UNIVERSITY OF PITTSBURGH SCHOOL OF MEDICINE | FALL 2020

PITTMED

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- **Excellence in Written Journalism, Magazines—Medical/Health (G. Jenkins, "Oct. 27, 2018: Pittsburgh's Darkest Day and the Mass Casualty Response")**

2020 Press Club of Western Pennsylvania Golden Quill Award

- **Excellence in Corporate, Marketing and Promotional Communications—Written, Medical/Health (G. Jenkins, "Surviving Survival")**

2020 Press Club of Western Pennsylvania Golden Quill Award

- **Excellence in Corporate, Marketing and Promotional Communications—Audio, Medical/Health (E. Vitone, J. Faust, M. Palko and E. Lloyd, Pitt Medcast: "Polio Pioneers")**

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HAVE YOU HEARD?

Pitt Medcast is an award-winning podcast from the editorial team of Pitt Med exploring matters of life, death and well-being. Among our recent episodes:

Meet Anantha Shekhar, our new dean. His thoughts on how Pitt can shape medicine.

Tale of Two Outbreaks—insights from a boyhood view of polio up close.

Relationship Abuse and its unexpected guises in the clinic.

pi.tt/pittmedcast

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JASMINE GREEN [cover and "Groundswell"], a Pitt alumna and workshop assistant with the University's Center for Creativity, describes herself as an artivist: her work is meant to broaden public conversation by reflecting sociopolitical issues. At 1Hood Media's Artivist Academy this year, she presented "Safe and Sound," a piece honoring Breonna Taylor and Aiyana Stanley Jones. In this issue, she paints her vision of a future where patients who are Black women are empowered in medical care, rather than trivialized. A Pittsburgh native, she contends that city residents must educate themselves in order to escape the culture of anti-Blackness that has cultivated difficult conditions for many African Americans.

DEBORAH M. TODD ["Forgotten Lives"], a communications manager with Pitt's Office of University Communications and Marketing, loves that her work publicizing Pitt research allows her to continually educate herself and sometimes even impact legislation. She has spent years writing about science and technology—at Reuters and the Pittsburgh Post-Gazette before Pitt. In her Pitt Med debut, she reports on a growing appreciation for archeology's insight into the lives of enslaved persons, whose stories have gone untold.

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UNIVERSITY OF PITTSBURGH SCHOOL OF MEDICINE MAGAZINE, FALL 2020
VOL. 22, ISSUE 2

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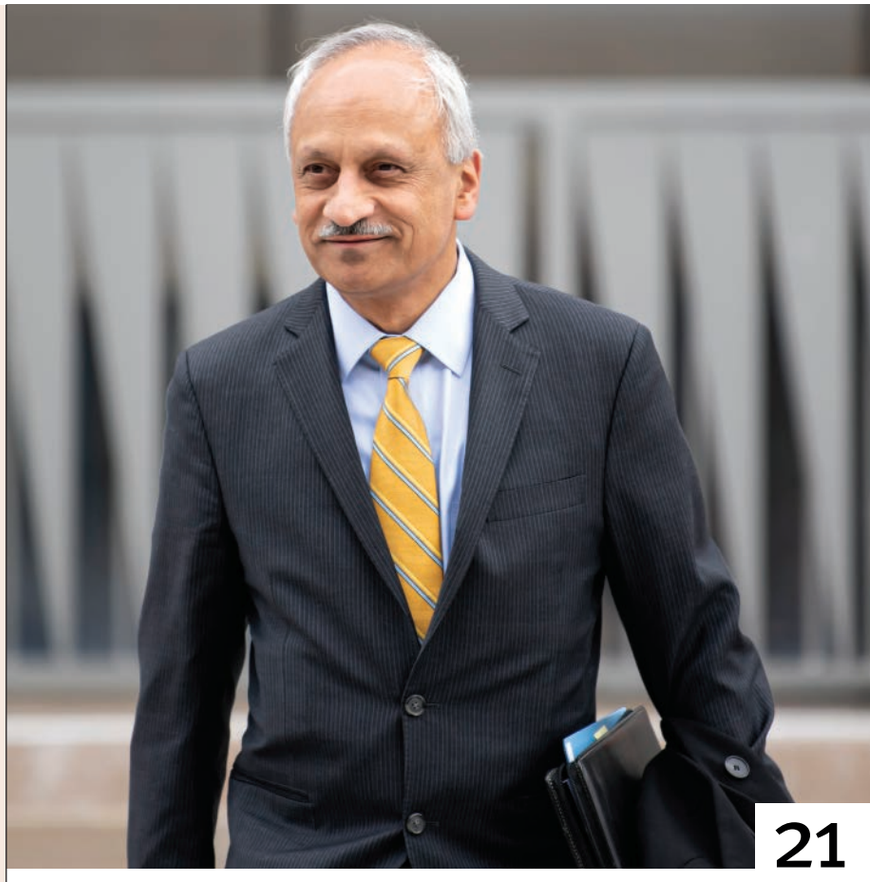
COVER

Tears do not make a garden grow. Pitt people are examining how a legacy of racism hurts the health of Black people today. (Cover: Jasmine Green © 2020.)



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Pitt Med is published by the Office of the Dean and Senior Vice Chancellor for the Health Sciences in cooperation with the Office of University Communications. It is produced quarterly for alumni, students, staff, faculty, and friends of the School of Medicine. PR 6752

AIMEE OBIDZINSKI/UNIVERSITY OF PITTSBURGH

You learn to know a beacon in a storm.
—Seneca

Dear Pitt Med Readers,

I am honored to serve as the new dean of the University of Pittsburgh School of Medicine and introduce the first issue of Pitt Med magazine published under my leadership.

This issue arrives when we are living through an incredible "new normal"—amid an unpredictable pandemic, civic unrest and a tenuous economy. This vortex of challenges is precisely where great medical and research universities like Pitt can serve as beacons. Science, innovation and collaboration have never been more important—or more necessary.

Here at Pitt Med, life presses on with renewed energy. In August, our first-year medical students made history with an extraordinary virtual white coat ceremony and their own class oath—a new tradition for Pitt. Our clinical faculty and trainees have been caring for patients at full capacity. Our educational leaders have been busy welcoming medical students to classes, online and on campus. And our investigators have been conducting research at warp speed to create critical knowledge, including urgent elucidations related to COVID-19.

The ensuing pages speak to some of these efforts. Our special report checks in on our faculty and students, who have been working tirelessly to understand, treat and prevent the spread of SARS-CoV-2 and COVID-19.

The idea for our cover story took shape this summer, following the murder of George Floyd and a University-wide charge to focus the lens of examination inward and assess our own systems and structures. The place where race intersects with medicine is hardly uncharted territory. But writer Elaine Vitone zeroes in on racism in medicine—how discrimination and inequity damage health. More to come on how Pitt people are removing structural barriers and increasing diversity, equity and inclusion.

It's worth noting that the corresponding art for this piece is by Ms. Jasmine Green, a Pitt alumna, Pittsburgh local and, using her own term, an "artivist." Green's paintings—which we commissioned for this issue—will soon be on proud display in Alan Magee Scaife Hall. You can read more about Green in the contributors' box on the preceding spread.

This issue also spotlights groundbreaking work happening on campus that's likely to carry real-world benefits for patients and clinical care teams alike. These advancements include a newly unveiled type of immunity, a new vaccine delivery option for protecting against tuberculosis and a way to leverage robotics to sharpen the immune system's attack on cancer cells.

So, while 2020 has reminded us—in stark clarity—of the capriciousness of life, it's also laid bare a quieter truth: That Pitt Med's firm commitment to training the best doctors, finding new cures and creating a more equitable society is needed now more than ever. I invite every one of you to join us in this mission and support our students, faculty and staff as we continue to negotiate this new normal—and thrive within it—in the year to come.

Stay safe and be well.

Anantha Shekhar, MD, PhD
Senior Vice Chancellor for the Health Sciences
John and Gertrude Petersen Dean, School of Medicine

Special Report

Steroids Help Severely Ill COVID-19 Patients

This summer, an international team of clinician-scientists led by the University of Pittsburgh's Derek Angus confirmed that inexpensive, widely available steroids improve the odds of recovery from COVID-19. In response, the World Health Organization updated its treatment guidelines to note that patients with COVID-19 who are on ventilators or oxygen and under intensive care should be given corticosteroids.

The study pooled data from 121 hospitals in eight countries and was reported in JAMA with Angus, chair of Pitt's Department of Critical Care Medicine, as the lead author on an article in a four-article package. Angus is also Pitt's associate vice chancellor for health care innovation and chief health care innovation officer at UPMC.

"It is relatively rare in medicine that you find drugs where the evidence of their effectiveness in saving lives is so consistent," says Angus. "This is, in many respects, the single clearest answer we've had so far on how to manage terribly ill COVID-19 patients."

Before COVID-19 emerged, Angus and several international collaborators had developed REMAP-CAP (Randomized, Embedded, Multifactorial, Adaptive Platform Trial for Community-Acquired Pneumonia). The platform was designed to find optimal treatments for severe pneumonia. When the COVID-19 pandemic began, they adapted REMAP-CAP to incorporate additional treatment regimens specifically targeting the SARS-CoV-2 virus.

Between March and June, a REMAP-CAP corticosteroid trial randomized 403 adult COVID-19 patients admitted to an intensive care unit to receive the steroid hydrocortisone or no steroids. The trial found a 93% probability that giving patients a seven-day intravenous course of hydrocortisone would result in better outcomes than not giving the steroid. The results were consistent across age, race and sex.

"This gives physicians like me, who treat the sickest of the sick, hope," says Bryan McVerry, coauthor of the study and associate professor of pulmonary, allergy and critical care medicine at Pitt. "We are beginning to get a handle on the deadly side of this disease."

GETTY IMAGES

Cows, Vaccines, Warp Speed

At last count, Pitt people were engaged in more than 400 studies related to COVID-19 and the novel coronavirus. A little update here.

A cow makes an awful lot of antibodies, buckets more than your average human. And when you're trying to fight a virus, that could be a lifesaver.

William Klimstra, University of Pittsburgh associate professor of immunology and member of the Center for Vaccine Research, is working on a project that started with the Department of Defense's interest in protecting soldiers from infectious diseases. The DOD is backing a company called SAB Biotherapeutics, in Sioux Falls, South Dakota, to breed cows with humanized immune systems to generate antibodies against the novel coronavirus. They've already had success with antibodies for MERS, a similar virus. It's hoped the new antibody therapy (called SAB-185) could be used to both treat COVID-19 and prevent it in frontline workers and in military personnel. In August, SAB-185 was injected into healthy volunteers for a phase 1 safety study.

Klimstra is also advancing a synthetic RNA-based novel coronavirus vaccine. (That's a third SARS-CoV-2 vaccine candidate for Pitt, in case you are keeping track. See "Science Champions" story on page 4.) On that vaccine project, Klimstra is partnering with Tiba, a small Boston tech firm. The Tiba pilot is in early stages, but the technology is worth talking about now. It uses programmable RNA designed to trick the body into thinking that it's come into contact with SARS-CoV-2.

That's a bit like the experimental vaccine called mRNA-1273 developed by Moderna and the National Institute of Allergy and Infectious Diseases (NIAID), which is in phase 3 trials. The Tiba vaccine uses a different molecular delivery method.

Sources for this special section include Pitt and UPMC reports.

ORBON ALIJA/GETTY IMAGES

Speaking of Moderna, as part of Operation Warp Speed, Pitt/UPMC has been chosen as a site for both the Moderna and the AstraZeneca vaccine trials. "Participating in Operation Warp Speed is a huge honor," said Judy Martin (Res '94, Fel '98) in a July news conference. Martin is Pitt codirector of the Pittsburgh Vaccine Clinical Trials Unit and professor of pediatrics. She is directing the Pittsburgh site for the Moderna vaccine clinical trial. Her colleague Sharon Riddler (Fel '94), associate professor of medicine, will be leading the Pittsburgh AstraZeneca trial; that experimental vaccine was developed at the University of Oxford.

The Big Screen: Pitt's Clinical and Translational Science Institute (CTSI) has been called into action by the National Institute of Allergy and Infectious Diseases. Chancellor Patrick Gallagher's June report to the Board of Trustees described how that unfolded:

On April 10, NIAID called for volunteers. The goal: Screen the nation for coronavirus antibodies—every region, from urban to rural. And determine the scope of the pandemic by finding asymptomatic carriers with antibodies in their blood. NIAID approached Pitt because coordinating volunteer participants in clinical research is what our CTSI does—and frankly, nobody does it better. . . . [By June] they'd already recruited half the 10,000 participants NIAID needs. (The University of Alabama-Birmingham is responsible for another 4,500.) They distributed finger-prick kits to those participants. Blood samples came in from all over the nation for analysis.

The CTSI team will soon start another nationwide serostudy recruitment effort for the agency.

Little Antibody Goes Long Way

It's tiny. And that has advantages.

Pitt scientists have isolated the smallest biological molecule to date that completely and specifically neutralizes the SARS-CoV-2 virus. This antibody component, which is 10 times smaller than a full-size antibody, has been used to construct a potential therapeutic against SARS-CoV-2 that may also prevent infection, notes John Mellors, chief of the Division of Infectious Diseases at Pitt and UPMC.

The researchers reported in the journal Cell that the drug, called Ab8, is highly effective at both preventing and treating SARS-CoV-2 infection in mice and hamsters. Its tiny size helps it diffuse in tissue to subdue the virus; it also makes it possible to administer the drug by inhalation or other routes. Most monoclonal antibodies in development would be administered intravenously through an IV drip.

Dimiter Dimitrov, senior author of the Cell paper and director of Pitt's Center for Antibody Therapeutics, was one of the first to discover neutralizing antibodies for the original SARS coronavirus in 2003. Starting in February, Wei Li, assistant director of the antibody center and colead author, sifted through hundreds of billions of antibody component candidates and found Ab8 in record time.

The Pitt researchers partnered with scientists from the University of North Carolina at Chapel Hill, University of Texas Medical Branch at Galveston, University of British Columbia and University of Saskatchewan.

The drug does not bind to human cells—a good sign that it won't have negative side-effects in people. And it can be produced in mass quantities. Abound Bio, a newly formed UPMC-backed company, has licensed Ab8 for worldwide development.

Science Champions

Pittsburghers are rooting for a homegrown COVID-19 vaccine.

"Nothing great in life is ever achieved alone," **Heather Lyke**, Pitt's athletic director, said in a recent news release. **So the families of four leaders in Pitt Athletics donated a combined $500,000 in support of Pitt's Center for Vaccine Research (CVR) as it advances a potential COVID-19 vaccine.** Those leaders are Lyke, football coach Pat Narduzzi, men's basketball coach Jeff Capel and women's basketball coach Lance White. Donations of $100,000 each were added by the Penguins, the Pirates and the Steelers—for a total of $800,000.

