerate discovery and application to human health.

BITS is composed of horizontally integrated research teams that will allow scientists and clinicians to work together along a common continuum. The integrating factor can be a disease, biologic pathway, investigative approach, or problem in society. In these teams basic scientists make lab- or data-based discoveries and then work with master clinicians and physician-scientists to evaluate the importance of their findings in well-characterized patient populations. Other investigators then look at the policy consequences of these findings, and focus on ways this knowledge can be used to generate companies and commercial products for patients.



Collaborative Research Teams

Horizontally integrated programs are being configured in these areas:

- **RESPIRATORY DISEASE** (Brown Investigators of Respiratory Disease, or BIRDs)
- **AGING**
- **GENETICS, GENOMICS, AND PERSONALIZED MEDICINE**
- **MUSCULOSKELETAL AND MOTION SCIENCES**
- **HEALTH CARE DELIVERY**
- **DEVELOPMENTAL AND REGENERATIVE MEDICINE**
- **OBESITY AND THE MICROBIOME**

Connecting to the Medical School

Three new sections have been established within Alpert Medical School:

- **MEDICAL EDUCATION**
  All medical education activities will be consolidated into one cohesive academic unit. The section will launch new master's programs, and will restore and grow Brown's MD/PhD program.

- **HUMAN GENETICS, GENOMICS, AND PERSONALIZED MEDICINE**
  Human genetics has become a fundamental aspect of modern biomedical research. The section will build expertise in diseases, applied approaches, and algorithms, statistics, and quantitative methodologies for genetic analysis.

- **TRANSLATIONAL MEDICINE**
  This section brings together physicians and scientists who are focused on pursuing new lines of translational research to increase our understanding of disease and create new therapies.

A Launch Pad for Ideas

THE ENDPOINT on the continuum is the translation of discoveries into real, marketable therapies or diagnostic tools that help patients. Brown Biomedical Innovations Inc. (BBII) will bridge the gap between the lab bench and the commercialization of a product, helping investigators bring their discovery further in its development to where a startup could be launched or to attract an outside investor.

Connecting to Brown and Beyond

PAXSON'S *Building on Distinction* was formulated with the express intent to unite expertise from across the University and its professional schools in solving problems that plague our society. The horizontally integrated research teams within BITS will do the same, and provide opportunities to connect the Division with experts in the:

- **BROWN SCHOOL OF PUBLIC HEALTH**
- **SCHOOL OF ENGINEERING**
- **WATSON AND TAUBMAN CENTERS**
- **APPLIED MATH DEPARTMENT**
- **HUMANITIES**
- **AFFILIATED HOSPITALS**

Big Data, Big Goals

New center combs medical records for answers.

THE BROWN CENTER FOR BIOMEDICAL INFORMATICS (BCBI), one of the horizontally integrated research teams, launched this summer with the recruitment of two of the country's best bioinformaticists.

Neil Sarkar, PhD, and Elizabeth Chen, PhD, bring the science of "big data" to Brown, which is vitally important for biomedical and many other areas of research. The electronic health record and other searchable databases promise to deliver new sources of insight into the practice of medicine and public health. They will establish a cohort of experts who will work with faculty from across Brown and its affiliated hospitals to mine these data and analyze their significance.

Sarkar, assistant professor of medical science and of health services, policy, and practice, is BCBI's first director. He says Rhode Island strikes him as a particularly good place to do this work, because its major hospital systems are affiliated with Brown and have largely coalesced around implementing electronic health record systems that promise compatibility.

"We want the new Center for Biomedical Informatics to become an epicenter for next-generation informatics research and really capitalize on the unique opportunity we have in Rhode Island as well as the unique relationships the University has with the hospitals," Sarkar says. "The timing is just right. If we can't do it here, then the rest of the country is in deep trouble."

Sarkar came to Brown from the University of Vermont, where for the previous six years he was director of biomedical informatics at the Center for Clinical and Translational Science. He studied the deep evolutionary history of an Alzheimer's disease-associated gene, developed a patent-pending system for abstracting data from medical records, developed new courses on biomedical informatics, and edited a textbook on foundational methods in the field.

Neil Sarkar and Liz Chen are the first appointees in the Section on Translational Medicine.

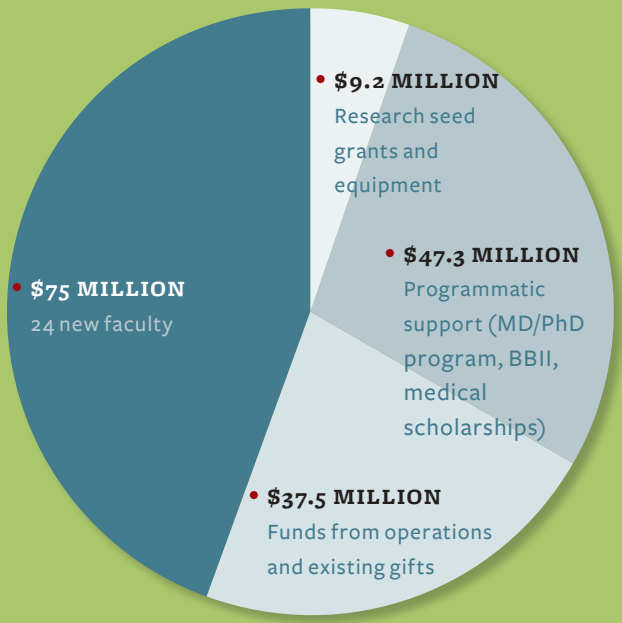
Elizabeth Chen, assistant professor of medical science and of health services, policy, and practice, is the center's associate director. She too had spent six years teaching and conducting research at the University of Vermont. Throughout that time, Chen contributed to the progress in which health care systems have increasingly captured useful data, and electronic systems have become more influential in how doctors, nurses, and insurers deliver care.

"What we want to do here as part of informatics training is talk about the history, that so much has been done in the past," Chen says. "Many people think this is a new field, but it's been around since the 1950s."

As part of the Brown Institute for Translational Science, BCBI will emphasize three areas: basic research (translational bioinformatics), clinical care (clinical informatics), and public health (public health informatics).

For example, one of Chen's projects, a collaboration with the University of Minnesota and the University of Vermont, involves developing computational methods to mine electronic health record data that yield knowledge about how social, behavioral, and familial factors affect disease.

—David Orenstein



Investments

The cost of the Division's strategic plan is $169 million.

Tab. IIII.

A DISEASE OF THEORIES

Preeclampsia—and its sometimes fatal outcomes—have baffled physicians for ages.

BY JOHN AURELIO '14

"Here lies Margaret Robinson, daughter of Arthur Robinson, Knight, of the county of York, and wife of Robert Jegon Esquire, with whom she was joined in the most chaste bond of married love for the space of nine years and, after she had most happily given birth to five children, her sixth offspring died while still enclosed in her womb. After being shaken by the force of frequent convulsions, she gave up her soul to heaven on the fourth day of December AD 1638."

—*from* **Pre-Eclampsia: The Facts**

COURTESY US NATIONAL LIBRARY OF MEDICINE

In the 17th century, "died in childbirth" would have been the epitaph for one in eight mothers, and there was little that medical ingenuity at the time could do about it. Most treatments relied on the dominant theory that illness resulted from an imbalance of the body's four humours—blood, phlegm, yellow bile, and black bile—a theory that modern science has long since discarded. There were no regular medical checkups during pregnancy, and there was no way physicians could properly diagnose pregnancy disorders. Besides bloodletting to balance the humours, physicians had little to offer expectant mothers.

Many of the problems that arise in pregnancy are understood and treatable today, but one is not: preeclampsia, the disease that killed Margaret Robinson in 1638. Marked by high blood pressure and resulting organ damage, preeclampsia is the most common pregnancy disorder worldwide and the leading cause of infant and maternal death in the US. Once known as the "toxemia of pregnancy," preeclampsia can cause lethal seizures if left untreated, and the only effective treatment is immediate delivery of the baby. (In the television series *Downton Abbey*, Lady Sybil died in a fit of seizures after her family refused to allow this emergency measure.) But if ending pregnancy early can save the mother, it can be disastrous for the infant. Preterm birth is a leading cause of infant mortality and neurological disabilities in children.

Modern medicine has not erased the specter of death from motherhood, and three centuries after it was first described by physicians, preeclampsia remains a heartbreaking dilemma. Scientists have yet to unravel the causes of this mysterious disease.

A UNIQUE PARTNERSHIP

"There are two important enigmas in pregnancy—preterm birth and preeclampsia. This is despite decades of research on both disorders," says James Padbury, MD, the William and Mary Oh–William and Elsa Zopfi Professor of Pediatrics for Perinatal Research, professor of pediatrics, and chief of Pediatrics at Women & Infants Hospital. Researchers know preeclampsia as "a disease of theories," and struggle to come up with a simple explanation for the condition. Preeclampsia does not have a single cause; instead, various abnormalities build in the mother like themes in a symphony until the condition finally surfaces, like the crescendo of a dissonant chord. Scientists have observed that preeclampsia runs in families and is more prevalent in first-time mothers, but no one has tied specific genes to the disorder. Scientists also have looked to the presence of free radicals and inflammation in the uterus and malfunctions in the mother's immune response during pregnancy as possible culprits. The abnormal constriction of the fine vessels that circulate essential nutrients to the placenta also may contribute to the disease. "When blood flow is abnormal in the placenta because of preeclampsia, you can also get abnormalities in blood flow in other parts of the body, even in the brain," Padbury says. Scientists agree that preeclampsia arises in part because of a failure in the unique partnership between a pregnant woman and her unborn child.

The path to motherhood wasn't an easy one for Brittany Josey. On a Sunday night in May 2011, Josey checked into the emergency room at Caritas Good Samaritan Hospital in Brockton, MA, after enduring months of a terrible cough. Only six months before, she'd had surgery to remove an intrauterine device, which had punctured her uterus. Now Josey was lying in an examination room in the same hospital with a diag-

nosis of bronchitis. And she received some startling news: she was pregnant.

During her examination, Josey felt a sharp pain when the nurse palpated her right side—her right fallopian tube had ruptured. Josey was suffering from an ectopic pregnancy, a life-threatening disorder that affects about 1 in 50 pregnancies. In an ectopic pregnancy, the embryo does not make the full journey to the uterus and instead implants in the fallopian tube. Her doctors rushed her into emergency surgery, which can save the mother, but the chances that the baby will survive are slim. At 22 years old, Josey had lost her first child, and her doctors told her that she would never have children again.

"It didn't matter whether I wanted children," Josey says. "Just knowing I would never have children was depressing." But after a year, things were starting to get back to normal. She was seeing somebody new and wanted a fresh start. After commuting to New York from Boston to be with her boyfriend, Josey finally made the decision to stay. She moved to the Flatbush section of Brooklyn, and settled into the expense and bustle of New York. "I started to accept that I would not have children," she says.

THE SICK PLACENTA

Preeclampsia begins with a breakdown in the machinery of the placenta, which delivers nutrients and oxygen to the fetus during pregnancy. The placenta also fends off infections, and is an important organ for protecting the fetus from vagaries in the maternal environment, Padbury says. A healthy placenta is crucial for a successful pregnancy.

"Everything needs to be in balance during pregnancy," says Elizabeth Triche, PhD, an assistant professor of epidemiology at Brown and a researcher at Mount Sinai Rehabilitation Hospital in Hartford, CT. Triche studies the environmental and genetic underpinnings of pregnancy disorders like preeclampsia. Early in pregnancy, the mother has to grow accustomed to the presence of the fetus. The human body normally cannot bear the presence of foreign cells, and the aggressive response of the white blood cells that patrol our circulation is what causes the fever and aches of illness. Scientists speculate that preeclampsia may be a result of intolerance against the fetus, a glitch in the immune response that treats pregnancy like a threat. "The mother's body may see the fetus as a fast-growing tumor," Triche says. "We do not know if that is true, but that is the hypothesis."

A HEALTHY PLACENTA IS CRUCIAL FOR A SUCCESSFUL PREGNANCY.

In a normal pregnancy, five days after the sperm fertilizes the egg, the resulting embryo moves through the fallopian tube to the uterus. The embryo is no larger than a speck of dust, and after embedding itself in the uterine wall it releases cells called trophoblasts into the uterus. Every trophoblast mines deep into the uterine wall, searching like roots through soil and forming a network of fine vessels that will eventually become the tendrils of the placenta. In preeclampsia the roots do not go deep enough, and the placenta begins to shrivel.

Meanwhile, preeclampsia often causes problems elsewhere in the body—symptoms that act as early warning signs of the disease. Headaches and nausea are common as a woman's blood pressure rises. But a lack of symptoms is an unfortunate marker of preeclampsia, and physicians must rely on experience to spot the condition early. "Women could be totally asymptomatic," says Kenneth Chen, MD, assistant professor of medicine and obstetrics and gynecology, who leads the Division of Obstetric and Consultative Medicine and the Integrated Program for High Risk Pregnancy at Women & Infants Hospital. "Or they could wake up in the morning not feeling quite right but with no specific symptoms," he says. The most concrete symptoms of preeclampsia are hypertension and protein in the urine, a sign of kidney damage, and these usually do

not present until 20 weeks into pregnancy. But preeclampsia is unpredictable, and these symptoms may not appear until a pregnant woman is dangerously ill—and even then she may be unaware of them. "There's no such thing as a standard textbook presentation," Chen says.

In severe cases of the disease, a woman can become delirious and suffer seizures, known as eclampsia. Nearly 8,500 deliveries occur at Women & Infants each year, and "preeclampsia affects up to 10 percent of all pregnancies," Chen says. "That's about 800 people a year, and I have two patients with this on my service right now."

"THERE'S NO SUCH THING AS A STANDARD TEXTBOOK PRESENTATION."

On August 21, 2013—more than two years after her emergency surgery—Brittany Josey made a startling observation: her period was late. On a break at work, she went to a drug store and bought a pregnancy test. "I felt my heart stop twice in my chest," she says. Josey was going to be a mom.

At first, she was afraid her pregnancy would end her relationship. "I debated if I should tell my boyfriend," she says. "I waited a couple of days, but when he heard, he was really excited, and I thought, maybe I am really excited, too."

She worried that the previous ectopic episode would cause new problems for her pregnancy. She had regular prenatal visits, and a mother who called and worried about her constantly. "I took care of myself," Josey says. "I had no abnormal tests and I never heard anything about possible complications." But toward the end of her second trimester Josey began to worry something was wrong. "My hands got tight," she says, "and I couldn't walk without feeling like I was going to pass out." Even so, her doctor reassured her that she was fine. Her last prenatal visit was on February 25, 2014, and despite her anxiety, all of her tests came back negative for any complications. "I wrote off these feelings," she says, and with her doctor's blessing she traveled to Rhode Island to celebrate her baby shower.

A few days later her symptoms worsened. "I was having sharp pains beneath my chest," Josey says, "and my hands and feet were swelling a lot more. My heart raced even when I was sitting down." Although she was only six months pregnant, Josey looked as if nine months had flown by. Her family urged her to see a doctor to be safe, but she hesitated. "I held off," she remembers. "I didn't think it was anything just yet." Finally she agreed to go to the emergency room at Women & Infants, and within minutes she was on her way to intensive care. She had severe preeclampsia.

IN SEARCH OF A CAUSE

The landscape of preeclampsia research is like an unfinished jigsaw puzzle, with clearly defined parts and much more empty space. One thing that is known is that preeclampsia shares much of its pathology with cardiovascular disease. Preeclampsia triggers the release of harmful molecules from the placenta that prevent the proper formation of blood vessels. Many of these molecules worsen the blood vessel constriction that causes hypertension in the pregnant mother. But, while many of these factors are significant, "each may be a consequence of the disease rather than a cause," Triche says. Any promising marker for preeclampsia may turn out to be just another symptom in the whirlwind of inflammation engulfing the uterus.

It would be helpful if researchers could study the condition in animals, but preeclampsia only occurs in humans. Although scientists have studied a variety of animal models for preeclampsia, to date none of the models fully duplicates its progress in pregnant women. In a 2010 study published in *The American Journal of Pathology*, researchers at Women & Infants honed in on a promising animal model for the disease. Scientists built on research linking the presence of the immune molecule interleukin-10 (IL-10) to a successful pregnancy, and began experimenting with mice genetically engineered to lack IL-10. After giving a dose of blood serum from

women with preeclampsia to these mice during pregnancy, they developed preeclampsia-like symptoms. "Our model is the first pregnancy-specific animal model for preeclampsia, a devastating complication of pregnancy," says Surendra Sharma, MD, PhD, the senior author of the study and professor of pediatrics at Alpert Medical School.

Researchers remain frustrated by their inability to mimic the conditions of a human pregnancy in an animal. But they press on. If they can identify a mechanism, they can get at treatment, prediction, and even prevention, Sharma and Padbury say.

By the time Brittany Josey was admitted to Women & Infants, her body was swollen from her feet to her face. In three days, she had gained 40 pounds. Her doctors could not do anything to bring down the swelling, but they immediately put her on a treatment of magnesium sulfate, which—for reasons still unknown—prevents seizures.

At that point, Josey was just 32 weeks into pregnancy, and her doctors wanted her hospitalized until delivery. As almost always occurs in preeclampsia, the doctors would have to balance her health with the baby's welfare. "Because my condition was so severe, they were going to keep me pregnant for under two weeks," she says; the baby would be born five weeks early. To prepare for the early delivery, doctors also treated her with corticosteroids, which help the infant's lungs develop faster and greatly increase the chances that a preterm baby will survive.

Days in the hospital passed in moments of boredom and apprehension. The magnesium left a taste in her mouth like a pocketful of coins, Josey recalls. "Everything felt repetitive, and I was miserable from being swollen," she says. Apart from weekend visits from her boyfriend and frequent calls from her mother, she spent her days waiting, and had to Skype into her own baby shower. "There was no telling how fast or slow everything would be," she says. After several days, her doctors decided she was stable enough to discontinue the magnesium sulfate.

One day later, on a gray Providence morning, Josey was having a quiet breakfast. "I got up to use the restroom, and that was the last thing I remembered," she says. When she came to, she was on the bathroom floor and her head was ringing. "I was being picked up off the floor of the bathroom and my right arm was twisted behind me." She'd had a seizure.

THE SMOKING GUN?

"Preeclampsia has clear evidence for a genetic underpinning," Padbury says. Researchers and clinicians have long suspected that there are genetic differences between mild and severe preeclampsia, and Padbury's recent research suggests that the genes involved fall into distinct genetic clusters. Using bioinformatic techniques to sort through thousands of scientific records about the genetics of preeclampsia, Padbury and his team identified target genetic clusters in a comprehensive 2014 paper published in the journal *Obstetrics & Gynecology*. "It is better to start with a cluster of genes we know are associated with preeclampsia," Padbury says. With his findings as a resource, scientists can narrow their search to hundreds rather than thousands of genetic targets.

Yet the search for a cause cannot advance without molecular evidence—a molecule that could network the many theories about preeclampsia. Such evidence may be emerging from Sharma's laboratory, whose 2014 study in *The American Journal of Pathology* sheds new light on the condition. "We are trying to approach preeclampsia from different angles," Sharma says. The most interesting one seems to be the discovery of a novel glitch that occurs in preeclampsia: the misfolding and aggregation of a protein that is normally harmless and present in every individual. This protein, transthyretin, shuttles hormones to different organs in the body and is crucial for a healthy pregnancy. "If the fetal brain does not receive the hormones it needs, the newborn will develop serious neurological issues," Sharma says. "We have found that transthyretin is not present in the same way during preeclampsia as it is in a normal pregnancy. When this protein misfolds, it can undergo aggregation. That is the toxic form of the protein, and it deposits in the placenta. Transthyretin could be a member of a group of proteins that undergo aggregation in response to adverse intrauterine milieu." Scientists have long suggested that preeclampsia is an inflammatory condition, but this is the first time misfolding and aggregation of a protein have been associated with the disease.