"We are stunned by the generosity and support the Pittsburgh community has shown for our center," said **Paul Duprex**, CVR director.

"The issues in medicine and bioscience are broad issues for improving the human condition," notes another Pittsburgher, **Ashok Trivedi**, managing partner at SWAT Capital and founder of Ashoka University in India. "The COVID-19 pandemic makes these points very clear. Not only is it infecting millions of people, it's bringing entire societies to a halt."

The Trivedi Family Foundation has given a significant gift to support the development of PittCoVacc, a vaccine platform invented by Lou Falo, chair of dermatology, and Andrea Gambotto, associate professor of surgery. PittCoVacc uses a low-cost microneedle patch—"a very effective method for delivering medications to millions," says Trivedi.

Henderson

With a Trace

Contact tracing is key to preventing COVID-19's spread. However, as several University of Pittsburgh students discovered this spring, this vital task relies on the work of case investigators, who line up the dots for the tracers to connect.

Minorini

When a new case of COVID-19 is reported to the Allegheny County Health Department, an investigator calls that person and asks about their symptoms, when they sought care, demographic information and the names of recent close contacts. The case investigator logs the answers into Pennsylvania's National Electronic Disease Surveillance System (PA-NEDSS) database, and the list of the patient's recent close contacts is passed to a contact tracer, who then reaches out to them.

A close contact is someone who has been within 6 feet of that person for 15 or more minutes starting at 48 hours before that person experienced symptoms of COVID-19.

"I'm really comfortable cold-calling people," says Andrew Henderson, who worked as a political organizer, calling potential voters in Virginia, before enrolling at Pitt Med. In March, he became one of 35 Pitt Med students who signed up as case investigators for the Health Department. Three students from the Graduate School of Public Health also worked as investigators.

With clinical rotations delayed because of the coronavirus, the work filled an educational void. For some Pitt Med students, it served as an elective, while others, like Henderson, volunteered at the beginning of the pandemic, and then received course credit the longer they remained on the job.

Henderson, now a fourth-year at Pitt Med, was a case investigator for nine weeks.

"I really enjoyed talking to patients about their symptoms, learning about the disease course," he says. Henderson, 33, was surprised when a few patients indicated that their first symptom was pain in their eyes.

"That's been reported nationally, but it's a rare symptom."

Henderson, who had been slated for a pediatrics rotation at UPMC Children's Hospital of Pittsburgh, felt sidelined after the pandemic hit. When he learned about the opportunity to volunteer at the Health Department through a med school-wide email, he reached out to several classmates and urged them to join him.

Rebecca Minorini also stepped up: "This felt like a direct way to help; and even though it wasn't face-to-face, it felt good to interview patients, give them guidance and answer their questions."

Minorini, a fourth-year med student doing a family medicine rotation before the pandemic hit Allegheny County, built a rapport with several patients. "A lot of people had follow-up questions," she says. "I called some people maybe six times over the course of the four weeks I was there. I became their contact person for this."

Minorini, 30, described how patients expressed a range of fears: from worry about when they could return to work to concern about getting food delivered. When a patient was in the ICU and too sick to talk, she spoke to a family member.

"It was a little scary to be on our side of it and not really know how to approach [each case] when you don't know the severity of each person going into it," she says.

The investigators also go over isolation protocols.

Debra Bogen, an MD and director of the Health Department, said Pitt students who worked as case investigators helped contain the spread of the novel coronavirus in Allegheny County. "And they saved lives."

—Gavin Jenkins

Disease Detectives

Nancy Glynn volunteered to be a contact tracer with the Health Department this spring. "It seemed like a great way to contribute to helping stem the spread of coronavirus," she says.

Glynn

And as an epidemiologist, she feels that being a disease detective is in her blood.

"It involves teaching health literacy, which I love," says the associate professor of epidemiology in Pitt's Graduate School of Public Health. "And piecing together the contacts' timeline and understanding one's exposure history can be a puzzle and enjoyable to me."

Contact tracers like Glynn call people who have been exposed to someone who tested positive for COVID-19; the tracers receive the information on close contacts from case investigators. Tracers instruct the people they call to self-quarantine for 14 days, and they discuss symptoms. "I expected people to be resistant," she says. "But most people are very appreciative of the call and the Health Department's effort, and they agree to remain in quarantine."

Sometimes, people did not believe the person calling was a tracer.

"At the beginning of the pandemic, a lot of people thought [it] was a scam," says Vivian Feng, a Pitt Public Health student.

Feng served as a contact tracer and then as a case investigator for the Health Department. Both roles require empathy, she notes.

"I try my best to lessen [people's] worries and answer all their questions and needs."

Both jobs have played such a crucial role in preventing COVID-19's spread that Pitt's Graduate School of Public Health launched a course on them this summer. Taught by Lauren Orkis, an adjunct assistant professor in epidemiology, the class has 20 Pitt Public Health students.

"We not only want to prepare students to serve as case investigators and contact tracers but also want to prepare them to serve as applied epidemiologists managing these types of operations," Orkis says. *—GJ*

Lean on Me, Virtually

It's April: Medical teams in New York City have been stretched thin by a surge of COVID-19 cases, and physicians with limited critical care experience are handling ICU patients. At Weill Cornell Medical Center in Manhattan, those physicians include hospitalists, doctors normally dedicated to the general care of hospital patients.

Sitting behind his desk in Pittsburgh at UPMC Montefiore, Ian Barbash stares at his computer. On the screen—a live view of an ICU at Weill Cornell. Barbash is able to see this because a Weill hospitalist is carrying a tablet. Barbash, medical director of UPMC TeleICU and Pitt assistant professor of medicine, virtually attends rounds with a team caring for COVID-19 patients.

The camera follows the hospitalists as they walk down the ICU hallway. Nurses have written each patient's vital signs and ventilator settings on the window to each room, saving the physicians from unnecessary trips inside that might further spread the virus. At each window, Barbash (Fel '16) discusses the patient inside with the team. The patients are sedated, lying on their bellies—a method called proning that allows oxygen to easily reach the lungs.

For more than two weeks in the spring, when New York–Presbyterian Hospital's medical centers (of which Weill Cornell is part) were overwhelmed, more than two dozen Pitt Med critical care physicians assisted them virtually through UPMC's TeleICU program. (In April, Allegheny County recorded 1,289 COVID-19 cases compared to more than 109,000 in New York.)

As a thank-you, New York-Presbyterian Hospital published a full-page advertisement in the Pittsburgh Post-Gazette saluting UPMC "Healthcare Heroes." (See ad on the right.)

"[Pitt Med doctors] mainly helped me with management of sedation and ventilators for patients," says Michael Torres, a hospitalist at Weill Cornell. "Even though I had never met them in person, working and talking with them felt very natural."

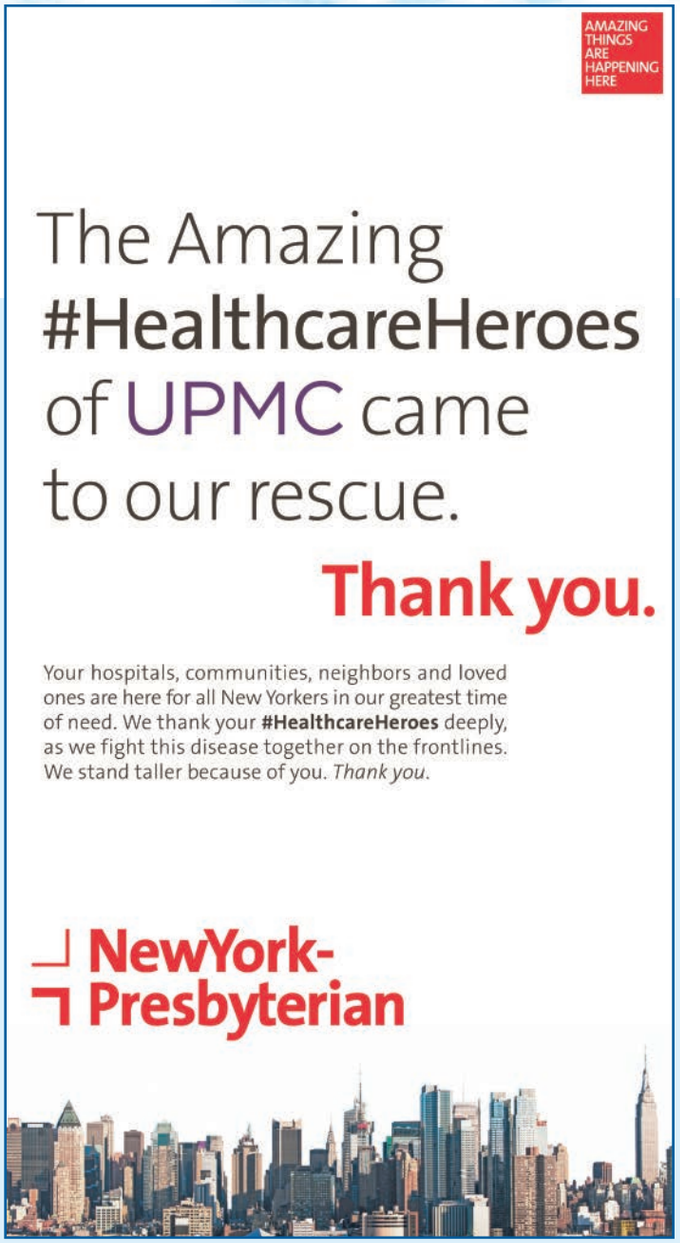
This spring, Corrine Kliment spoke on the phone with several physicians in New York who worked in a step-down unit—the last stop before the ICU. Kliment, an assistant professor of medicine, advised a few pediatricians on how to figure out dosages for adult patients.

"What I helped with was managing," Kliment says. "How you set a ventilator. What medications you should give. How you sedate the patient so they're comfortable."

Kliment and Barbash say that they spent a lot of time validating professionals who knew what they were doing but were stressed out.

Kliment says that the news on television did not fully capture what she heard on the phone, and Barbash describes what he saw through virtual rounds as "surreal."

"I saw a recovery unit for operating rooms that was completely transformed into an ICU and filled with coronavirus patients," he says.



This ad ran in the Pittsburgh Post-Gazette in the spring.

Critical care medicine docs here are now helping the U.S. Army Medical Research and Development Command's Telemedicine and Advanced Technology Research Center to create critical care telehealth and interdisciplinary staffing options for COVID-19 and other national emergencies.

Rachel Sackrowitz, an associate professor of critical care medicine and chief medical officer for the UPMC ICU Service Center, notes that telemedicine isn't really about technology.

"Telemedicine is about connecting people," she says. "Fundamentally, the connection is very old school: two or more people working together to try to solve a problem."

In that sense, Sackrowitz adds, being thanked in 2020 with a newspaper advertisement was quite apt. *–GJ*

Devoted to noteworthy happenings

at the medical school

CAMI MESA

Warren and Mark Shlomchik

Hello ... Flu Shots

Imagine a crowded room of people who are social to a fault. They're all close-talkers who, with unwashed hands, touch people a lot. They sneeze and cough without covering their mouths. And worst of all, they have nearly no immunity to any type of viral infection. This is not a nightmare sequence from an episode of "Seinfeld." It's a description of child care centers in America. And according to new research, the vast majority of centers don't require children or employees to receive a flu shot.

Timothy Shope, professor of pediatrics at Pitt, and his team interviewed 518 child care center directors in the country. They found that only a quarter of these centers required flu vaccinations for children, and even fewer, 13%, required that staff members get flu shots.

Shope says this is a policy failure—only four states have influenza vaccine laws for child care—that reflects how the public views the flu in relation to other diseases.

"Parents and society have a healthy respect for diseases like measles and polio, and they should," Shope says. He warns that influenza is also dangerous—2 in every 1,000 people with influenza died in the 2018–19 season. (Somewhere between 1 and 3 children in 1,000 who become infected with measles die.)

The U.S. Centers for Disease Control and Prevention, which funded Shope's research, recommends flu shots for everyone 6 months of age or older. But nationally, influenza immunization rates hover below 50%.

Shope worries that the ongoing pandemic might overshadow the dangers surrounding the upcoming flu season. If that happens, he believes children and child care professionals could pose a health risk this winter as COVID-19 continues to spread.

"We don't want our emergency departments and hospitals to be overrun with people with influenza," he says. "We also really don't want to find out what it's like to be infected with both influenza and SARS-CoV-2."

—Evan Bowen-Gaddy and John Hansen

On the Mark

It's been known for years that the immune system can kill cancer cells. The catch is that its assassins (T cells) must be very exacting. The target changes with every single tumor and person. You want to find the antigens derived from the genetic mutations that turn a normal cell into a cancerous one.

Brothers and Pitt immunology all-stars Mark Shlomchik (shown right) and Warren Shlomchik (shown left) have recently started a company with seed funding from UPMC to find those targets and T cells so that they are specific to each patient. Their company, BlueSphere Bio, uses robotics to sift through thousands of T cells from a patient's tumor to determine which of those cells already know the mutated antigens in that patient's cancer. This way, they can create an army of T cells that know exactly where to strike.

Mark, who is chair of immunology, says this is a breakthrough since, up until now, T-cell research has been looking for common targets between tumors but not patient-specific ones. Warren, director of Hematopoietic Stem Cell Transplant and Cell Therapy, adds: "Most of the mutations that we want to target are incidental to the process of developing cancer, which differs in every tumor; so it has to be a product that's developed on an individual basis."

Other advantages of their method: "We think it's about 50 times cheaper than previous technologies and maybe 100 times faster," notes Mark. "We can look at 1,000 T cells in a day with minimal hands-on [effort]. With previous technology, that would take probably months and lots of individual effort." *—EBG*

FOOTNOTE

Research isn't free. That's why UPMC Enterprises—the venture capital and commercialization arm of UPMC—plans to invest $1 billion to develop new drugs, diagnostics and devices by 2024. The commitment includes the $200 million that was invested in Pitt investigators' research in 2018 to help establish the UPMC Immune Transplant and Therapy Center. The 10-digit investment stands to boost the work of physician-scientists like Toren Finkel, who cofounded Generian, a startup focused on healthy aging, as well as Mark and Warren Shlomchik, who cofounded a startup that you can read about on this page. Stay tuned for more promising ventures.