There are several reasons why misfolded transthyretin is such a promising lead. Along with evidence that the toxic form of this protein builds up in the placenta of preeclamptic women, misfolded transthyretin also triggers cell death and may cause the release of other harmful molecules that circulate in mothers with preeclampsia—a rare in-

stance of a molecule that could be a prime mover among the pathways known to contribute to the disease. "The whole cascade can be completed by keeping one or two molecules at the center," Sharma says. "Different molecules can bring about different changes, but they may all be interlinked in the end."

Sharma, the principal investigator behind the transthyretin research, is looking to translate these findings into a clinical test. "If we can detect toxic protein aggregates during the early stages of pregnancy," he says, "it can be used as a marker for preeclampsia." Sharma's research with the IL-10-negative pregnant mouse model also revealed that the healthy form of transthyretin can inhibit it and reverse preeclampsia symptoms caused by toxic transthyretin. While the animal model limits the finding, and the exact mechanism behind this remedy is still unclear, it presents an opportunity to explore transthyretin as a possible treatment for the disease. Scientists speculate that certain women could be genetically predisposed to misfolded proteins, offering yet another possible avenue to predict the disease.

Misfolded proteins, known as amyloids, also play a part in a number of disorders normally associated with the later stages of life. Amyloid deposits are seen in neurodegenerative disorders, such as Alzheimer's and Parkinson's diseases, an exciting observation amid mounting research that traces abnormalities in brain development to the earliest stages of pregnancy.

Recent findings suggest a specific link between dysregulated transthyretin and Alzheimer's disease, a disorder of amyloid deposits in the brain. Published in 2013 in *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, the study details the effects of treating mouse models for Alzheimer's with healthy transthyretin. The results were strikingly similar to Sharma's findings with preeclampsia: healthy transthyretin inhibited Alzheimer's-like symptoms in the mice. Research directed by Sharma and Padbury about the relationship between preeclampsia and Alzheimer's is still ongoing, but these findings may offer clues to understanding the higher incidence of Alzheimer's disease in women.

Children whose mothers had preeclampsia are also often at a higher risk for neurological disorders, and women who have had preeclampsia have double the risk for heart disease and stroke during the 15 years after treatment.

Brittany Josey's life—and that of her child—were once again in danger. She had hit her head on the floor after the seizure, and her memories blurred

COURTESY BRITTANY JOSEY

BORN TOO SOON: Like many preemies, Liam was jaundiced and needed phototherapy. The lights convert the bilirubin in the baby's blood into a form that can be more easily excreted.

with pain and confusion. Doctors and nurses flooded her room and began to prepare her for an emergency delivery. "It took me a while to realize what was happening," she says. "I remember a room full of people telling me to push." Three pushes later, a little after 5 a.m. on March 11, 2014, her son, Liam, was born.

Liam had many of the problems of premature birth. He was 4 pounds, 11 ounces, and soon began losing weight. He was jaundiced and had trouble feeding. "He was just so tiny," Josey remembers. "I was afraid to hold him." Her son also struggled to sustain his own body temperature. Meanwhile, doctors continued monitoring Josey, who was at risk for another seizure, and whose blood pressure was still dangerously high.

Slowly Liam recovered, and Josey suffered no more seizures. After waiting two weeks, she finally was able to hold her baby.

THE FUTURE OF PREECLAMPSIA

As clinicians hone their experience and researchers test their theories, women with preeclampsia have few options. In 2010, a large National Institutes of Health-funded trial ruled out recently proposed preventive therapies for preeclampsia—vitamin C and vitamin E. Now researchers are examining chocolate as a protective supplement against preeclampsia. When pregnant women eat chocolate, one of its molecular byproducts, theobromine, increases in the body. "We found it to be strongly protective against preeclampsia," Triche says. Now the challenge is translating this dietary therapy into a treatment regimen.

Studies have shown that exercise and weight control also may help prevent preeclampsia, but preventive measures are few and far between. There is a growing scientific consensus that taking low doses of aspirin early in pregnancy may prevent preeclampsia, but this therapy is not widely used and is primarily effective for women already at high risk for the disease. Women unlikely to get preeclampsia can still get the syndrome out of the blue. "Unfortunately, that is all we can offer women at this point," Triche says.

"PREGNANCY WAS AWFUL, BUT AT THE END OF IT, WELL, LOOK. HERE'S A LITTLE PERSON."

"We want to study preeclampsia using Alzheimer's tools. All of us in the field are trying to race to the front to combat the disease," Sharma says. "When there is no concerted effort to pursue novel concepts, we end up ignoring some wonderful observations."

In June 2015, Women & Infants received a nearly $5 million grant from the National Institutes of Health to support its work in perinatal biology, and under Padbury and Sharma's leadership, research into preterm birth and preeclampsia will remain strong.

"If we reconcile our ideas, we can come up with a conclusive but very powerful approach," Sharma says. "I hope it happens sooner rather than later."

Josey arrived home in Brooklyn on a cold and windy afternoon in March 2014. The rumble of the subway shook her apartment as she wrapped baby Liam in blankets. "I didn't get to enjoy pregnancy," she says. "I didn't know how common preeclampsia was, and I didn't know it could turn into anything else."

Josey and her family have since moved to Far Rockaway, Queens, a neighborhood that is still feeling the aftermath of Hurricane Sandy. But it's quieter and there are fewer people around. Liam is now a healthy toddler, nearly 25 pounds and teething, and has no trouble keeping Josey up at night.

"I couldn't be happier with how healthy he is," Josey says. "Pregnancy was awful, but at the end of it, well, look. Here's a little person."

John Aurelio *is an analyst at a health care startup and a freelance writer based in Brooklyn, NY. He first researched preeclampsia as an undergraduate in the laboratory of Surendra Sharma.*

STIRRING THE POT

What do we really know about medical marijuana?

BY PHOEBE HALL

PHOTOGRAPH BY ERIK GOULD

Ellen Smith P'05 thought her doctor was crazy.

Two years earlier, he'd finally put a name to the source of the pain that had plagued her for 54 years: Ehlers-Danlos syndrome, a connective tissue disorder that stretches her ligaments and tendons and leaves her prone to frequent subluxations.

They'd tried to alleviate the pain with pharmaceutical painkillers, with no luck—Smith can't metabolize them. She underwent 22 surgeries. As the pain progressively worsened, she had to give up her career as a middle school history teacher, and quit swimming. She spent four years in a wheelchair. She barely slept.

In 2006, Rhode Island legalized medical marijuana. Smith's physician thought it might help. She'd smoked pot in college, "and I hated the feeling," she says. "But here's a doctor saying, go try this because there is nothing else to give you for pain."

So she tried it. "The next thing I knew, it was morning," she says. "I slept the entire night."

WEEDING OUT THE TRUTH

Marijuana didn't cure Smith, but it changed her life. Now 65, she rarely needs her wheelchair anymore. She sleeps most nights, and most days the only drug in her system is a low dose of cannabis, delivered in an olive oil infusion that she cooks herself, in her kitchen. Holding up the bottle, she says, "This is what keeps me alive."

More than 1 million Americans are legal medical marijuana patients. The drug has been said to work for just about any condition you can think of, from cancer and HIV/AIDS to glaucoma to Alzheimer's. The growing body of anecdotal evidence has persuaded more than three-quarters of the public, and nearly half of US states and the District of Columbia, that cannabis is a legitimate medical treatment and should be legal.

HARVEST TIME Ellen Smith P'05 collects leaves from marijuana plants that she grows in her basement to treat her chronic pain. "I don't have a lot of control over what's going wrong with my body, but this is something I can control," she says.

But physicians considering it for their patients have few peer-reviewed studies or clinical trials to guide their decisions. That's because marijuana's classification by the US Drug Enforcement Agency as a Schedule I substance—meaning it has "a high potential for abuse" and "no currently accepted medical treatment use"—discourages scientists, who must endure a lengthy federal approval process to conduct research, and then struggle to get funding, a legal supply of the drug, and, finally, patients for their studies.

In March, a bipartisan group of US senators introduced a bill that would reclassify marijuana as Schedule II, grouping it with cocaine and oxycodone, and lowering the barrier for research. It's a move that both supporters and opponents say is long overdue.

"Whenever you choose a therapy, you choose it based on risks and benefits," says Professor of Medicine Peter Friedmann, MD, MPH, who directs the Brown/Rhode Island Hospital Fellowship in Addiction Medicine. "The benefits [of marijuana] are unknown, and the risks are known. ... There are people who believe it works for them, but we really don't have the studies to show if that is an effective therapy." By rescheduling cannabis, he says, "we would be able to do those kind of studies."

James Crowley, MD, professor emeritus of medicine and a retired hematologist-oncologist, is more direct. "The Schedule I designation has been deadly," he says. "In the future people may well say, 'Do you know at one time this life-saving drug was illegal?'"

WHAT ARE THEY SMOKING?

Over the decades there has been lots of federally funded research on marijuana, but most of it has focused on negative effects, among them addiction, abnormal brain development, and mental illness, especially among people who began using in adolescence. That intrinsic bias bothers many scientists, perhaps even some at the National Institute on Drug Abuse; in a 2014 paper in the *New England Journal of Medicine*, NIDA authors noted that most studies focused on heavy, long-term users and that confounding factors, such as concurrent use of other drugs, "detract from our ability to establish causality." The authors continued, "There is also a need to improve our understanding of how to harness the potential medical benefits of the marijuana plant without exposing people who are sick to its intrinsic risks."

"THERE ARE PEOPLE WHO BELIEVE IT WORKS FOR THEM, BUT WE REALLY DON'T HAVE THE STUDIES TO SHOW IF THAT IS AN EFFECTIVE THERAPY."

It's only within the past 50 years that we've begun to understand marijuana's physiology and why it affects humans and other animals the way it does. The two species used recreationally and medicinally—*Cannabis sativa* and *C. indica*—produce hundreds of chemical compounds, more than 80 of which are cannabinoids, which appear to play a role in the plant's self-defense. In the early 1960s the Israeli chemist Raphael Mechoulam, PhD, sometimes called "the father of marijuana research," identified the two most abundant cannabinoids: tetrahydrocannabinol (THC), which is responsible for marijuana's psychotropic properties; and cannabidiol (CBD), its principle non-psychoactive compound.

It took another quarter-century for researchers to figure out that animals have our own, endogenous cannabinoids. Like neurotransmitters, endocannabinoids have receptors throughout the brain and nervous system. But, whereas the brain uses neurotransmitters to send messages to postsynaptic neurons—I'm cold, I'm hot, that hurts—and trigger a reaction—shiver, sweat, flinch—endocannabinoids are produced on demand, when those messages are received, and travel "upstream" to the presynaptic neuron, where their receptors are located. This serves to moderate the body's initial reaction to a stimulus— dulling pain to tolerable levels, for example.

The elucidation of the endocannabinoid system "has been wonderful to watch

from the perspective of a GP who's been recommending [marijuana] to patients since the '70s," says Jeffrey Hergenrather MD'75, the president of the Society of Cannabis Clinicians. "It has this modulating role, this way of helping us to eat, sleep, relax, forget, and protect—all the things we need to do to stay healthy and centered." He recalls reading the scant medical literature about marijuana while he was at Brown, and "marveling at the polarization and inconsistencies" in the findings. Early in his practice, Hergenrather says, he had patients who swore cannabis helped them with myriad ailments, from pain to seizures, and he gave his tacit blessing.

THC and CBD indeed can have beneficial effects when they bind to humans' cannabinoid receptors, moderating pain as well as anxiety and nausea, and stimulating appetite. But that's not all they do, of course. THC, in particular, overwhelms the endocannabinoid system, dampening too many processes in sometimes adverse ways. Judgment, reaction time, and coordination may be impaired; users may experience panic or paranoia.

Effects on the memory are a larger concern, especially among adolescents, as the endocannabinoid system appears to play an important role in brain development. "Repeated cannabis use with high THC appears to affect the formation of the prefrontal cortex, the stress response systems, and dopamine neural activity, probably through impairment of the connectivity of neurons," says Jeffrey Hunt, MD, professor of psychiatry and human behavior. Furthermore, he adds, "the earlier you use, the more risk you have to become addicted."

Right now doctors considering medical marijuana for their patients must balance concerns about these adverse effects with anecdotal evidence and their own observations. Most of the physicians interviewed for this article reported decidedly mixed results using cannabis for nausea. Crowley says marijuana helped some of his patients cope with the anxiety of living with cancer; Hergenrather says he's seen it alleviate symptoms of Crohn's disease and of Alzheimer's, and that it may have shrunk a child's glioma. Stories of epileptic kids whose seizures have slowed or ceased with cannabis treatment have become staples in the popular media, from *National Geographic* to *Wired* to CNN.

But few high-quality clinical trials of medical marijuana have been done in the US. Better established research programs exist elsewhere in the world, notably Israel and Europe, yet worldwide, the most conclusive evidence supports its use only for pain and complications related to multiple sclerosis. Studies on glaucoma, nausea, appetite stimulation, insomnia, and Tourette syndrome have been less clear; its effectiveness treating pediatric seizure disorders is unproved.

Thomas Trikalinos, MD, PhD, director of the Center for Evidence-Based Medicine in the Brown School of Public Health, says drug research is needed to "disentangle the signal from the noise." The "gold standard" for addressing causal questions, such as whether medical marijuana works, is randomized trials, with enough people to achieve statistically significant results, he says. When those aren't possible, observational studies may take their place—but those findings may be difficult to interpret. "Some may self-select to take medical marijuana; others may be more resistant," he says. "Those who self-select may have a more severe disease and have tried everything, or may like to experiment." So it's hard to tease out whether different outcomes are due to the treatment, or the patients themselves.

"Let's assume medical marijuana works to alleviate pain in people with chronic pain who have tried several treatments and not responded. So do you recommend everyone take it? Hardly," Trikalinos says. Though some people swear cannabis works for them, at this point their results are subjective. "But if you are in pain," he says, "a subjective outcome is the most important outcome."

LEARNING CURVE

Ellen Smith insists that visitors go down to the basement ahead of her. "I'm slow," she says, as she folds down the seat of her stair lift. "It's embarrassing."

As a registered caregiver for five other Rhode Island patients, Smith grows marijuana in the basement of her North Scituate home, where she and her husband, Stuart, have lived since 1992 and raised four sons. After riding down the stairs, Smith leads the way to the first of two warm, bright, aromatic rooms, where she clones, nurtures, and harvests 15 varieties of cannabis; another door leads to a greenhouse, where the plants grow taller than her. Back upstairs, she concentrates the dried flowers into tinctures, salves, lozenges, and oils, tailored to each patient's needs, including her own.

Smith grows so many different plants, and offers it in so many different forms, because marijuana affects each person in different ways, she says. "You can't tell someone with MS, 'this is the strain

that works for you.' It just doesn't work that way," Smith says. "It's not like going to a pharmacy and one size fits all."

Fifteen strains of marijuana are but a fraction of the hundreds out there, created through selective breeding and hybridization of the two species, *Cannabis sativa* and *C. indica*. Each species has different effects, on nausea, suppressed appetite, pain, and other conditions, as do the plant's two most abundant compounds, THC and CBD; furthermore some people don't want to get high. Finding the strain that works for each patient is an art, though some in the field are trying to make it a science.

The Thomas C. Slater Compassion Center in Providence is one of Rhode Island's three state-regulated dispensaries. A former US Postal Service processing center, only the letters "TCS" on one side of the beige, low-slung building distinguish it from its similarly drab neighbors on a busy industrial stretch north of downtown. After passing through security, where a guard checks identification and medical marijuana cards, patients walk by a display with the requisite Bob Marley, John Lennon, and pot leaf images into a cavernous space that's more hip lounge than waiting room: exposed brick, sleek stainless steel counters, paper lanterns, and comfortable chairs.

The patients, for the most part, look like any you'd see standing in line at Walgreen's; behind the counter, the patient advisers may fit certain stereotypes in their appearance—dreadlocks, tattoos—but they try to offer the same discretion and assistance that a customer of any commercial pharmacy would expect. "The patient advisers do a really good job of pointing people in the right direction," says Melissa Bouchard, the Slater Center's patient outreach coordinator. They keep files for each patient, and use the data they amass as well as any available studies to make their recommendations. It can be a slow and sometimes frustrating process, Bouchard admits. "It's trial and error at first to find the strains that work," she says.

The Slater Center offers about 50 different strains, and each is clearly marked, on acrylic display shelves in the waiting room, with the percentages of *C. sativa*, *C. indica*, THC, and CBD. Steve Doyle, the director of cultivation, says cloning and consistent growing methods help ensure consistent products. Still, "it's not a widget on a production line. It's a living plant," he says. An outside laboratory confirms each product's contents.

As for determining dosage, caregivers tell patients to start "low and slow," Bouchard says. "We want them to build a tolerance so they don't have an adverse reaction." Advisers help guide patients toward the most effective products, Bouchard says, but ultimately they "have to find what works for them." Smith says, "You really have to be your own doctor on this. You really have to be your own pharmacist."

It's a statement that makes some health professionals cringe; but Daniel Harrop, MBA '76 MD'79 RES'83 acknowledges parallels to his psychiatry practice in Providence. "The dosage range [of pharmaceuticals] is incredible as well," he says. "There are people who need one-quarter mg of Xanax a day, there are people who need 8 mg a day, and both seem to work. … But we're able to do that because it's legal and people can pick it up at the pharmacy and know they're getting the legal stuff." Harrop says he's "on the fence" about the therapeutic benefits of cannabis, but because of the compassion centers, "I'd be a little more at ease writing a medical marijuana prescription because now I would know the stuff is clean and there is some investigational research into its contents."

Discomfort with marijuana's quasi-legal status, concerns about side effects, and uncertainty about the contents of some products deter many patients and physicians. But putting it in pill form may not be the answer. The FDA has approved two drugs synthesized from THC, dronabinol (Marinol) and nabilone, to treat nausea and suppressed appetite; though they show some promise for chemotherapy and AIDS patients for whom other drugs have failed, they were "superseded almost right away by better agents," says Crowley, who prescribed Marinol when it was first introduced, in the 1980s. A UK firm has developed an antiepileptic for children that is 98-percent pure CBD; clinical trials, which are ongoing, suggest just moderate improvement.

Some researchers suspect that the hundreds of compounds in cannabis work together in what is called the entourage effect. "The whole is greater than the sum of its parts," Hergenrather says. "I think there's such a variability in the genome of the cannabinoid receptors and the way they work, and what's nice for one person won't be nice for another. … It would be wonderful to get a closer look at these things, but the feds won't let us."

If the laws governing marijuana research ease up, the Slater Center is ready

to collaborate. "We're this little petri dish of patients coming here," says Christopher Reilly, the center's spokesman. "We have data on who comes here, what they use, what their symptoms are." But they can offer only anecdotal evidence to guide their patients. "We need studies to show how this is all working, to corroborate the work we do," Bouchard says.

CLEAR THE AIR

The recreational use of marijuana is now legal in four states and decriminalized in many others, and more than half of the public supports legalization. That the popularization of pot as medicine may have eased the path for recreational weed does not sit well with some MDs. In an editorial in the *Journal of the American Medical Association* in June, the authors wrote, "if the states' initiative to legalize medical marijuana is merely a veiled step toward allowing access to recreational marijuana, then the medical community should be left out of the process, and instead marijuana should be decriminalized." Harrop, who has seen many more patients struggle with the effects of criminal marijuana convictions than with the effects of the drug, says, "It would be better to have recreational marijuana than to adulterate the medical system."