AIMEE OBIDZINSKI/UNIVERSITY OF PITTSBURGH

Overheard

Our Antibiotics Pipeline is in Danger

A great deal of modern medicine relies on antibiotics. We're not just talking about routine infections. Nearly every patient who undergoes surgery, as well as every transplant and chemotherapy patient, depends on effective antibiotics to prevent or treat infection. Like many in his field, Cornelius J. Clancy, Pitt associate professor of medicine, has grown alarmed by the increase in antibiotic-resistant infections, also known as superbugs, over the past decade. Clancy is also director of the Extensively Drug Resistant Pathogen Laboratory in Pitt's Division of Infectious Diseases. Recently, he analyzed antibiotic prescriptions—from throughout the nation—for treating a superbug. He came to some troubling realizations.

What did you learn from your study on antibiotics?

We've long known that [the last-line antibiotic] polymyxins are not very effective in terms of curing infection, and that they also carry major toxicity. What we found is, although new drugs have come out to improve both patient outcomes and lower toxicity, their uptake by hospitals has been slow but steady. It's taken about four to five years for them to finally begin to surpass the polymyxins in use against superbug infections nationwide. And we're not sure what the reason for that is, but the cost of the new antibiotics could be an issue. They are more expensive.

The marketplace is broken. There is little money to be made in the development of new antibiotics. A new antibiotic that covers resistant pathogens is really only going to be used against those resistant pathogens, meaning its use is infrequent. Reimbursement in the U.S. system is based on units dispensed, and it's just impossible on a per-unit basis for anyone to make money developing antibiotics. And, there are plenty of spaces within medicine where you can develop drugs and make a lot of money.

What can happen if antibiotics are no longer viable?

If antibiotic-resistant infections continue to increase, and we have more untreatable infections, or ones that are only treatable with one or two antibiotics, it could get to a point that a lot of what we do in day-to-day medicine becomes too risky. If we revert to a time before antibiotics were in use, then, for a patient with an infection, it's just going to be a matter of how the infection turns out based on their own immune system and their own ability to fight it off.

What needs to happen to ensure we continue to develop new antibiotics?

We need a reimbursement model that captures the societal benefit of antibiotics. We need to de-link the value of the antibiotic from the absolute use of that antibiotic. *—Nichole Faina*

Next Generation

Since their first year at Pitt Med, Noah Pyles and James O'Brien have gotten into long, inquisitive conversations that often end with, what they call, "napkin calculations." Last summer, one discussion concluded with an eye-opening estimation: In their combined 14 years of lab work, they had probably disposed of tens of thousands of pounds of single-use plastics.

Pyles and O'Brien, who are in their third year at Pitt Med, wondered: "What kind of footprint does that leave on the environment?" They determined that, this year, the United States will dispose of around 3 billion pounds of medical plastic that wasn't recycled beforehand.

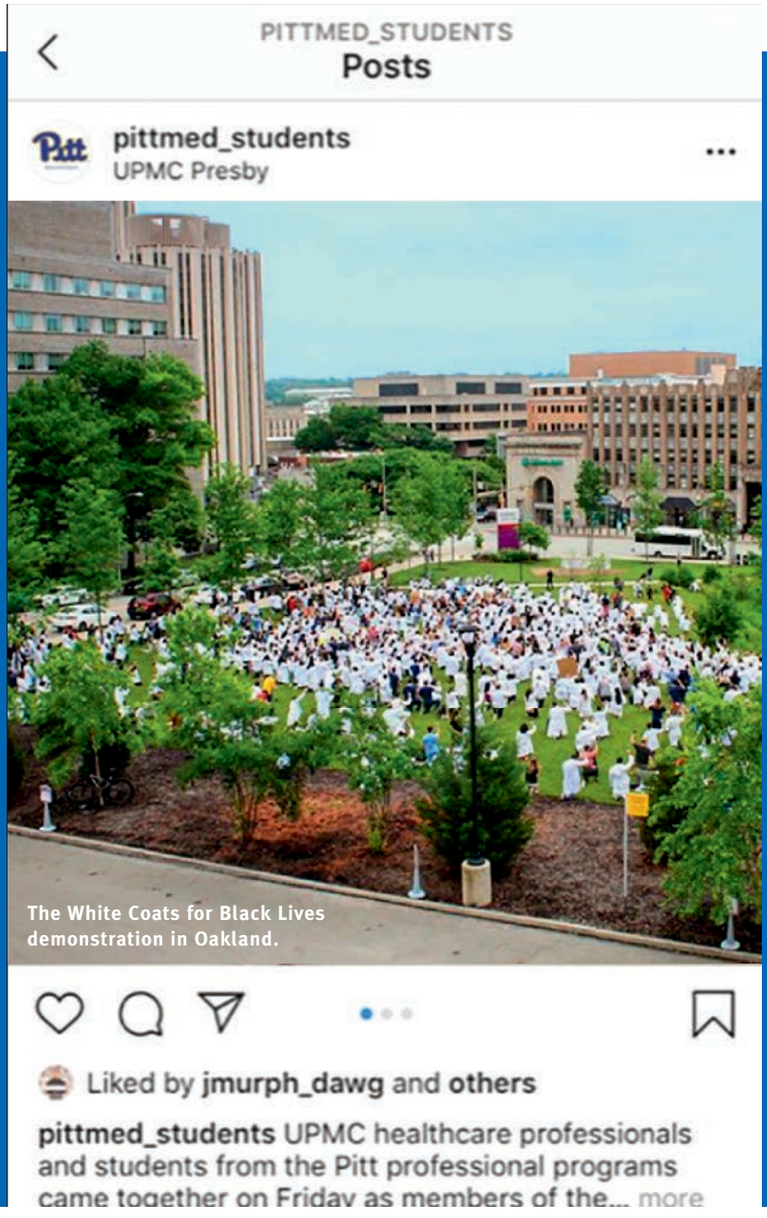
Inspired to provide a solution to this problem, Pyles and O'Brien created Polycarbin, a recycling system for medical plastic; and this year, they won first place and $25,000 at Pitt's Randall Family Big Idea Competition for their salvaging company. Their system installs sorting bins in research labs, then hauls polypropylene waste to a facility to be cleaned and recycled.

O'Brien and Pyles, who bonded as roommates during their first year at Pitt Med, are co-CEOs in the company and wear nearly every hat. Pyles says their "interests and abilities form a very nice Venn diagram." Pyles focuses more on product development and researching user experience, while O'Brien is the networking guru. Once they have attracted enough investors, they plan to launch the platform at a commercial scale.

As part of their pitch to investors, Pyles says they point out that medical plastic requires nearly twice the energy to dispose of than the kind people toss in a bin under their kitchen sink. Production and disposal of medical plastic in the United States also sends about 4 megatons of CO_2 into the air each year. And its incineration is carcinogenic.

"When [O'Brien] and I are talking to investors, we like to describe the biomedical plastic economy as one of the largest ecological problems that no one has probably heard of," Pyles says.

"And one of the largest public health problems no one has heard of," O'Brien adds. *—EBG*



The White Coats for Black Lives demonstration in Oakland.

Sarah Atta

Worth Following

What's it like to be enrolled at Pitt Med these days? The Office of Student Affairs and Diversity Programs launched an ambassadors program in 2019 so students from a range of backgrounds can tell their stories. Haniah Zaheer (Class of 2023), Maria Evankovich (Class of 2023), Spencer Talentino (Class of 2023), Joe Murphy (Class of 2022), Sarah Atta (Class of 2024) and Victoria Humphrey (Class of 2021) share Instagram and Facebook accounts, where—in the pre-COVID-19 days—they posted photos of study sessions with classmates, early morning trips to the gym, their favorite Pitt Med faculty and staff, the beauty of Pittsburgh and the like. More recently, they've shown ways Pitt Med students have helped the community during the pandemic and protested racial injustices.

"The platforms serve a dual purpose of highlighting some of the amazing people and activities Pitt Med has to offer, while also helping pre-med students along their journey," says Humphrey. "We love when they reach out to us and ask questions."

Start following them, and you'll get hooked! See @pittmed_students on Instagram and www.facebook.com/pittmedstudents on Facebook. *—GJ*

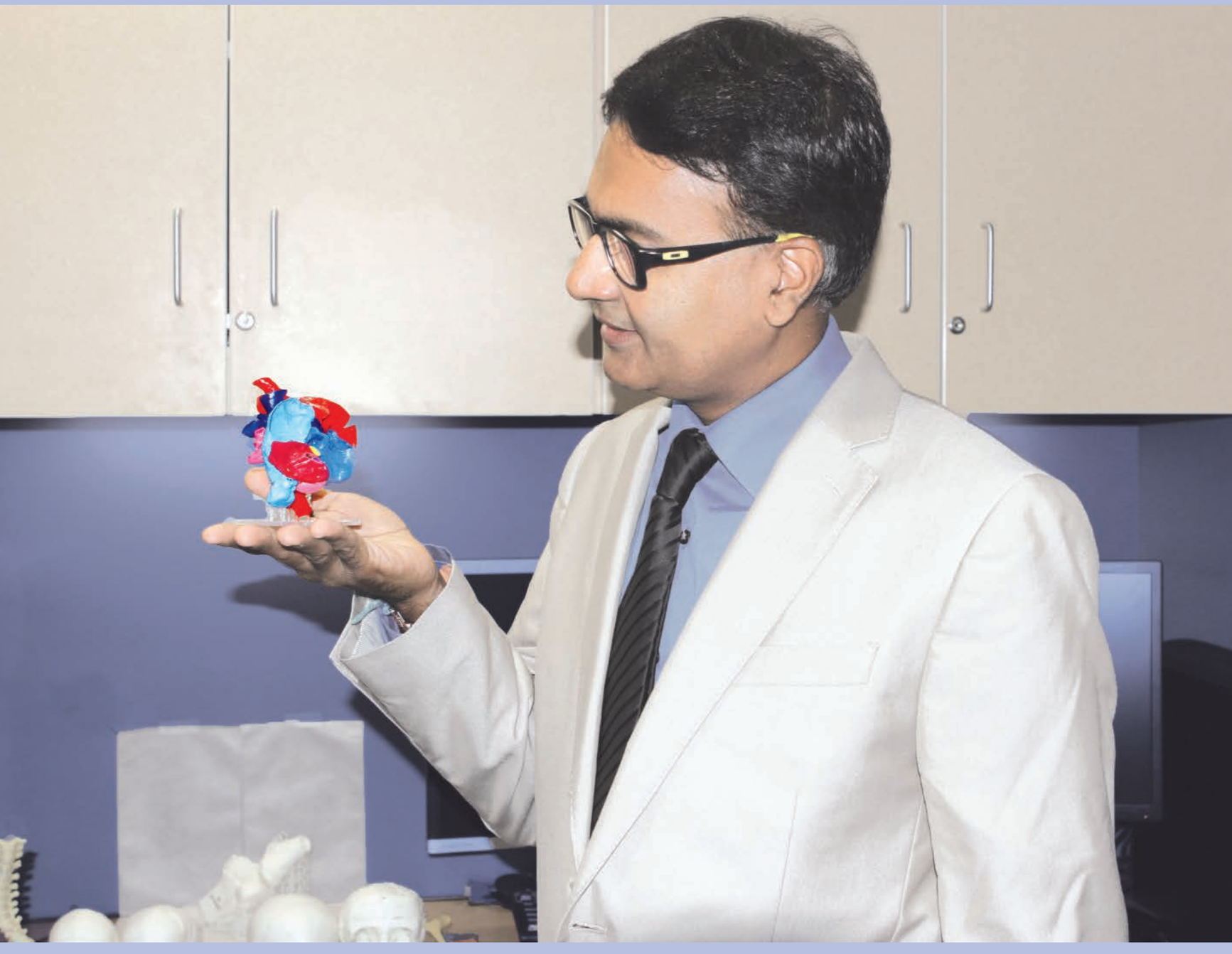
Doctor-to-Be

Humphrey

Victoria Humphrey is a third-year Pitt Med student who takes pride in how she balances academics with community involvement. On top of her role as a student ambassador (see above), she's treasurer for the Class of 2021, and she also runs Snacks for STEM, a nonprofit organization that gives healthy treats to children at Pittsburgh Fulton PreK-5 in the city's Highland Park neighborhood (with Camille Davis, a fellow third-year student). Snacks for STEM evolved out of Apples 4 Education, a similar non-profit that Humphrey, 27, founded when she competed for Miss Florida (she placed second runner-up). Though the former Miss University of Miami was raised in Tampa Bay, attending Pitt Med has been her dream since she was a little girl. Her grandfather Hugh Raymond Primas Jr. (DMD '47, MPH '69) served as an inspiration. As a professor in Pitt's Graduate School of Public Health, Primas Jr. taught and advocated for improving health standards throughout central and southern Africa.

Humphrey is hoping to pursue a residency in dermatology. Representation matters to her, and because only about 3% of dermatologists in America are Black, Humphrey is particularly interested in serving low-income Black and Hispanic patients: "Disease presentation on a patient with fairer skin can look completely different from a patient with darker skin, and it often goes undiagnosed or misdiagnosed." *—GJ*

Explorations and revelations taking place in the medical school



Three-dimensional printed models of tissues, bones and organs are helping reduce the operative time at Children's, thanks to Darshit Thakrar's team.

MODEL SOLUTION

3D RADIOLOGY HELPS KIDS

BY KATY RANK LEV

Darshit Thakrar holds up a red-and-blue plastic model about the size of a bell pepper. It's a life-size replica of a 3-year-old patient's rare anomaly known as criss-cross heart. "Seeing and touching these models can change a surgeon's perspective," Thakrar says, pointing to brightly dyed atria emptying into the wrong ventricles. In a laboratory within the radiology department at UPMC Children's Hospital of Pittsburgh, Thakrar used a 3D printer to render the organ's likeness so the patient's cardiac surgeon could study it. The typical approach for this condition, Thakrar explains, is to create a tunnel to redirect the blood. "Our surgeon studied the model and found a more efficient fix—a bypass that took the blood in a more direct path."

Thakrar, assistant professor of radiology at Pitt, benefited from 3D imaging technology himself when engineers constructed the socket of his prosthetic limb. He lost a leg in a car accident shortly after moving to Pittsburgh in 2015. Thakrar spent months at home recovering, undergoing rehabilitation and learning to use his prosthesis, which was built based on 3D images of his leg.

While recovering and still in a wheelchair, he was eager to learn something new and keep his mind active. "I needed sanity," he says. He read voraciously about 3D visualization and printing in his field and how to apply the principles of 3D printing to help his patients.

Thakrar had an idea: start a 3D printing program at Children's. Colleagues at UPMC Presbyterian helped him get started; and Thakrar taught himself to use drafting software. With the support of his division chief, Ashok Panigrahy, who holds the John F. Caffey Chair in Pediatric Radiology, Thakrar was able to secure a 3D printer and start the program in 2016. Initially working nights and weekends, Thakrar printed the first few models. Seeing the benefits, the administration added April Krivoniak, a biomedical engineer, to the lab to perfect these models. On this day, she's snipping excess residue off of a model of a child's enlarged heart. The sound is like cracking pistachios.