Most people can drink alcohol responsibly, and most should be able to use marijuana responsibly, too, says John Femino '71 MD'76, the medical director of Meadows Edge Recovery Center in North Kingstown, RI. But at least 10 percent of the population, when exposed to any drug, including alcohol, will have problems, he says. "I'm not a prohibitionist," Femino says. "But people are missing the big point. I've practiced addiction medicine for almost 40 years. If we focus our energy on 'is the drug safe?', we can never get to the key question, which is, 'safe for whom?'"

Research, Femino says, needs to focus not only on whether, how, and for what conditions medical marijuana works, but also on its safety for individual patients. He's concerned about interactions with other drugs, such as opiates, and about patients with substance abuse histories. Several states authorize medical marijuana for post-traumatic stress disorder, even though no research yet supports its use, and since many patients with PTSD have addiction issues, he says, "it's exactly the opposite treatment you want to do." And Femino worries about the safety and variability of a natural product, even one grown organically, in controlled conditions. The development of morphine from opium was "a godsend," he says. "The history of medicine is to get away from natural products because they're so darn dangerous."

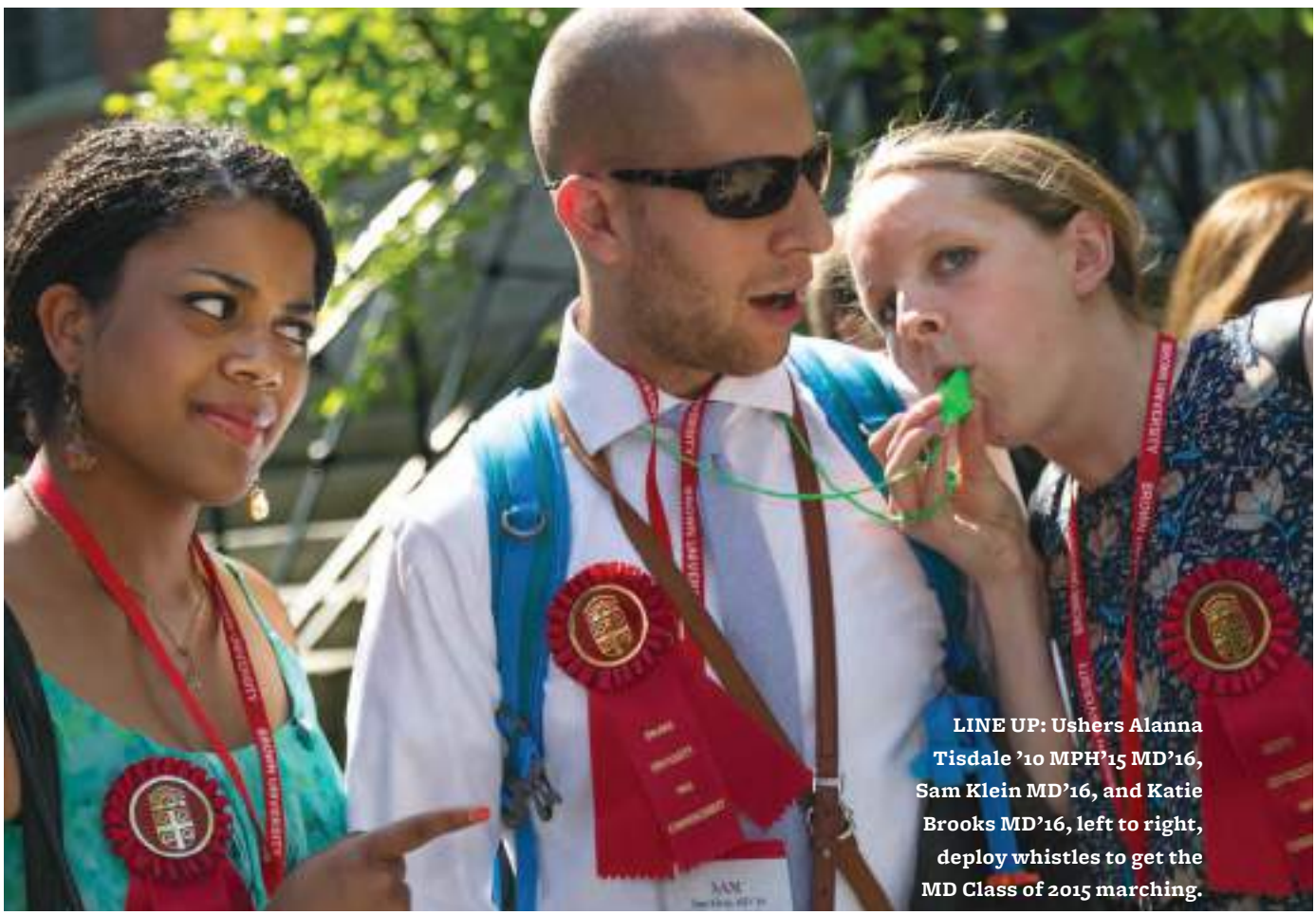
Hergenrather, who has been approving medical marijuana for patients since its legalization in California, in 1996, says unscrupulous suppliers put patients at risk with tainted, mislabeled, and potentially harmful products. "There is a role for the government in helping to create a path for quality medicines that are organically produced, with certain known, measured amounts of [its active ingredients], so you have a product that is clean and you know what you're getting," he says. "We owe it to the public to have clean, measured medicine."

Many physicians have patients who, as Harrop says, "swear by" medical cannabis; but, being scientists, they want to wait and see what the science says. While the cart may be before the horse, as the *JAMA* authors opined, the horse is very much out of the barn. "No one can stop the use of medical marijuana, so what we should do is try to understand exactly what we know at this point and do a systematic appraisal," Trikalinos says. "We should not leave this to experimentation. … Advocacy can help move the conversation forward, but it also hurts it if it is thought of as a miracle drug that doesn't need research or scrutiny."

"IF WE FOCUS OUR ENERGY ON 'IS THE DRUG SAFE?', WE CAN NEVER GET TO THE KEY QUESTION, WHICH IS, 'SAFE FOR WHOM?'"

ALUMNI ALBUM

CHECKING IN WITH BROWN MEDICAL ALUMNI



LINE UP: Ushers Alanna Tisdale '10 MPH'15 MD'16, Sam Klein MD'16, and Katie Brooks MD'16, left to right, deploy whistles to get the MD Class of 2015 marching.

SCOTT KINGSLEY

TELL ALL

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

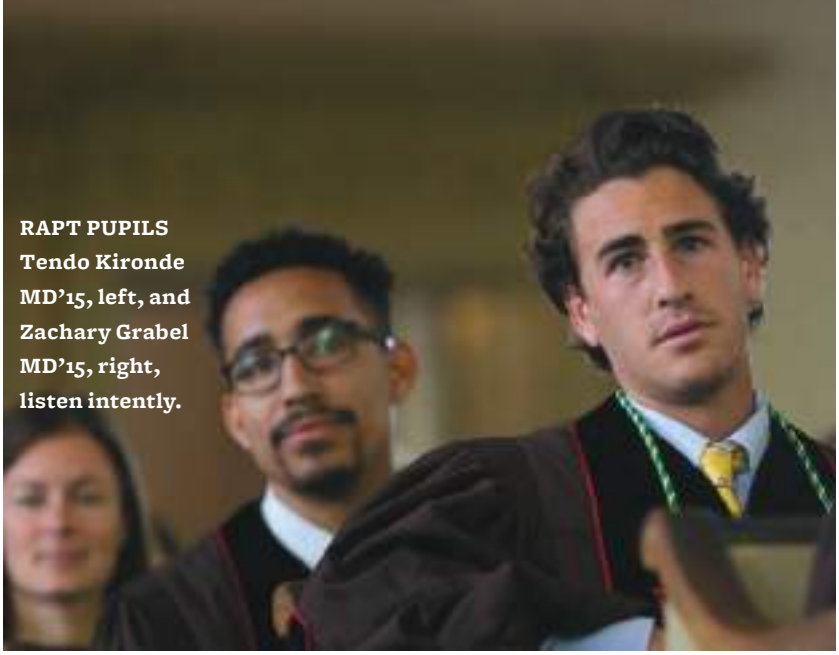
CLASSNOTES

ALUMNI

1982

Christopher Chute, DrPH '77 writes: "After nearly 27 years at the Mayo Clinic, where I founded the biomedical informatics program, I have 'retired' to become Bloomberg Distinguished Professor in Health Informatics at the Johns Hopkins University; professor of medicine, public health, and nursing; and chief health research information officer for Johns Hopkins Medicine. I am also president-elect of the American College

of Medical Informatics. Since 2007 I have chaired the ICD-11 revision for the World Health Organization. I remain active on NIH study sections, sundry committees, and the health information technology standards development and interoperability process. My wife, Jeanne Nevin, continues to work as an administrator at the Mayo Clinic and will join me in Baltimore once our historic Rochester, MN, home sells."



RAPT PUPILS Tendo Kironde MD'15, left, and Zachary Grabel MD'15, right, listen intently.

1985

Scott Haltzman '82 is the medical director of the Department of Behavioral Health at Fatima Hospital in North Providence. In his new role he will create and implement new clinical services across the health system CharterCARE, which includes Roger Williams Medical Center. Scott, who has written four books and several book chapters on relationships and marriage, delivered the Charles O. Cooke, MD, Distinguished Visiting Lecture, on relationships and individual happiness, at Reunion.

Robin Gail Oshman, PhD, completed a two-year term as president of the Fairfield County (CT) Medical Association and is the president of the Women's Medical Association of Fairfield County. In 2014, Robin received the Presidential Citation Award from the American Academy of Dermatology. She practices dermatology out of her home office in Westport, CT. Robin also teaches Yale dermatology residents at the West Haven VA and is on the volunteer staff at Yale-New Haven Hospital. Last year, she celebrated her 40th anniversary with her husband, Barney Spivack, MD. Her son, Josh, and daughter-in-law live in Sweden.

Richard Parker is the first chief medical officer of Arcadia Healthcare Solutions, a health care analytics company based in Burlington, MA. Previously the chief medical officer for the Beth Israel Deaconess Care Organization physician

OPENING CELEBRATION

WELCOME BACK: The 2015 Reunion/Commencement Weekend kicked off with the Opening Celebration, an evening of food, fun, and Brown Medical Alumni Association awards. Honorees this year included, right, Michael G. Ehrlich, MD, chair of the Department of Orthopaedics, who received the W.W. Keen Award; and Andrea A. Anderson '96 MD'00, far right, who won the Early Achievement Award. Above, Marlene Cutitar '83 MD'86 RES'92 snaps a photo.

See more photos from the weekend at www.flickr.com/alpertmedicalschool.

SCOTT KINGSLEY; DAVID DELPOIO (2)

ALUMNI ALBUM

network, where he worked for 30 years, Rich also runs an independent consulting company, Parker Healthcare Innovations, which focuses on the fee-for-service to global-payment transition for doctors and hospitals.

1986

Robert Panton '83 MMS'86 was elected vice speaker of the Illinois State Medical Society at its 2015 annual meeting. A member of ISMS since 1987, he has chaired its Governmental Affairs Council and serves on the Council on Economics. Bob is the immediate past president of the Chicago Medical Society. An ophthalmologist in practice in Elmwood Park, IL, he is on active staff at several Chicago-area hospitals.

1990

Peter Kilmarx is the deputy director of the Fogarty International Center at the NIH. Previously, he directed the CDC's office in Zimbabwe, and was deployed, in 2014, to lead the Ebola response in Sierra Leone and colead the response in Guinea (see *Brown Medicine*, Winter 2015). He is a captain in the Commissioned Corps of the US Public Health Service.

1992

John M. Kennedy is the director of preventive cardiology and wellness at Marina Del Rey Hospital in California. An invasive cardiologist, he writes and lectures frequently on how stress adversely affects the cardiovascular system. His most recent book is *The Heart Health Bible: The 5-Step Plan to Prevent and Reverse Heart Disease*, published last year.

1996

Agueda Hernández '92 is the new director of the Family Medicine Residency Program at West Kendall Baptist Hospital in Miami, which is affiliated with Florida International University's Herbert Wertheim College of Medicine. She will continue as medical director of the Baptist Health Primary Care Family Medicine Center.

2000

Gretchen Green '96 MMS'98 spoke at the American Medical Women's Association Centennial Meeting in Chicago in April. A member of the AMA's Women Physicians Congress, her research on the history of women in medicine and on obstetrical anesthesia has won numerous awards. Gretchen lives with her husband and two children in Greensboro, NC, where she is an attending radiologist at Greensboro Radiology.

2002

Amar Desai, MPH '97, the CEO of USC Care and Ambulatory Care Services in Los Angeles, was selected for the 2015 edition of "Rising Stars: 25 Healthcare Leaders under 40." The list is published annually by *Becker's Hospital Review*.

2006

Jesse Ritvo joined the board of directors of Washington County Mental Health Services in South Barre, VT. Jesse is the assistant medical director of inpatient psychiatry at the University of Vermont Health Center-Central Vermont

SAUBER LECTURE

DISTINGUISHED LECTURER Atul Butte, PhD '91 MMS'95 MD'95, above, director of the Institute for Computational Health Sciences and professor of pediatrics at the University of California, San Francisco, delivered the 20th Annual Ruth B. Sauber Distinguished Alumni Lecture. Attendees included, at right, Norman Ward MD'81 and Patricia King PhD'82.

CAROLINE GOLLUB (2)

FORWARD, MARCH: Allison Kay MD'15, left, and Helen Johnson '11 MD'15, center, line up for the procession.

SCOTT KINGSLEY

Medical Center and an assistant professor of medicine at UVM.

2009

Mark Brady, MPH MMS'09 was an executive producer of *24|7|365: The Evolution of Emergency Medicine*, which won a New England Emmy Award for Best Documentary in May. Brady, an emergency physician in Memphis, TN, is working on a new film about end-of-life care (see *Brown Medicine*, Spring 2015).

Anthony Del Signore completed his sinus/skull base fellowship at the University of North Carolina Medical Center in July and joined the faculty of Mount Sinai Beth Israel in New York as an assistant professor in sinus and skull base surgery.

Gul Dolen PhD'08, an assistant professor of neuroscience at the Johns Hopkins University School of Medicine, was named a 2015 Searle Scholar and received a $300,000 grant to fund her autism research over three years. She will seek out the brain cells responsible for the pleasure people take in social interactions to help her test whether autistic patients avoid social interactions because they don't feel this pleasure in the typical way. Gul joined the Hopkins faculty in 2014 after completing a postdoc at Stanford University.

2010

Stanley Voigt '06 and his wife, Elizabeth Davis Voigt, DVM '06, welcomed their first daughter in June. After Stan completed his residency training in otolaryngology-head and neck surgery at Tufts Medical Center last summer, the family moved to Alexandria, VA, where he works at Associates in Otolaryngology, a practice affiliated with Inova Mount Vernon Hospital.

2011

Rajiv Kumar '05, founder and CEO of ShapeUp, is expanding the company to Boston. The Providence-based organization, which supports employer wellness programs through social networking, opened an office in San Francisco in 2014. ShapeUp has more than 120 employees and more than 600 clients, including Microsoft and Bank of America.

2014

Jen Nykiel '10 and Cathy Mardula '12 married July 11 at Promontory Point in Chicago, followed by s'mores and fireworks over Navy Pier. Thirty-two of the 122 guests were Brown alumni. Jen is an emergency medicine resident at the University of Chicago Medical Center. They live in Chicago's Hyde Park neighborhood.

2016

Alanna Tisdale '10 MPH'15 and **Roop Dutta** were named 2015-2016 NIH Medical Research Scholars. The residential program is part of the NIH's goal to train the next generation of clinician-scientists and biomedical researchers. Scholars conduct basic, clinical, or translational research in NIH laboratories and clinics, in areas that match their career interests and research goals. Each scholar has a full-time NIH investigator as an adviser and will present their research at the NIH and at conferences.

RESIDENTS

1994

Chong Park, MD, a cardiothoracic surgeon and chief medical officer at Jefferson Hospital, in Jefferson Hills, PA, received the 2015 Maurice Cleveland Waltersdorf Award for Innovative Leadership in April. The award recognizes outstanding alumni of Washington & Jefferson College who attain a high level of achievement and exemplify spirit and leadership. Chong, who earned his bachelor's degree at W&J, has led the hospital to national acclaim for its excellent outcomes and quality initiatives, including its exceptional care for cardiovascular and thoracic patients. Its Heart Program has received national recognition during his tenure from outside agencies.

2000

Keri Lemmond, MD, is a psychiatrist in the behavioral health services department at Kaiser Permanente's Kona Medical Office on the island of Hawaii. Prior to joining the Kona clinic, Keri was a locum tenens physician at Kaiser Permanente's behavioral health services

EYE ON ALUMNI

Step It Up

Two alumni are elected to key University posts.

Galen Henderson


Jeffrey Hines

For the first time ever, the president of the Brown Alumni Association will be a Medical School alumnus. Galen Henderson MD'93 is president-elect of the BAA, an organization composed of and serving alumni of all Brown's degree programs. After his two-year term, he'll serve another two years as president.

Henderson is director of neurocritical care and the Neuroscience Intensive Care Unit at Brigham and Women's Hospital. He is an assistant professor at Harvard Medical School. A past president of the Board of the Brown Medical Alumni Association, Henderson is active on the advisory councils for the Brown-Tougaloo Partnership and the Division of Biology and Medicine. He received the Brown Bear Award in 2014.

Jeffrey F. Hines '83 MD'86 was elected a trustee of the Brown Corporation in May. He is a gynecologic oncologist with WellStar Health System in Atlanta. He began his career in the US Army Medical Corps, deploying as a battalion surgeon during operations Desert Shield and Desert Storm. For Brown, he has chaired the Alumni Interviewing Program, served on the southeast regional committee for Boldly Brown, and raised funds for undergraduate scholarships, the IPC Endowed Scholarship, and Alpert Medical School. He is a member of the Brown Medical Alumni Association Board and founding chair of its Advancing Diversity committee.

—Kris Cambra


THAT'S MY HAT Nicholas Canelo '11 MD'15 poses with well-wishers.

ALPERT MEDICAL SCHOOL ARCHIVES (2); SCOTT KINGSLEY

clinic in Wailuku, Maui, where she will continue to provide care.

2013

Suja Sadasivan, MD, a neurologist, joined the UMass Memorial Medical Group in Worcester, MA. She recently completed a fellowship in movement disorders at the Lahey Clinic Medical Center in Burlington, MA. Her clinical interests include deep brain stimulation, dystonia, Huntington's disease, Parkinson's disease, and tics.

FELLOWS

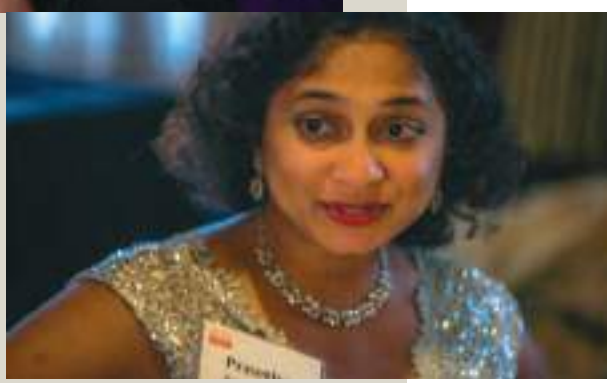
1998

Maureen Chung, MD PhD'01, a surgical oncologist specializing in diseases of the breast, is the new medical director of the Southcoast Physicians Group's Breast Care Program in Dartmouth, MA. A graduate of the surgical oncology fellowship at Brown, she was a breast surgeon and program director of the breast disease fellowship at Women & Infants Hospital before taking directorship positions at the Saint John's Health Center and John Wayne Cancer Institute in Santa Monica, CA.