Across from a row of computers interpreting X-rays, MRIs and CT scans, another bank of machines churns away at turning flat digital slices into multidimensional models. In the middle of the room, a 3D printer constantly whirs.

The models have aided medical teams at Children's in planning operations, practicing techniques and constructing medical implants. They've also helped boost morale for the children. For example, a model can help a child with cancer understand what her tumor looks like and how important it is to stick with her therapy, Thakrar says. Some kids like to crush their model as they go through the therapy—a process that makes them feel empowered over the disease.

Anyone can order models of healthy bones online. The ability to print pathology has been a game-changer from a teaching standpoint, Thakrar says, gesturing at his cabinet of curiosities: gleaming ribs, distorted lungs, congenital conditions in all shades of dyed resin.

> **"Our surgeon studied the model and found a more efficient fix—a bypass that took the blood in a more direct path."**

Now, students and surgeons are no longer limited by the decomposition rate of preserved tissue. They can pass around a model of the same diseased kidney for years.

Thakrar, a father of two, jokes that he really should print a brand new leg for himself using actual human tissue: He imagines building one from scratch with stem cells from his child's umbilical cord. "We never can imagine the wonders science can create. I will wait for the science to get there in my lifetime," says Thakrar.

He's already checked off one item on his bucket list. With his new blade-type sprinter's leg, he ran a 5K. ■

COURTESY D. THAKRAR

BENJAVISA/GETTY IMAGES

NOT THE MAMA

FERTILITY TREATMENTS, NOT MATERNAL AGE, MAY DRIVE RISK OF IMPRINTING ERRORS

BY ALLA KATSNELSON

Last November, a woman in central India reportedly gave birth to twin girls at the age of 74, making her the oldest-ever new mom.

Advanced maternal age isn't just the stuff of record books, of course. Routinely, women are having babies much older than in the past—well into their 40s and beyond—often with the help of assisted reproductive technology (ART).

Researchers know that babies born to mothers who undergo fertility treatments have an elevated risk of some diseases caused by glitches in the genome. They also have an elevated risk of certain diseases caused by errors in how genes are expressed, such as the neurological disorder Angelman syndrome.

Mellissa Mann, associate professor of obstetrics, gynecology and reproductive sciences at Pitt, wondered what might be driving this increased risk.

"Because assisted reproduction is often used with increasing maternal age," she explains, "we wanted to ask whether the age of mothers themselves could cause the problem."

Mann studies a process called genomic imprinting, which occurs during the development of eggs and sperm. When chromosomes from each parent join forces in a fertilized egg, certain genes are expressed only from the maternal chromosomes and others only from the paternal ones. Chemical tags called methyl groups are attached to the DNA at the nonimprinted copies of these genes, silencing them.

In earlier studies, Mann and her colleagues had found that genomic imprinting was perturbed in mouse embryos that were generated using a process similar to what doctors use for human ART: treating a prospective mouse mom with hormones, removing fertilized embryos from her uterus, and then growing them for several days in a dish. The team found that the hormone treatments scrambled genomic imprinting, as did the process of growing the embryos in the dish.

Her team focused on a handful of genes that, when imprinted incorrectly, cause neurological and other diseases in childhood. The researchers tracked these genes in embryos from four different age groups of female mice ranging from the equivalent of 15 years old to more than 45 years old in human years. And surprisingly, across these age groups, they saw no difference in how the genes were imprinted.

Next, Mann and her colleagues tested whether ART procedures such as injecting females with hormones combined with growing the embryos in a dish affected imprinting. The team ultimately found that indeed they did—but equally so across all four age groups.

The results, published in Clinical Epigenetics in November 2019, were "promising," says Mann. "We thought we would see changes in DNA methylation with advanced maternal age, because we know there are biological pressures on the system," she says. "It was good to see that age was not a problem."

Mann notes that there's at least one caveat to the study: The oldest mice her team tested were just 14 months of age, and although that is an advanced maternal age for mice, the human equivalent of 45-plus years leaves more time for molecular damage to accrue. Researchers must test the finding in eggs from humans of different ages to be sure, she says.

Still, the findings hint that while some factors affect genomic imprinting in the embryo, others do not. "Now we can focus on narrowing in on those biological factors," she says. Her group is trying to tease out exactly how hormone treatments and other aspects of ART affect gene expression in early embryos. They also plan to perform a similar study in older fathers, Mann says. "The literature is now suggesting that there may be biological effects with advanced paternal age." ■

SERGEI DUBROVSKII/GETTY IMAGES

OUT IN THE COLD

NEARLY HALF OF TRANSGENDER YOUTH AVOID DISCLOSING TO THEIR DOCS

BY HEATHER BOERNER

Gina Sequeira (Fel '20) remembers what it was like to be a young person visiting doctors who assumed she was straight—and how that made her doubt that those clinicians were safe to come out to as a queer person.

So when an adolescent patient of hers at UPMC Children's Hospital of Pittsburgh's Gender and Sexual Development Program told her that a previous provider had refused to treat them after the patient explained that they were transgender, Sequeira wondered how many other patients in the program had avoided talking to their physicians about their gender identities.

The answer, it turned out, was more than Sequeira could have imagined.

According to her paper, published in the Journal of Adolescent Health in February, almost half—46%—of the young people surveyed (204 of the clinic's patients, ages 12–26) had purposefully avoided disclosing their gender identity to their provider, even when it was important to their health. A quarter hadn't disclosed their gender identity to any provider outside of the gender clinic.

"It really opened my eyes to how much work there still is to do as health care providers and health care systems" to make clinics welcoming to all young people, Sequeira says.

The findings are especially important because data have shown that parental support and access to gender-affirming care in adolescence and adulthood is associated with lower rates of depression and anxiety, and fewer suicide attempts—all of which are far more prevalent in transgender people than in the general population.

Nondisclosures can have wide-ranging health consequences, says Gerald Montano, medical director of the Gender and Sexual Development Program at Children's, Pitt assistant professor of pediatrics and Sequeira's mentor.

Montano recalls an adolescent transgender girl who had wanted to start hormones as part of medical transition, but her parents weren't ready. So the teen went to another clinic.

"She passed really well, so [physicians] didn't know she was assigned male at birth, and they started her on hormonal contraception," he says. "That's not … the right medication to help affirm someone's gender identity."

Or in another example: Imagine a young man in the emergency department complaining of abdominal pain, but failing to disclose that he has ovaries.

"That's critical information to make sure that I'm working up that patient … in the most appropriate way," Sequeira says.

The onus to encourage disclosure is on providers, not patients, she says. In the survey, 47% of participants said they'd like the provider to initiate a conversation on gender, preferably during the confidential portion of the exam. "We are not creating a space that is welcoming or safe for young people to talk about their identities," Sequeira says.

She notes that it's "very likely" that her survey respondents—all of whom were patients in UPMC's multidisciplinary gender clinic—are not representative of the scope of the problem in the broader population of transgender youth. A vast majority of the respondents have "pretty significant parental support," she says, and almost 90% of those patients are white.

Sequeira—a Pitt alum now at the University of Washington—is pursuing a follow-up study via social media to include a more diverse and representative sample of trans youth.

Before her study, Sequeira was already routinely asking her patients about their support networks. Now, she says, she also asks patients which health care providers they are out to, so she can communicate effectively with the team without unintentionally outing the patient.

She wants more insight. "How can we provide better education for everyone in the health care delivery system, from the front desk staff to the nursing staff to the physicians? These data highlight the continued need."

To patients considering disclosing their identity to a provider, Sequeira says that the "when" and the "how" of this decision are extremely personal. There is no one right way.

"Just because disclosure looks a certain way for one person does not mean it has to look the same for someone else. It really should be up to each individual person to decide what feels right for them." ■

"RACE" IS NOT THE RISK FACTOR, RACISM IS

BY ELAINE VITONE

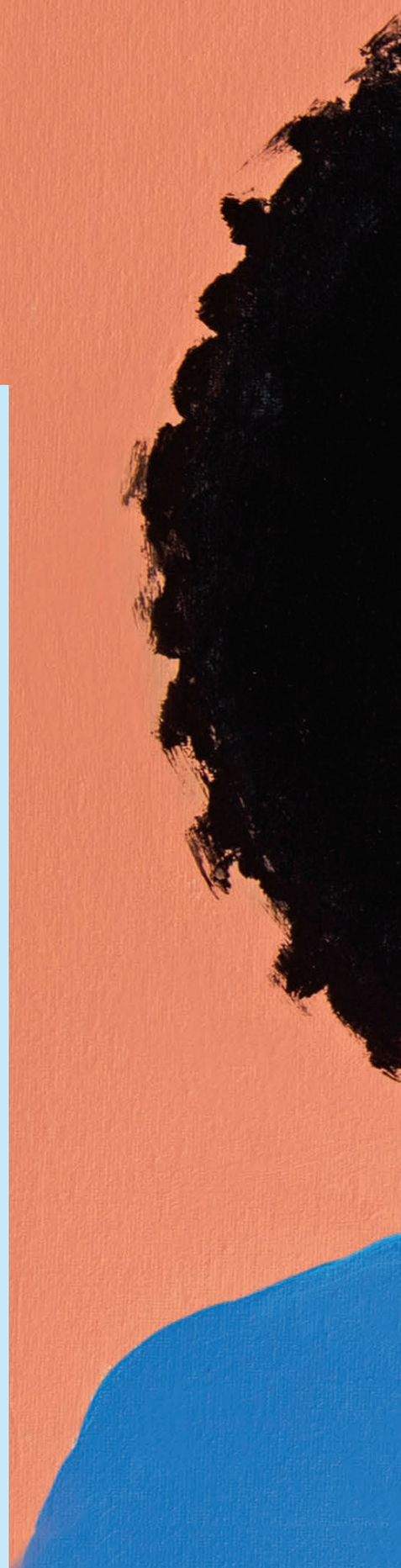
PAINTINGS BY JASMINE GREEN

GROUNDSWELL

In August of 1953, in rural Hale County, Alabama, two immigrants from Jamaica were expecting their second child, a baby girl. But when the big day came, the local hospital was not an option. The couple's choices were: drive more than 100 miles away to the nearest integrated hospital in Birmingham or deliver in the next town over, in the office of a rare general practitioner who was known to open his door to Black patients.

They chose the latter, and that was how Jeannette South-Paul (MD '79) came to be. Her mother gave birth on an exam table, then rested for a couple of hours on the doctor's waiting-room couch until she felt better. And then they went home.

The family eventually moved to downtown Philadelphia, where her parents ran a rescue mission for 34 years. South-Paul, her parents and her five brothers and sisters lived above the mission. She grew up helping out, serving meals. On Saturday mornings in high school she ran the thrift shop, selling clothing for 50 cents a piece.



Modern medicine's promise is bountiful health. Why have Black Americans been left behind?

This is where her desire to pursue medicine began: surrounded by the everyday differences in how people are treated, and the toll those differences take "on emotional, spiritual and physical health," she says.

Today, South-Paul is a U.S. Army colonel and recently retired Andrew W. Mathieson Professor and chair of family medicine at the University of Pittsburgh—though she certainly doesn't act retired. She's often Zooming for four hours a day with Veterans Affairs and other committees. The recipient of the American Medical Association's Pride in the Profession Award, the Joy McCann Foundation prize for mentorship and Pitt Med's own Black Bag Award (which honors a faculty member each year for work with underrepresented minority students), South-Paul has dedicated her career to equity in community health in her many roles: researcher, medical educator, physician, mentor—and potluck host for up-and-coming women in medicine.

South-Paul cowrote the grant that established the UPMC Matilda H. Theiss Health Center, UPMC's first federally qualified health center; it was funded for 17 years. The center is located in Pittsburgh's Hill District—the same neighborhood she called home as a med student. In the '70s, landlords in Pitt's backyard, Oakland, would not rent to her.

On a recent Zoom-filled summer afternoon, from her new home office in Maryland, South-Paul explains it was no surprise that COVID-19 has not turned out to be the "great equalizer" that politicians, celebrities and the media predicted in the early days of the pandemic. The novel coronavirus is much more lethal to Black and Brown people across the United States, and unsurprisingly so—"not because they are genetically less valuable or weaker," she says. No. Nor is this some mystery we need samples and scans to uncover.

The death toll, rather, is the sum total of the realities of American life that stare us all in the face every day.

Consider public health experts' best advice: Stay home and flatten the curve. Service-sector and other jobs that cannot be carried home in a laptop case (and that usually don't come with health insurance) are overrepresented among Black and Latinx populations. So are reliance on public transportation to get to those jobs and more densely populated housing and multigenerational residences to come home to.

Consider the lungs, where we first learned this pathogen sows devastation: Black Americans are up to three times more likely to land in the hospital with an asthma attack. "We know that asthma rates in children are especially high in Allegheny County and specifically high around some of these manufacturing plants," South-Paul notes. Throughout the country, Black Americans are 75% more likely to live near industrial facilities—and the environmental toxins that come with them, according to a recent report cosponsored by the NAACP.

The cardiovascular system and kidneys, which are also embattled by COVID-19, deteriorate absent a diet of nutritious, whole foods. But such a diet is a luxury. Half of all low-income neighborhoods in the United States are food deserts. Black Americans, the most segregated of ethnicities, have the highest poverty rates in the country. Black Americans are twice as likely as white Americans to have diabetes and 40% more likely to have high blood pressure.

Remember Hurricane Katrina, South-Paul asks? In that crisis, the public safety dictate was: Get out of town. But that was a plan hatched by those with cars and credit cards and privilege. Meanwhile, residents of the Lower 9th Ward faced the storm unaided, while dozens of city buses—the obvious tools of a lifesaving mass evacuation that could've been—sat idle in a parking lot.

"I can give example after example through my career. Every time there is a crisis, that crisis is superimposed on longstanding structural inequities," South-Paul says, citing HIV and the H1N1 virus, as well. Not an equalizer, great or otherwise, among them.

In recent years, medical education at Pitt and elsewhere has increasingly focused on social determinants of health (factors like socioeconomic status, education and health care access), which we've covered in this magazine. We've touched on bias. We've touched on race, our language at times falling short; we've called race a "risk factor" and failed to fully explain that it's inequities and discrimination—not Blackness—that cause disease. We missed the story.

A groundswell of data gives chilling credence to the fact that there's more to health inequities than just income or education. Further, the way that many of us talk and write and teach about race all too often is: Wrong.

The point we've been missing—the one that should not have been such a shock to anyone—was that it wasn't race, but racism and its legacy, that sickens, maims and kills.

To be clear: From a scientific perspective, the word "race" should have quotes around it. We've known since the 1990s that human beings are 99.9% genetically identical. For all of Western medicine's attempts to force taxon-

Chief complaint: Sick and tired of being sick and tired.