2009

Nicole Alexander-Scott, MD MPH'11 became the director of the Rhode Island Department of Health when the state Senate confirmed her appointment in May (see story, page 9). An assistant professor of pediatrics and of medicine and previously associate director of the Pediatric Infectious Diseases Fellowship at Alpert Medical School, she had worked for RIDOH as a consulting medical director of its Office of HIV/AIDS and Viral Hepatitis and served as its interim director.

REUNION DINNER



NIGHTLIFE: Reunion classes gathered in the historic Biltmore Hotel ballroom to reminisce and reconnect on Saturday night. Elizabeth Niemiec MD'10 and her fiance, Marc Braunstein, above; and Preetha Basaviah '91 MD'95, right, celebrate their reunions.

SAY CHEESE: Sarah Swanson '11 MD'15 and family can't hide their happiness.

2013

Steven Schiebert, MD, DO, joined New Jersey Spine & Orthopedic in Millburn, NJ. Steven, an orthopedic surgeon, has an interest in performing minimally invasive spine procedures. Previously he worked at Advanced Orthopedics & Joint Preservation in Valley Stream, NY, and Sunrise Medical in Staten Island.

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DAVID DELPOIO (2); SCOTT KINGSLEY

OBITUARIES

FACULTY

MARY WEBB AMBLER, MD

Mary Webb Ambler, 82, of Bellingham, MA, died April 1, 2015. A neuropathologist with degrees from Boston University School of Nursing and Boston University School of Medicine, she was a professor of pathology and laboratory medicine at Brown. She was the program director of the neuropathology residency at Rhode Island Hospital and a consulting neuropathologist at the Providence VA Medical Center and the Office of State Medical Examiners of Rhode Island. After retiring from Brown as professor emeritus, in 1993, she worked as a field site visitor for the Accreditation Council for Graduate Medical Education until 1999. Mary served her community as a charter member of the Blackstone Valley Region II Area Board of Mental Health and Mental Retardation, trustee of Milford-Whitinsville Regional Hospital and of Bellingham Library, voter registrar, and member of the Republican Town Committee and other town committees. She enjoyed watercolor painting and spending time with her family. She is survived by her husband, Lee G. Ambler; her sons, Thomas and Scott; and three granddaughters. Donations in her memory may be made to the Webb Family Scholarship Fund, c/o Community Foundation of Southeastern Massachusetts, 30 Cornell St., New Bedford, MA 02740.

Mary Webb Ambler

HERBERT P. CONSTANTINE, MD

Herbert P. Constantine, 85, of Providence, died May 3, 2015. Born in Buffalo, NY, he earned his medical degree at the University of Buffalo School of Medicine. He was chief of ambulatory care and community medicine at Rhode Island Hospital and served on the Brown faculty for more than 30 years; upon his retirement, in 1997, he was named professor emeritus of health services, policy, and practice. A Providence resident for more than 50 years, Herbert remained active in retirement, serving as a consultant to the state Department of Health and on the boards of directors of local community health centers, the Moses Brown School, and the Providence Athenaeum. He also was a member of the Providence Art Club. He is survived by his wife, Muriel, and two children, Paula and John. Donations in his memory may be made to the Providence Athenaeum, 251 Benefit St., Providence, RI 02903.

STEWART KIRKALDY, MD

James Kydd Stewart Kirkaldy, 86, of Middlebury, VT, died May 19, 2015. A clinical instructor in community health at Brown in the 1980s, he practiced family medicine in Westport, MA, for 45 years. Stewart was born in England and attended medical school at the University of Edinburgh. A Fulbright brought him to Fall River, MA, where he met his wife, Frances Bowen; they returned to England, where he served two years as a medical lieutenant in Yorkshire with the Royal Air Force, and he then practiced in Nova Scotia before moving to Westport in 1960. There Stewart's practice eventually grew to become the Westport Family Medicine Center, from which he continued to make house calls into the 1990s. He also was medical director of several regional nursing homes. A recorded Quaker minister, he served for many years as the clerk of the Westport Monthly Meeting of Friends; and he served two terms on the Westport Board of Selectmen, including as its chairman. He was twice named Westport's Man of the Year, received teaching honors from Brown for his work shepherding medical students interested in family medicine, and was honored for his dedication to the well-being and care of seniors. Upon retirement, in 2005, he moved to Middlebury; a dedicated birdwatcher, he volunteered at the Birds of Vermont Museum in Huntington, VT, as well as the Henry Sheldon Museum of Vermont History. He was predeceased by his wife, and is survived by two sons, four grandchildren, and one great-grandson. Donations in his memory may be made to the Middlebury Friends Meeting, P.O. Box 1026, Middlebury, VT 05753; or to the Birds of Vermont Museum, 900 Sherman Hollow Road, Huntington, VT 05462.

ARMAND D. VERSACI, MD, P'76

Armand D. Versaci, 91, of Providence, died June 17, 2015. The son of Italian immigrants, he was the first Italian American to receive a degree from Harvard

ALPERT MEDICAL SCHOOL ARCHIVES

Medical School, in 1947. He performed more than 20,000 surgical procedures during his career at Women & Infants Hospital, the Providence VA Medical Center, and Rhode Island Hospital, where he was chief of the Department of Plastic Surgery. He co-founded the first residency program in plastic surgery in New England, at Rhode Island Hospital; and helped establish the program for plastic surgery at Brown, where he also created a plastic surgery exchange program with young surgeons from Italy. After retiring, in 1996, as clinical professor emeritus in surgery, he organized and participated in more than 60 medical missions in Latin America, Europe, and the Middle East to establish burn units and train local medical staff. An avid sailor and art enthusiast, he was a member of the board of trustees of the Rhode Island School of Design, and provided free medical attention to artists in need, including Dale Chihuly and Italo Scanga. In 1999, the Carter Family Charitable Trust established the Armand D. Versaci Research Scholar in Surgical Sciences Award at Brown, which hosts an annual lecture in his honor; the Congress of Italian and American Plastic Surgeons created the biennial Versaci Lectureship in 2004. He is survived by his four children, including Lisa '76, and nine grandchildren. Gifts in his memory may be made to the Armand D. Versaci Research Scholar in Surgical Sciences Award-Brown University, Gift Cashier, Box 1877, Providence, RI 02912.

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ALUMNA

SUNITI SOLOMON, MD HON.'06

Suniti Solomon, 76, of Chennai, India, died July 28, 2015. Globally renowned as the pioneering force in India for treating people with HIV and slowing the rate of infection in that country, Solomon worked closely with Alpert Medical School faculty and students for more than two decades. For her achievements, Brown honored her with a Doctor of Medical Science degree in 2006.

The growth of a tiny clinic with an earthen floor and one examining table to a large in- and outpatient medical center, the YRG Care facility in Chennai, "is all Suniti," says Susan Cu-Uvin, MD, director of the Brown Global Health Initiative and professor of obstetrics and gynecology and of medicine. Cu-Uvin recalls how Solomon was driven by her embarrassment about how the Indian government was treating HIV issues and patients when the epidemic was first discovered. Solomon also was active in education efforts and worked to break down the stigma of AIDS.

> "She quite simply transformed me, changing the way I view medicine and scientific research."

Through a grant from the NIH's Fogarty International Center and other sources, many doctors from Solomon's center were able to come to Brown for training. Alpert Medical School faculty and students regularly went to work at YRG Care. "It's been great bilaterally," says Charles C.J. Carpenter, MD, professor of medicine and former director of the Lifespan/Tufts/Brown Center for AIDS Research. "She has developed a program that is remarkable and has made a huge difference."

Rami Kantor, MD, associate professor of medicine (infectious diseases), traveled to YRG Care many times and says Solomon "was a tremendously impressive lady, with unlimited energy, wisdom, and almost visible power." Of her partnership with Brown, he says, "She greatly valued the clinical care teachings, the research, and the technology transfers that occurred through the years and resulted in numerous publications in the medical literature, new generations of YRG Care students and physicians, and most importantly, better care for HIV-infected patients."


Suniti Solomon

"She quite simply transformed me, changing the way I view medicine and scientific research," says Kartik Venkatesh '06 PhD'11 MD'13, an ob/gyn resident at Brigham and Women's Hospital. "For many of us who were fortunate to have trained under her guidance, we frankly wouldn't be who we are today: physicians and researchers always aiming for socially and culturally relevant care."

Solomon's work, including active collaboration with Brown, is continuing at YRG Care through the leadership of her son, Sunil, and other colleagues.

—Noel Rubinton '77

MOMENTUM

Focus on the Future

For many, financial aid makes medical education possible.

The cost of medical education, at Alpert Medical School as elsewhere, severely strains the resources of many students and their families, and can be prohibitive to some. With annual costs of attendance now nearing $80,000, it is urgent to find ways to reduce the burden.

Greta Solinap MD'19 says it was her financial aid package that allowed her to attend Brown; otherwise she would have gone to medical school in her home state of Arizona. "It has allowed me to think much less about finances and more about my studies and what type of doctor I want to be," she says.

"I couldn't imagine going through medical school without financial aid," Tian Ran Zhu MD'17 says. "The funding has alleviated a huge financial burden on my family's shoulders and has made me all the more appreciative of my school and how Brown has continually supported its students through their medical education."

ADAM MASTOON

Lei Ding, MD, a neurologist, and Jean H. Chen, MD, a physiatrist, say the happiness of their daughter, Julia Ding MD'17, at Brown inspired them to help other students. Graduates of Beijing Medical University who now work in New York City, the couple decided to fund a medical scholarship through their family foundation after attending an Alpert Medical School information session in Brooklyn last spring.