A groundswell of data gives chilling credence to the fact that there's more to health inequities than just income or education. Further, the way that many of us talk and write and teach about race all too often is: Wrong.

omy on humanity, race is, in reality, nothing more than a social construct. An aspect of identity. An idea.

But it's a powerful idea at that, and its impact on health cannot be ignored. Through discrimination and bias—conscious or not—race shapes every facet of American life.

As Harvard University's David Williams, who has studied health disparities for decades, explains in his 2017 TED Talk (which has been viewed 1.2 million times): In one study, Black teens who reported higher levels of discrimination had higher blood pressure, stress-hormone levels and weight by age 20. And through time, these stressors went hand in hand with obesity, cancer, heart disease and, sadly, premature mortality.

"Most surprising of all," Williams says in his presentation, "whites who have graduated from high school live longer than Blacks with a college degree or more education."

One of the most shocking examples of health care inequities is at the bedsides of new mothers.

Nationwide, African American women are four times more likely to die or nearly die as a result of pregnancy than white women.

These data support a hypothesis known as weathering, which has been gaining momentum in scientific circles for decades. It goes something like this:

Compare two people over time. One lives in an optimal environment, with access to necessary resources and relatively few stressors. The other person has the opposite experience, and as the years pass, their body is worse for the wear. This, the thinking goes, is why diseases present at much earlier ages in Black Americans than in white Americans.

South-Paul, who has served on several task forces through the years for the National Academy of Medicine, says the data are clear: The amount of stress a person is under influences their susceptibility to chronic conditions.

"This is not a mystery. This is not new."

WHY THE DISTRUST?

Picture a medical team on rounds. A patient, propped up in bed, follows the group's discussion of her illness and treatment response, and how best to move forward toward recovery. A plan emerges. The attending physician tells the patient what, in his informed medical opinion, should happen next.

OK? he says, looking at the patient, ready to move on to the next bed.

But her gaze is elsewhere, fixed on the medical student in the room.

Is that right? the patient asks the young third-year in a short white coat. *Do you agree?*

And the reason for this hesitation, this need for approval from the greenest member of the medical team, is because the patient is African American, and the medical student—the only other Black face in her sights—is the only person in the room whom she trusts.

This is a scene many of our institution's Black students and trainees would find familiar, says Pitt's Esa Davis, an MD/MPH. Davis is associate professor of medicine and of clinical and translational science and director of the UPMC Tobacco Treatment Service, as well as of the Career Education and Enhancement for Health Care Research Diversity (CEED) Program. She's also associate director of the Clinical and Translational Science Institute KL2 Scholars program.

When I first brought up the subject of patient trust, I was expecting to hear about history: The Tuskegee syphilis study. The Cincinnati radiation experiments. Sterilization at the hands of eugenicists. Surgical experiments in the era of American chattel slavery. Separate but unequal Jim Crow hospitals. Henrietta Lacks' stolen cells.

Instead, I heard tales of health care providers—today, not decades ago—who do not listen. Who do not make eye contact. Who do not believe patients.

Davis, who helms two training programs for junior faculty members, has been a mentor, sounding board and coach for dozens of emerging Pitt-minted physicians and physician-scientists of color for nearly a decade.

And to many of her patients, she is a singular source of comfort in navigating a fraught health care system.

"Honestly [trust] is probably the reason why a majority of the patients who come and see me, come and see me," says Davis, who is an African American. "Because we start on equal footing."

Bias is mistrust's flipside and reason for being. And unfortunately, it has been well documented in medical literature, from 20 years ago to the present day, explains assistant professor of medicine Utibe Essien, a millennial in a bow tie. (Well, usually, anyway—in the summer heat, he wears a Harvard T-shirt for our video chat.)

Essien, a core investigator with the Center for Health Equity Research and Promotion in the VA Pittsburgh Healthcare System, studies clinical bias; his expertise has thrust him into the national spotlight in recent months, with interviews with The Washington Post, STAT News, Vox, CNBC and The New York Times.

Recently, on NPR's On Point, Essien said that, along with poverty, trust is a critical issue around health equity in the pandemic:

"We have a long, long, long history of distrust in the health care system in African American communities. Rightfully so. And individuals in those communities just thinking, *Oh, I'm probably not going to be tested. The doctor might not believe me.* That certainly is compounding the issue."

Essien cites a 1999 New England Journal of Medicine (NEJM) paper, wherein researchers polled cardiologists on how they would treat hypothetical patients. The researchers sent videos of actors, who represented a variety of ethnicities and genders, describing chest pain. And despite the actors' identical scripts, the physicians were more likely to order the appropriate workup for a suspected heart attack for white patients, especially white men. Black women were the least likely to receive the standard of care.

In recent years, the medical community has finally begun to take seriously a startling race-based assumption that's baked right into everyday clinical practice and instruction (after the University of California, San Francisco's Vanessa Grubbs and others had been sounding the alarm for more than a decade).

It has to do with the GFR (for glomerular filtration rate), an algorithm that's been the go-to measure for kidney function and health for decades.

As it turns out, when doctors dutifully check the box for "African American," the system automatically assumes the patient has more muscle mass, explains Essien (who is Black), "whether it's someone like me, who has not been to a gym in the last three months because of COVID, versus a white bodybuilder."

As a patient's kidney health deteriorates, their GFR score declines. The lower the score, the closer that patient moves toward a spot on the kidney transplant wait list. The system's race-based assumption means Black patients automatically score higher—and thus, must wait longer, and grow sicker—than white patients do to even get in line for this lifesaving intervention.

Another algorithm known as the PFT (for pulmonary function test) presumes that Black people have lower lung volumes than white people, a falsehood that was popularized by the infamous pre-Civil War physician Samuel Cartwright.

Today, the legacy of that lie persists in inconsistent assessments of lung function, which likely contribute to disparities in pulmonary care.

In Cartwright's day, that same lie was used to justify slavery. Hard, forced labor, he wrote, moves blood to the brain, "and it is the want of sufficiency of red vital blood

that chains [enslaved people's] minds to ignorance and barbarism when in freedom."

To date, with the publication of an NEJM paper out of Harvard this June, there are 13 known algorithms with race-based assumptions, spanning a range of medical questions related to breast cancer risk, heart surgery complication risk, vaginal versus caesarean mode of delivery and more.

In a 2016 study, University of Virginia researchers interviewed white med students and residents about perceptions of ethnicity and physiology. The racist notions that about half of these respondents went along with boggle the brain: Black patients have thicker skin, they said. Black patients' blood is thicker and more likely to pool and clot, they said. Black patients have fewer sensory nerve endings and feel less pain, they said.

If these were the preconceived notions of actual medical doctors and doctors-in-training, says Essien, "that makes you wonder what other people are thinking."

That same study found that the residents who responded in this way were more likely to undertreat pain in Black patients—a disparity that is well documented in the literature.

In 2018, Essien published in JAMA Cardiology a study showing that Black patients were about 30% less likely to receive the latest, greatest medications for atrial fibrillation, a chronic heart disease that causes strokes. And when his team controlled for other factors like age, whether or not the person has insurance or whether or not they are hypertensive, there was still a difference of 20%.

"There must be something else living in that 20%," he says, "and that's where I'm really hoping to dive in with my research now—talking to patients and providers about what could be driving that difference. If it's not clinician bias, then is it patient trust? Is it just patients' broader social factors?"

Factors like, for example, the cost of medication. Davis recalls a scene from her own rotations in med school in New Jersey. A patient, an African American man, had just had a stroke. And the resident on the team presented the case as: *This patient was noncompliant and did not take his medication.*

Davis spoke up and told him, *No, that wasn't what had happened.*

In reality, the cost of his prescription rivaled his rent. So he paid his rent first, with the intention of filling his script later, when he could get the money together—"what any reasonable person would do in that situation." This patient needed to be connected to a social worker, she said.

It's moments like this, says Davis. There's a judgment, a key omission, a miscommunication, a flat-out falsehood. "This is how trust gets eroded." When the physician isn't listening—really listening—the patient knows it, and that can influence expectations of the care they'll receive the next time they encounter a white coat.

Davis is acutely aware of all of this in every clinical interaction. "I *listen* to my patients," she says.

And when she has to refer to a specialist, she first sits down with the patient for a chat: *These are the questions you need to ask. These are the answers you need to make sure they give you.*

And before her patient heads out, Davis contacts the doc personally: *I'm selecting you for a reason—because I know that you will sit and talk and provide all their options.* She follows up after the fact, too, to see how it went. And if that specialist falls short? No more referrals.

But for some patients, despite all these safeguards, trust is so shattered that even when all goes well, they still will not follow through with the specialist's advice until they have taken yet another step: They come right back to Davis.

Dr. So-and-So said this and this. I told him I needed to talk to you first.

"It happens all the time," Davis says.

Without trust, cumulative effects on health snowball. Age-related screenings and other preventive care are a much tougher sell—let alone setting foot in the clinic for an annual exam in the first place.

A wealth of data show that when doctors and patients identify with the same race or ethnicity, physician judgment calls land more often in the patient's favor, whether it's ordering flu shots or an interventional heart procedure or a script for pain meds. But today, only 5% of doctors are Black and 5.8% are Latinx, and in competitive specialties like orthopaedics, plastic surgery and dermatology, the numbers trickle down even further.

In June, Essien coauthored a perspective paper in NEJM examining the impacts of changing the U.S. Medical Licensing Exams—which, as of 2021, will be scored on a pass/fail basis. This will be a change for the better in terms of medicine's pipeline problem, he says. Because throughout the last 20 years, the exam has become a means of exclusion and "weeding people out," he says.

When doctors dutifully check the box for "African American," the system automatically assumes the patient has more muscle mass.

Underrepresented minority students tend to score lower on these exams, and this is due to a number of reasons that largely point to historical inequities in communities of color, the authors note. A low test score can be a crushing blow to a med student's confidence at a pivotal moment, the start of the third year. And all of this for a test that has not been proven to correlate with future clinical competence.

"Standardized exams can be the great equalizers they are purported to be," write Essien and his colleagues, "only if everyone has access to the resources required to excel on them," namely: high-quality early education, test preparation and science programs, and a community of professionals to mentor and guide a young MD in the making.

Essien and his coauthors, Quentin Youmans of Northwestern University and Quinn Capers IV of Ohio State University,

call for a more holistic review of applicants—and critically, providing busy doctors and program directors the support they need to make that kind of review possible. (Capers, by the way, spoke on these topics at Pitt in 2017—you can see his slides at pi.tt/capers17.)

This would be a more subjective process, yes.

"Nevertheless, we believe that holistic review will be a tide that raises all ships equitably," the authors write. The diverse workforce it makes possible can be a powerful protectant against the twin dilemmas of clinical care: clinician bias and patient mistrust. In these, subjectivity is alive and well.

The time to diversify the workforce is *yesterday*, says Davis. While this is true across the health sciences, the shortage of physicians of color, in particular, is urgent. "We really do have to start today to change what it's going to look like in 10 years, when all these people get through and get finished and board certified and through residency and fellowship.

"It's a minimum 10-year process"—and even longer in certain specialties, says Davis. And for docs going into academic medicine—the pipeline to build the pipeline to come—the need is even more dire, she continues. Physician-scientists are on the decline overall.

The time to diversify the workforce is *yesterday* . . . While this is true across the health sciences, the shortage of physicians of color, in particular, is urgent. "We really do have to start today to change what it's going to look like in 10 years, when all these people get through and get finished and board certified and through residency and fellowship."

IN A PANDEMIC

When COVID-19 hit Boston, about 40% of the patients admitted to Massachusetts General, where Essien trained, were Latinx. About 80% of those patients were Spanish speaking. That underlined a whole new set of urgencies.

"How challenging is it to be able to have these really critical, heartfelt, end-of-life conversations with a patient whose language you don't speak?" he asks. Bringing in an interpreter means another person in the room—and interpreters are not always available. Conversations through remote interpreters can be halting and awkward.

Of course, not all COVID-19 patients are awake and able to speak for themselves.

Picture a medical team in a moment of crisis, a triage crew assessing options as the worst nightmare has been realized: There are more patients who are critically ill with COVID-19 than there are resources available to treat them—namely, ventilators.

Perhaps their exchange is in the shorthand that is typical in the medical sphere:

A 58-year-old African American male . . .

A 63-year-old white female with . . .

And darting around the room is the word *comorbidities*—underlying conditions that are not equalizers at all.

Whose faces are at this table?

To assist hospitals in implementing a fair approach to allocating scarce resources during the COVID-19 pandemic, Pitt Critical Care Medicine's Douglas White has spearheaded the creation of a model policy. It has been endorsed by the Commonwealth of Pennsylvania and has been adopted or is being considered for adoption by several hundred hospitals across the United States. (It can be downloaded here: pi.tt/modelhospitalpolicy.)

RISING

In response to concerns raised by underrepresented minority students in letters and town hall meetings, Anantha Shekhar—the new John and Gertrude Petersen Dean of the School of Medicine and senior vice chancellor for the health sciences—made addressing discrimination and xenophobia a top priority from the very first month of his Pitt tenure this summer. After a series of frank discussions with Black, Asian and Pacific Islander students, in July, he announced his first concrete steps toward change: forming a rapid response team to review objectives identified by Black medical students; establishing a dean's scholarship to be awarded to up to three underrepresented minority students annually; and creating an Office of the Ombudsperson, which will offer confidential and anonymous support to students within all six of Pitt's health sciences schools.

Around this time, I began a listening tour of some two dozen School of Medicine faculty, most of whom are people of color, to discuss the effects of discrimination and inequity on health. (It quickly became obvious that these conversations were not all for this single story, but the first of many in forthcoming issues of Pitt Med.)

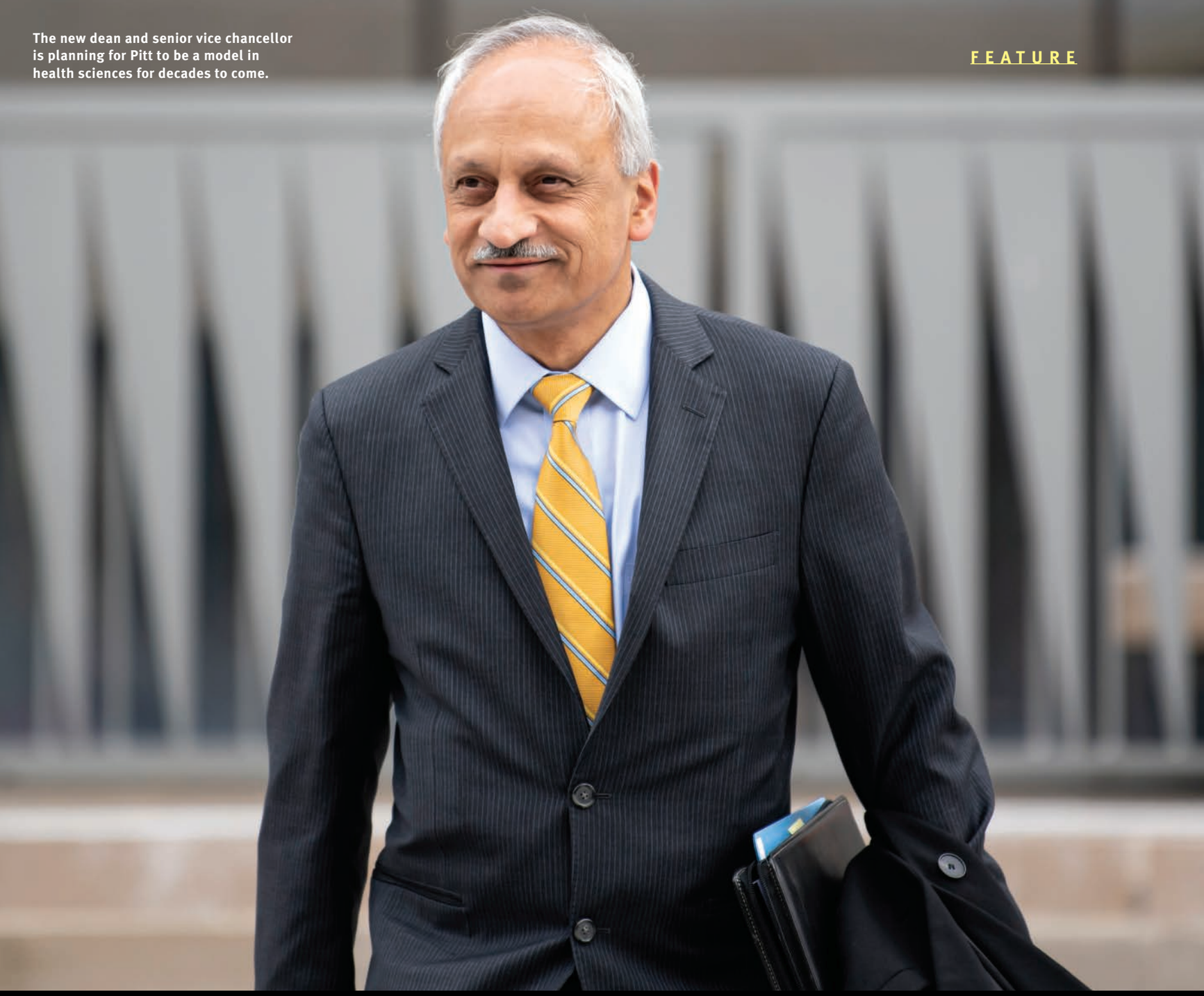
At the time of these interviews, the school's task force was just days or weeks into existence. The Zoom huddles were just beginning.

Still, I heard sentiments of relief for finally being able to name the 10,000-pound elephant in the room. Cautious optimism and hope that perhaps this really is a turning point—that the school will step up to the challenges. Delight in hearing that Dean Shekhar, by all accounts, is deeply committed to social justice and has been for some time. And encouragement at seeing a surprising number of white colleagues getting involved.

Most of all, I heard gratitude that Pitt Med students had made this moment possible.

"They are realizing that in this world that we live in, we cannot continue to teach medicine as business as usual," says Essien.

South-Paul, who has worked on behalf of underserved patients as well as underrepresented minority physicians for decades (and still does in her so-called retirement), cheers for this new chapter. "I think the young people have really energized us," she says. "They said, *We won't put up with this*. We have to really celebrate these young people. They're getting us going." ■



The new dean and senior vice chancellor is planning for Pitt to be a model in health sciences for decades to come.

THE CONNECTOR

ANANTHA SHEKHAR: MEANINGFUL CHANGE HAPPENS WHEN WE WORK TOGETHER

BY CHRISTOPHER SOLOMON

PHOTOGRAPHY BY AIMEE OBIDZINSKI

There's an issue with the way we teach our care providers. In the real world, doctors and nurses work shoulder to shoulder every day with pharmacists and discuss how to help their patients. Surgeons turn over post-op treatment to therapists. No one professional can meet the multiplicity of a patient's needs.

For the most part, these caregivers learn how to work together on the job. Miscommunication can mean medical errors, poorer outcomes for patients, perhaps even unnecessary death. But when these professionals actually make care decisions together and know how to collaborate, patients do better and are more satisfied, studies show. Team members also feel more valued.

And yet for all these benefits, schools often allot only a day or two in the curriculum for interprofessional education. The University of Pittsburgh wants to do better—and accrediting agencies now demand better.

When Pitt went looking for the right person to oversee its health sciences schools, it wasn't looking for someone who was content to manage the status quo of six nationally respected programs. The search committee wanted someone who would forge new connections; someone who would see new paths forward.

It found Anantha Shekhar at Indiana University, home to the nation's largest medical school. This summer, Shekhar, an MD/PhD, joined Pitt as the John and Gertrude Petersen Dean of the School of Medicine and senior vice chancellor for the health sciences. Taking the job, he says with eagerness, was an opportunity for him "to bring together all of the health sciences—not just medical, but nursing and public health and various other kinds of ways one can disrupt health care."

One achievement on Shekhar's long resume while in Indianapolis was to bolster the institution's interprofessional collaborations.

At one point in that work, he encountered a snag: IU has no pharmacy school. Shekhar was undeterred. "He reached out to another university that had a pharmacy school, to bring them into the fold, so that he could make a complete health professions team," says Jacqueline Dunbar-Jacob, dean of Pitt's School of Nursing and a member of the search committee that helped bring him to Pitt. Such effort to get schools at IU, and beyond, talking to one another was "just incredibly exciting" to the committee, says Dunbar-Jacob.

Shekhar has made a career of pushing past existing fences and into the fertile fields that lie beyond. Since his arrival at Pitt on June 1, he already has begun to tackle that issue, modifying what was to be a medical school building to create shared space among health professionals. He also assembled a group from the various schools to produce an education plan, says Dunbar-Jacob.

The year's upheaval has not much slowed his efforts, she says.

"The University of Pittsburgh is only as successful as our students and scholars," says Chancellor Patrick Gallagher. "That's why, when we sought to fill this position, we looked for a leader who could spark unprecedented levels of collaboration, innovation and impact. Anantha was it—he checked every box on our ambitious list—and the future of Pitt Health Sciences looks even bolder and brighter in his capable hands."

Shekhar doesn't cut the figure of a trespasser across borders and a tilter at siloed institutions. In conversation he speaks with the even, approachable voice of a psychiatrist, which he is. (He met his wife, Gina, a child psychiatrist, in residency. The couple has two children, an attorney and a cancer geneticist.) Even on a Zoom call, he wears a tie, knotted neatly below a trim mustache that is salted with his 63 years. In meetings, he is known for listening more than talking.

Time and again at IU, however, where he was on faculty for 29 years, some of his most intriguing successes resulted from a willingness to walk right past the tired lines that separate disciplines and link people with different perspectives to see what results. He is a shepherd who favors his flocks mismatched, believing that a diversity of skills and views make for more productive, vigorous offspring than what the standard flock delivers.

"I have really enjoyed bringing people together, connecting the dots," he says.

Shekhar now brings that passion to an enormous job at Pitt. In his new role, he helps shape the careers of more than 6,000 faculty and staff and the success of 5,000 students. He is responsible for encouraging the growth of Pitt's medical research enterprise and succeeds Arthur S. Levine, who steered the health sciences to national research prominence and more selective admissions during his two-decade-plus tenure.

The upside of such responsibility is having a hand on so many levers.

"What I could do in Indiana, I can do three times faster and three times bigger with Pitt. There's tremendous skill here," he says.

He works closely with UPMC, which operates a large health insurance company, UPMC Health Plan. "We have an insurance product that could actually pay for transforming health care," he says. "So, that was a really unique opportunity that very few academic centers can provide."

In a late August discussion, Shekhar outlined eight ambitious goals he has for the

health sciences throughout the next five years. (See "Bold Goals.") One goal is to boost Pitt's ability to get novel discoveries into the clinic where they can help patients. Drug development often takes a dozen or so years to go from laboratory to marketplace, says Shekhar, yet that doesn't always need to be the case. For example, with new therapeutics such as CAR-T cells, "theoretically, they can get to at least patients, if not to market, within the first three years or so," he says. Doctors take these cells from the patient, modify them, then return them to the same patient—so the process often is considered safer and the approval happens faster.

Pitt already is a standout among research institutions; it garnered more than $700 million in research grant expenditures in fiscal 2020. Several health sciences schools were in the top 10 among peers for National Institutes of Health research dollars. Pitt can do even better, Shekhar says.

In fiscal 2019, University health sciences researchers secured 83 U.S. patents; garnered 152 licenses, options and deals; and began 15 startup companies. The University hovers around the top 50 universities in the world for innovation, according to Reuters. Shekhar wants the University to reach the top 10 within five years. Part of how the University gets there is via another goal: dramatically increasing NIH funding.

Grants that researchers receive from the NIH are a good benchmark of a university research program's health, says Shekhar. He wants Pitt to increase overall NIH grants by 10% year after year for the next five years:

"What that will actually do, really, is place us in the top two or three medical schools in the country."

That goal may sound pie in the sky. Yet Shekhar has a track record in the department of the unlikely: From mid-2015 until he departed in May 2020, when Shekhar oversaw all research at IU's School of Medicine, NIH funding grew there by 73%.

How Pitt grows these grants leans in part on Shekhar's long-standing talent for bringing people together who don't always talk to each other.

"Pitt is very strong in—and a lot of its rise over the last 20 years under Dr. Levine was related to—sort of individual laboratory-scale research. So, a lot of R01 grants from NIH, the bread and butter of biomedical research," says Jeremy Berg, associate senior vice chancellor for science strategy and planning in the health sciences and former editor of Science magazine.

"But I think the opportunity now is to try to do things that are more team science, more research that brings together basic scientists and clinical translational scientists and to try to tackle problems that can't be solved by just one lab," he says. "That's where Pitt has lagged behind many of our peer institutions." Those projects are often larger and more ambitious. Dozens of existing centers and institutes already reach across departments, schools and universities here. Berg has been working with Shekhar to identify opportunities where the University may be particularly well-placed to win these large interdisciplinary grants.

"It doesn't take a heavy hand" to encourage such work, Berg says. "It's just a question of starting the discussion and getting people talking to each other, and then the scientific opportunities and enthusiasm will take over."

At IU, Shekhar brought in research powerhouses Purdue University and the University of Notre Dame to form the Indiana Clinical and Translational Sciences Institute. It was, and remains, the only statewide institution of its kind. Shekhar was its founding director. Indiana's institute broke down long-standing barriers between the universities. But collaboration had its challenges: Purdue's world-famous engineering program was an hour away, for instance. At Pitt, Shekhar again sniffs advantage: "Pitt has its own engineering school, plus we have Carnegie Mellon University next door."

More collaboration yields more ingenuity which yields more breakthroughs. Then, says Shekhar: "We increase the number of patents issued. We increase the number of commercial entities using a patent to build a product."

Yet, right now, "There are many, many barriers for an average investigator, or even a bright young scientist, to think about commercialization of their products or think about translation," he says. He'd like to see more CEOs of startups and other business executives available to brainstorm with scientists. And a commercial zone, in which drugs for testing can be manufactured to high standards.

Shekhar has made a career of pushing past existing fences and into the fertile fields that lie beyond.

Shekhar wants to foster a culture of entrepreneurship so that talking to an expert about commercializing an idea is about as routine as heading to the corner café for a cup of coffee. Such explorations should be seen as natural, not something a few enterprising scientists here and there decide to do.

And then, once a venture lifts off, he wants to keep that venture and its energy here in Pittsburgh. "There's a whole ecosystem that we need to create for this to happen, organically and all the time."

Shekhar entered medicine, in part, because he was fascinated by the brain—how it works, why it makes us do what we do.

Then, sadly, while in medical school at St. Johns Medical College in Bangalore, India, the experience of a close boyhood friend gave him an intimate look at brain pathology. His friend, who was a student in the veterinary

school, began to have trouble seeing. One night, as the two walked together, the friend walked straight into a pillar. It turned out that a brain tumor was pressing on his optic nerve. Soon the young man's personality changed and then changed again. Shekhar's friend died a few months later. By the end, his friend felt no sadness at what was happening, only happiness. The tumor had stripped him of grief, of regret.

"That sort of led me to saying, 'How does the brain regulate everything we do and everything we feel?'" Shekhar says. Today in addition to being a psychiatrist, Shekhar is a well-respected neuroscientist. His work has resulted in five novel approaches to treating psychiatric disorders that are in various stages of commercialization. (See "On Path to the Clinic.")

People don't always like change. Shekhar acknowledges that his even demeanor and his training have served him well as he's asked others to stretch beyond their comfort zones. "People are very complex and have various complex motivations, reactions," he says. "So, that sort of helps me be much more tolerant of deviance from my own mission, if you will, and at the same time be more empathic. It also helps me get to the idea of what would be a win for that person," he says. "That's very critical, especially when you are trying to persuade people to do things that they may not naturally think about doing."

Among all of this—the getting grants, the making stuff, the cajoling—he tries to never lose sight that it is only a means to bigger ends. What's at stake? Delivering the best care, healing our patients, making our communities healthier.

"What I could do in Indiana, I can do three times faster and three times bigger with Pitt."

The world shifted seismically in the months between when Shekhar accepted the job in January and when he arrived on campus. He came on board in the thick of a global health crisis, assuming the responsibility to keep tens of thousands safe at an enormous institution—and within neighboring communities, too—while navigating closures and reopenings. Immediately, he sat at the head of the table for a new advisory group responsible for guiding University decisionmakers as they respond to the virus. Shekhar also pulled together a panel of physicians and other medical experts to staff Pitt's COVID-19 Medical Response Office, which oversees COVID-19 testing, contact tracing, reporting procedures and isolation and quarantine protocols at all five University campuses.

Meanwhile, Pitt scientists are determined to find a way out of the pandemic. Three coronavirus vaccines are under development here along with promising potential interventions.

Not only the coronavirus convulsed American society this year, of course. There has been new focus nationwide on structural racism and social equity. In June, some 400 medical school students and faculty attended a virtual town hall. At the meeting, Shekhar was asked to respond to a nine-page list of demands, several of those devoted to making the School of Medicine more equitable and welcoming.

It was his third day on the job.

"It was trial by fire," he recalls. That day, he mostly listened.

"He was careful not to overpromise and say that all these changes can be made right away," says Pooja Humar, a second-year medical student who was on the search committee that had identified him. But Shekhar says these issues have long been important to him. At IU, he'd established several programs to increase minority representation.