Ding says he and his wife have been impressed by the School's approach, including combining research and medical training. They hope the Lei Ding, MD, and Jean H. Chen, MD, Medical Scholarship will encourage recipients to be "better students and better doctors," he says, and concentrate more on studies and worry less about money.

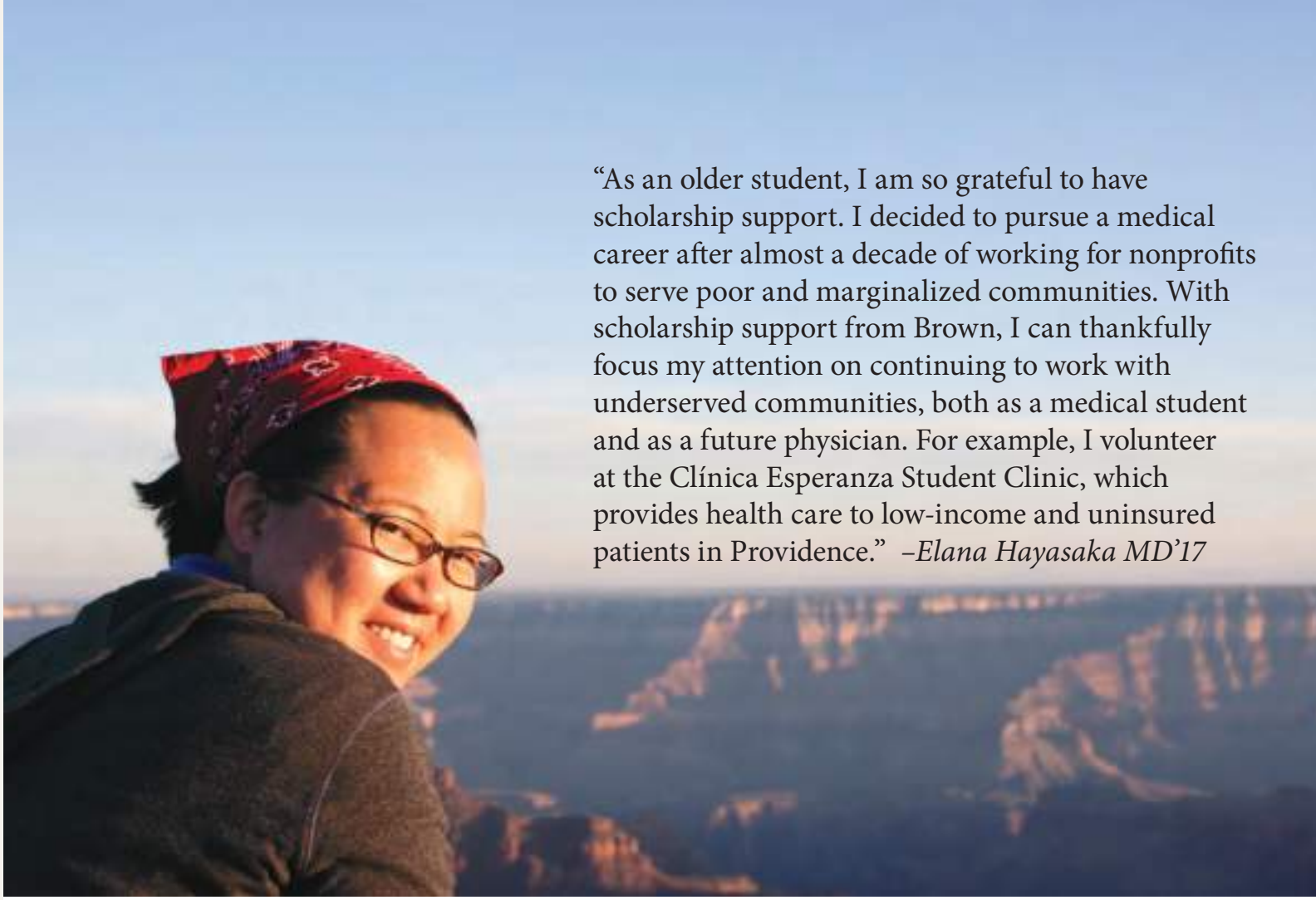
Alpert Medical School has $8.3 million for student financial aid, says Linda Gillette, the director of financial aid. More than half, $4.6 million, comes from donors, making them an essential source of support. Of the current 524 students, more than two-thirds receive aid, including 256 students who receive scholarships, which don't need to be paid back.

Gillette says the Medical School works hard to keep students' debt as low as possible. The Class of 2015 graduated with an average debt of $123,000, down slightly from the previous year. She says scholarship gifts are important "so our students aren't borrowing outrageous funding."

And aid inspires recipients. "I feel privileged to attend a renowned medical school at Brown," says Zhu, who was an undergraduate at the University of California, Berkeley. "I have been inspired to study hard, give back to my community, and participate in the Brown Medical Annual Fund. I have donated to the fund each year and value the importance of donors to help support future medical student scholarships."

Solinap spent two years working on public health projects in the Philippines before starting medical school. "Attending Brown and studying in Rhode Island offer me unique and valuable experiences that align with my personal interests in medicine," she says. "Providence and nearby cities have diverse groups of immigrants, Spanish-speaking populations, and underserved communities. There are also many pioneers and leading researchers in public health, pediatrics, and holistic care that I look forward to interacting with."

—Noel Rubinton '77



"As an older student, I am so grateful to have scholarship support. I decided to pursue a medical career after almost a decade of working for nonprofits to serve poor and marginalized communities. With scholarship support from Brown, I can thankfully focus my attention on continuing to work with underserved communities, both as a medical student and as a future physician. For example, I volunteer at the Clínica Esperanza Student Clinic, which provides health care to low-income and uninsured patients in Providence." *–Elana Hayasaka MD'17*

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Questions? Contact Bethany Solomon, director of the Brown Medical Annual Fund, at Bethany_Solomon@brown.edu or (401) 863-1635.

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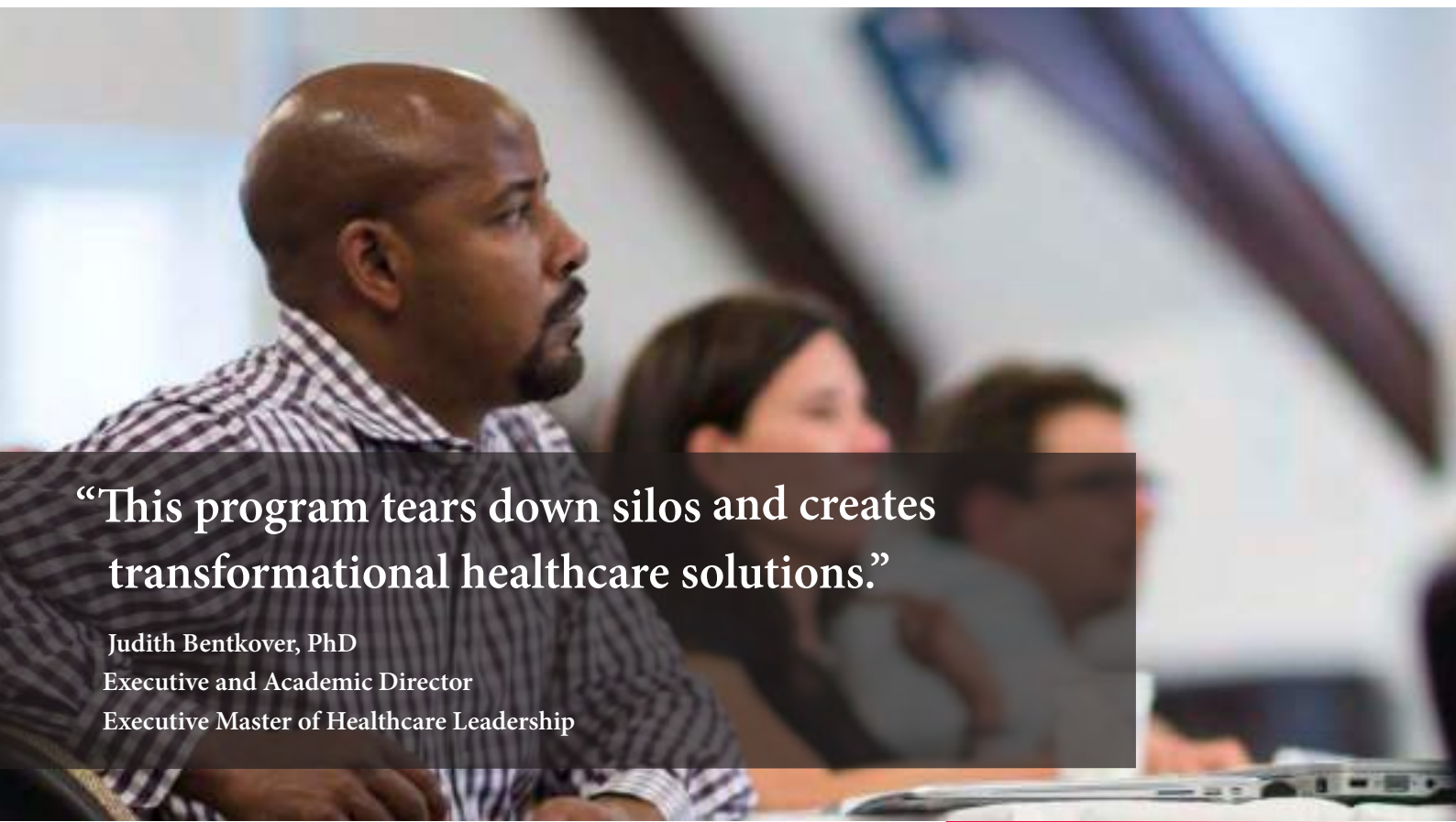

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