At Pitt, Shekhar made social equity a top priority. He's creating an ombudsperson program, which students across all the health sciences schools will be able to use to confidentially and anonymously address their concerns. He created three fully paid scholarships for underrepresented minori-

ON PATH TO THE CLINIC

As a neuroscientist, Anantha Shekhar has focused his research in part on developing treatments for psychiatric disorders that don't currently have effective treatments. Five of his efforts have been spun off into startup biotech companies. Here are three:

Most drugs that treat schizophrenia are dopamine blockers. Karuna Therapeutics, a public company, is evaluating a treatment that Shekhar and colleagues demonstrated in the early 2000s operates through a different mechanism. The treatment, now in phase 3 trials, seems to help sufferers think more clearly. Shekhar hopes it will be a "breakthrough."

Gate Neurosciences is another company, private at this writing, that is at work on several compounds for depression, bipolar disorder and anxiety disorders, he says. "One of the drugs works within 24 hours to improve depression and suicidal behavior."

Anagin is developing new treatments for post-traumatic stress disorder and chronic pain. *—CS*

ties. Shekhar also created a Rapid Response Team of more than two dozen faculty and students—with strong representation from the Black community—to help review the student concerns raised.

Low numbers of Black and Latinx faculty in the health sciences is an issue nationwide, and Pitt is no exception. He wants to see a significant increase in minority representation in the health sciences faculty in the next five years.

Humar has noted—with approval—that the medical school's curriculum has changed already. Required sessions now address bias and racism in medicine. Students and faculty discuss specific cases and ways in which a doctor-patient interaction reflected a lack of thought, or blind spot, or prejudice.

The curriculum is on Shekhar's desk for other reasons, too. In America medical school usually runs four years. It is not uncommon for a student to emerge with $170,000 to $200,000 in medical school debt alone, says Shekhar. As a result, a majority of students, staggering under this burden, head into high-paying specialties such as dermatology, radiology and anesthesiology.

We aren't hurting for specialists in these areas, notes Shekhar. "Whereas you don't get that many pediatricians, family medicine doctors and primary care doctors whom we need more of to actually improve our health care."

A national movement has been under way to change medical school. If the curriculum could be rejiggered to teach students the bulk of what they need to know in three years, then part of the fourth year could be a paid hybrid year in which the student is a trainee. That could reduce a student's debt by as much as $75,000, says Shekhar.

Pitt is now moving to join other universities that have adopted this model, but it will take time. A new curriculum may be ready for students entering in fall 2022.

With the world in disarray, some might wonder if all of this is a lot to tackle—if maybe a steady hand on the tiller would be job enough.

But to Anantha Shekhar, now has always been the right time to get to solutions.

BOLD GOALS

This summer, Shekhar laid out eight ambitious goals to make our academic health center—Pitt Health Sciences and UPMC—among the very best in the country by 2025.

1. Research excellence. Be top 3 in the nation.
A first step: Recruit, retain or rebuild in the most promising areas of science to grow NIH funding by an average of 10% per year.

2. Educational excellence. Be top 10 in the nation.
A first step: Transform the curriculum so that it provides the best integration of biological, social and cultural determinants of health and disease and the comprehensive basis of clinical medicine.

3. Clinical excellence. Be top 10 in the country.
A first step: Partner with UPMC to build more transformative therapy programs, on par with Pitt's famed transplantation program.

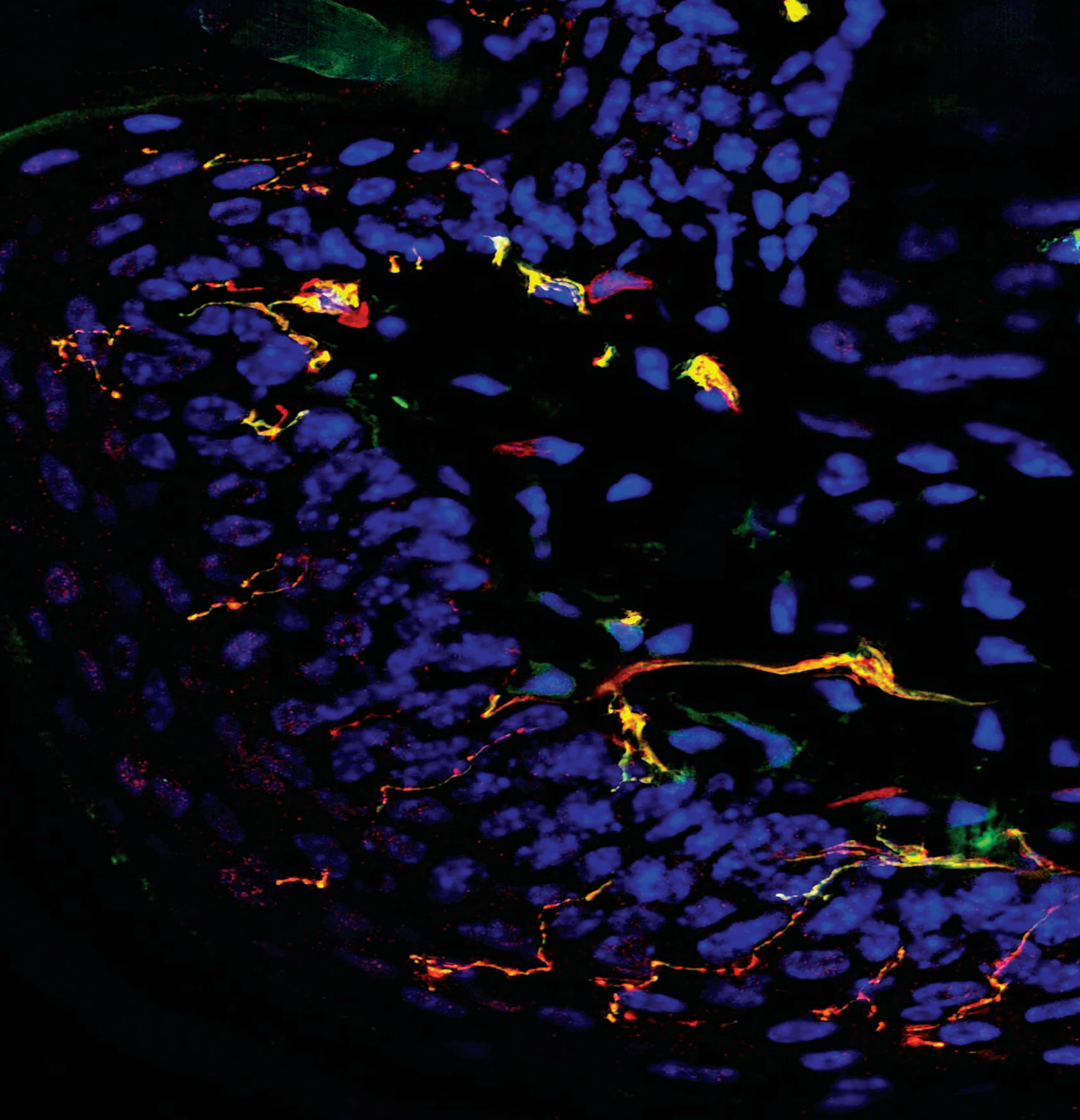
4. Translational excellence. Be top 10 in the country.
A first step: Align top research programs with tech transfer pathways and entrepreneurs in residence.

5. Community engagement and health justice. Be best in class.
A first step: Design community programs that make our neighbors healthier. With UPMC, put Allegheny County on track to being among the top 10 healthiest counties in Pennsylvania.

6. Faculty diversity, growth and leadership development. Be in top quartile of the country.
A first step: Create a cluster hiring program to increase underrepresented minority faculty.

7. Commercialization and product development. Be top 5 in the nation.
A first step: Create a precommercial incubator and begin plans for a biotech corridor.

8. Interprofessional education. Be a top performer among university health sciences.
A first step: Create an interprofessional education program across all six health sciences schools.



A Pitt team demonstrated that pain-sensing nerves help fight skin infections and prevent their spread, suggesting a previously unknown type of immunity. This image shows dermal and epidermal expression of ion channels (green) that allow pain to reach the brain from the skin. Here we can also see antibody expression shown in nerve fibers (red) and cell nuclei (blue).

SOME NERVE

PAIN-SENSING NEURONS ALSO FIGHT INFECTION IN THE SKIN | **BY GAVIN JENKINS**

On a sunny spring day, two kindergarteners are roughhousing on the playground. One boy pinches the other on the underside of his arm, twisting the skin hard. The boy being nipped cries in agony instantly. The nervous system is that fast. As his skin is tightly squeezed and turned, specialized nerve endings in his epidermis shoot a pain signal up his spinal cord to his brain and back to his arm in a millisecond.

While the nervous system serves as the body's information superhighway, the immune system acts like its missile defense operation. Defined by how it identifies and attacks pathogens, the immune system launches lymphocytes (B cells and T cells) and leukocytes (white blood cells) at viruses, bacteria and parasites.

And now scientists are beginning to realize just how closely these systems work together when someone is pinched, scratched, breaking out in a rash or experiencing a psoriasis flare-up. At least when there's skin in the game, so to speak, the systems work together.

When he started medical school at Washington University, Daniel Kaplan didn't know much about immunology, he says. Raised by virologists who worked in a lab together at Vanderbilt University, Kaplan fell in love with the immune system's "elegance" during his first course on the subject. He was captivated by the competition between cells and how they are widely distributed.

In particular, Kaplan became enchanted by the T cell: Its genetic shuffling that generates receptors to certain antigens. The highly choreographed process that weeds out and kills the T cells that can't detect pathogens. The suppression and removal of T cells that are reactive to proteins. A small slice of T cells left behind can detect a universe of troublemaking antigens.

"It's evolutionary theory writ small," says Kaplan, an MD/PhD professor of immunology and dermatology at the University of Pittsburgh.

Kaplan used to think the nervous system and the immune system hardly intermingled. He and other experts in the field weren't aware that neurons in the skin played an important role in integrating inflammatory signals and regulating inflammation. Then, in 2014, researchers at Harvard University published a study showing that when the nerves in the skin of an animal model of psoriasis are chemically removed, senses of pain and heat from inflammation don't arise.

At the time, Kaplan was working on a Candida infection project at the University of Minnesota. Reading the study, he realized that the Harvard researchers had used the same inflammatory pathway for their model of psoriasis as he was using on the models for his lab's study. Thanks to the Harvard study, Kaplan and his team soon concluded that they had overlooked pain-sensing neurons.

"We were like: *Oh, the nerves are one step upstream in the immune response to infection*," Kaplan says.

He and his team chemically ablated the neurons and showed that these particular neurons are required for an immune response to Candida albicans, a fungus that causes candidiasis, commonly known as thrush.

In 2015, shortly after finishing the Candida study, Kaplan left Minnesota for Pitt Med. But he continued to think about how the neurons were able to detect Candida. When he got his lab set up in Pittsburgh, he wanted to know: Is activation of the nerve alone sufficient to generate inflammation?

"To be honest, I didn't think it would be," Kaplan says. "It seemed unlikely that just neuropeptides could generate inflammation."

But Kaplan was wrong. And in collaboration with Kathryn Albers and Brian Davis, who are professors in Pitt's Department of Neurobiology, he and his team of researchers demonstrated that pain-sensing nerves—the same ones that tell you that you're in pain if you get pinched—help fight skin infections and prevent their spread. The finding, based on studies in mouse models and published in 2019 in Cell, suggests a type of immunity no one realized existed. That pain-sensing nerves can detect pathogens was known, but they showed that nerve activation alone was sufficient to trigger an immune response and also signaled protective immunity to sites adjacent to infection.

"It's a different way of thinking about the skin," Kaplan says. "It looks like the neurons in the skin are actually playing a pretty important role in integrating inflammatory signals and regulating inflammation."

Stretching across a total area of roughly 22 square feet for the average adult, skin is the largest organ in the human body. It regulates heat, contains nerve endings that react to hot and cold temperatures and acts as an anatomical barrier against an array of pathogens.

Kaplan, 52, is fascinated by the progression of skin diseases and by how immune cells interact with one another in the organ's layers. But what does he love most about studying skin immunology? The abundance of diseases for study it affords him.

"There are so many skin diseases that have dysregulated immune responses as part of their pathogenesis that we may have a real chance to have a therapeutic impact on patients," Kaplan says.

And he got into dermatology by accident. As a PhD student, Kaplan studied cancer immunology at a time when few believed the field had much promise. He spent years measuring the size of tumors on the flanks of mice. "It was something at which I was quite proficient," he says, dryly.

Like Pitt, Washington University's MD/PhD program was broken down by two years in the med school, followed by three years earning a PhD, and then ending with two more years in the medical program.

Kaplan assumed that he'd focus on hematology/oncology when he returned to medical school. But one day, a dermatology fellow who worked in a neighboring lab asked Kaplan to join a dermatology clinic. Kaplan went and was blown away by the diversity of skin diseases.

"Most of them had an immunologic basis, and I felt quite ignorant since clinical dermatology was entirely new to me," he says.

A resident asked Kaplan to help with an excision of skin cancer on a patient. She wanted him to measure the tumor size before excision, perhaps his only clinically useful skill at the time, he points out. "I decided right then and there to match into dermatology," he says.

Kaplan's passion for skin immunology has yielded results since he moved to Pittsburgh. His work has revealed the importance of TGF-ß (transforming growth factor beta)—a cytokine that controls proliferation in most cells—in maintaining resident memory T cells in the skin. His team showed that, after a skin infection, antigen-specific CD8+ T cells, which are white blood cells that kill damaged cells, including cancerous ones, migrate into the skin.

Kaplan calls his lab's research on the role of pain-sensing nerves in the skin's immunology, which he refers to as "the nerve project," the most exciting work he's done so far at Pitt. Why? *Lasers!* There are other reasons, of course, like revising how we think about our skin and the potential for therapies.

But Kaplan says optogenetics—the method of using a laser to control the activities of individual neurons in living tissue—made working in the lab fun.

Whenever Kathryn Albers looks up and sees Kaplan standing in her office doorway, he's usually smiling and energetic. "It's like: 'Okay, what exciting conversation are we going to have now?'"

JOHN ALTDORFER

From left: Kathryn Albers, Dan Kaplan and Jonathan Cohen. (Shown before the pandemic came to Pittsburgh.) Brian Davis is another key scientific collaborator.

Albers, a member of the Pittsburgh Center for Pain Research (PCPR) who became a fellow of the American Association for the Advancement of Science recently, met with Kaplan during his interview process at Pitt Med. When they spoke, Kaplan expressed interest in the center's work, and the two discussed how great it would be to collaborate if he moved to Pittsburgh.

He didn't wait long to take Albers up on the idea. On one of Kaplan's first days at the Thomas E. Starzl Biomedical Science Tower, he bumped into her in the hallway, and they discussed possible collaborative projects. Kaplan mentioned the Candida infection study he published before leaving Minnesota, and Albers told him that she and Brian Davis, a visceral pain expert at PCPR, had activated nerve fibers in mouse models using optogenetics.

They knew that the skin cells, immune cells and nerve cells were communicating. The cells have the same molecules and similar receptors; when one cell type is activated, the others respond in some way. But the team wanted to know how that response occurs and what the ramifications are in terms of the system. A project to find out seemed like a perfect extension of Kaplan's Candida study.

"When [Kaplan] came to Pittsburgh, it was an opportunity to really delve into the skin side of things," Albers says. "And also look into the immune system. Before [Kaplan] arrived, we really didn't have the expertise on board. He filled an incredibly valuable niche for us."

Like Kaplan's parents at Vanderbilt years ago, Albers and Davis are a married couple who share a lab. Davis' work examines how the peripheral nervous system (nerves and ganglia outside of the brain and spinal cord) changes and adapts.

Kaplan would soon discover that working with a neuroscientist would come in handy.

"She would point us in the right direction and tell us when our ideas were just plain wrong," Kaplan says.

Albers was uniquely qualified to work with Kaplan. At the PCPR, she uses optogenetics to study how the epithelial lining communicates with nerves. She focuses on how pain, which includes itching, she says, is processed and signaled from the skin.

When "the nerve project" began, Kaplan and Jonathan Cohen, an MD/PhD student in his lab, collaborated with Albers and Davis to develop an optogenetic mouse model where pain-sensing neurons in the skin could be activated by shining a blue laser light. Cohen, a Long Island, N.Y., native who attended Swarthmore College as an undergrad, became known around the lab as "the laser king."

Using a 473-nanometer laser, Cohen beamed a blue light onto the models while they were anesthetized. The light was set to a pulse similar to the frequency at which the neurons in the skin's nerves fire.

"Optogenetics was the best system for doing this," Cohen says. "It's common in neuroscience, but it's very new in immunology."

First, Cohen activated the neurons with the blue laser, releasing a protein called CGRP, which recruited different types of immune cells to the site on the skin. The reaction suggested that neurons can jump-start an immune response even before sentry immune cells can.

"We thought: *This is really cool*," Kaplan says.

When Kaplan's team analyzed the skin on the models, they saw cytokines, which are a characteristic of an immune response. After a couple of days of stimulation, they noticed white blood cells were being recruited to the skin, as well.

"I was surprised that just activating this subset of neuron is sufficient to generate what appeared to be a classic [immune] response in the skin," Kaplan says. "So, we did a lot of work to validate all of that."

Kaplan always uses the word "we" when describing lab work. He's quick to point out that the breakthrough wouldn't have happened without a list of researchers that includes Tara Edwards, Andrew Liu, Toshiro Hirai, Marsha Ritter Jones, Yao Li, Shiqun Zhang, Jonhan Ho and Jianing Wu, as well as Albers, Davis and their lab team.

Next, they infected the same mouse models with either Candida albicans or Staphylococcus aureus, a common bacterium that can turn deadly under certain conditions. Using optogenetics and chemical nerve blockers on the skin, researchers in Kaplan's lab showed that when the fungus infected the models at one location, the nerves not only detected and initiated an immune response to fight the infection, but also sent a signal toward the spinal cord. Those signals then boomeranged back to the skin around the infection to activate immune defenses in anticipation, preventing the infection from spreading.

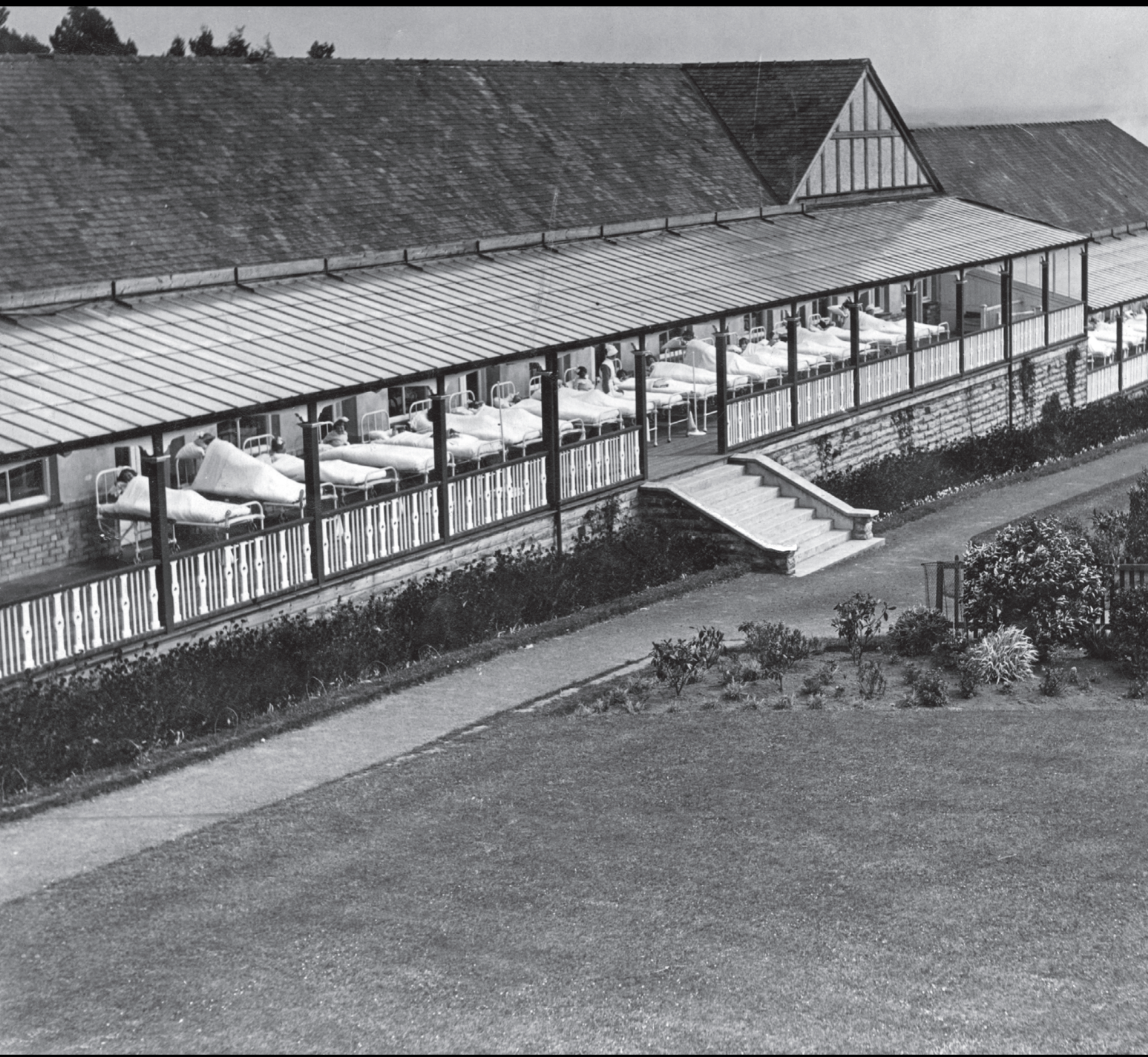
Kaplan calls the nerve-driven protective mechanism "anticipatory immunity" because the nervous system can communicate information in milliseconds, compared to hours or days for the immune cells to do the same function.

What are the clinical implications of the breakthrough? Kaplan doesn't know for sure, but he says it could have implications for autoimmune diseases of barrier tissues like the skin or gut.

"Understanding this really new type of immunity raises the intriguing question of whether we could develop a drug to selectively suppress excessive autoimmune inflammation in specific tissues, avoiding the negative side effects that come with using a broad immunosuppressant that affects the entire body," he says.

That said, Kaplan did not get started on this work to find a specific cure. He's driven to understand how the body works, specifically the skin.

"I would say not enough people think about it." ■



TB sanatoria stressed lots of fresh air.

PHOTO: STAFF/MIRRORPIX/GETTY IMAGES

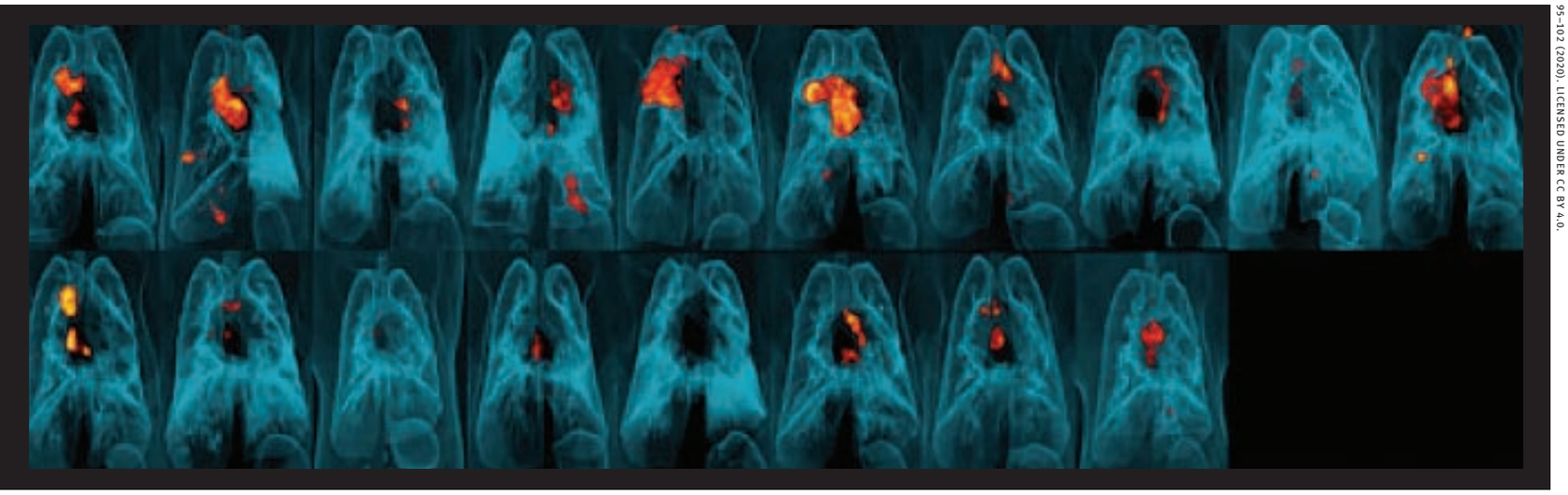
A BADLY NEEDED NEW APPROACH FOR TB'S CENTURY-OLD TREATMENT | BY JENNY BLAIR

ANOTHER SHOT FOR AN OLD VACCINE

Amid the crowded, tubercular cities of mid-19th-century Europe, the sanatorium movement was born. Rows of bedridden, anemic tuberculosis patients—their pallor giving the disease its nickname "white plague"—rested outdoors or on porches, breathing fresh air and eating hearty meals. Though a tuberculosis vaccine was introduced in 1921, it was only modestly effective, and sanatoria remained popular until the 1950s, when antibiotics rendered open-air treatment obsolete.

Not so the vaccine. At nearly a century old, conferring only partial, temporary protection, it remains the only one available today.

One-third of humanity is now infected with Mycobacterium tuberculosis, sometimes called tubercle bacilli. In 2018 alone, 10 million people contracted TB and 1.5 million died, many with a drug-resistant form of the disease.



Researchers from NIAID and Pitt showed that just by changing the method of delivering the TB vaccine, they could ward off inflammation (red and yellow) greatly in a monkey model. The top row shows typical vaccination delivery—through the skin. The bottom row shows delivery through intravenous injection.

In an inspired move, teams from the National Institute of Allergy and Infectious Diseases (NIAID) and the University of Pittsburgh have made that old vaccine astoundingly effective in monkeys.

The culmination of a years-long collaboration between NIAID's Robert Seder and Pitt's JoAnne Flynn, a professor of microbiology and molecular genetics, the research involved trying several routes of vaccine delivery—not only the usual welt under the skin, but also directly into the lungs, and, crucially, by intravenous (IV) injection. Monkeys that received the IV vaccine were almost all protected from later infection by tuberculosis. The results appeared in Nature.

As it gradually became clear that the vaccine had worked to prevent infection, Flynn was astounded.

"You're like, *Could this be possible—that there's nothing there?*" Flynn recalls. "It was stunning."

"We said, *How would the route affect immunity and protection?*" Seder says of their experimental design discussions. "Lo and behold, the IV worked magically."

"No other TB vaccine has come close to showing the efficacy that this IV [version of the vaccine] has shown. It blew our socks off," said coauthor Charles A. Scanga, Flynn's project manager. "This vaccine really has the potential to make a huge impact on global public health."

Moreover, the IV vaccine's translation to human medicine is a decent bet, because a monkey's reaction to tuberculosis is so similar to that of humans, says Thomas Smithgall, chair of microbiology and molecular genetics.

"Getting a paper in Nature is a big deal, and I think it really speaks to the importance of the work and also the sophistication of the model," Smithgall says. "We're much closer to rhesus macaques than we are to mice. . . . People aren't highly inbred strains of mice."

Tuberculosis spreads when people inhale bacilli small enough to enter the alveoli of the lungs. Once lodged there, the bacteria enter large immune cells called macrophages and begin replicating. Infected macrophages signal other immune cells to gather around, where they coalesce to develop a nodule called a granuloma.

What happens next? It depends. The host organism usually mounts an effective cellular immune response within about 10 weeks, and in 90% to 95% of people, the bacilli are walled off and controlled in the granulomas—an asymptomatic state called latent tuberculosis, which requires no vaccination to achieve. Many people live their entire lives in a latent state, never knowing they have been infected by tuberculosis bacilli.

But latency is no guarantee of ongoing health. Up to 10% of people with latent TB later develop reactivation disease. Among people with HIV, that rate is much higher.

When defenses fail, the bacilli escape and the immune system's attempts to destroy them begin destroying lung tissue. Bacilli can also set up infections in other parts of the body. Active TB kills half of untreated patients. Meanwhile, coughing spreads the bacilli to fresh hosts.

The only available vaccine is called Bacille Calmette-Guérin (BCG). It is a weakened live strain of a related bacterium called Mycobacterium bovis, and 2020 marks its 99th year in clinical use. Most of those who receive it are newborns, and it can protect young children relatively well from severe forms of tuberculosis. But it does little to stop pulmonary TB in older children and adults, the groups most often responsible for spreading the disease. BCG's protection wanes after about 15 years, and giving booster shots doesn't work.

And yet, BCG is the best we have; and Flynn notes, "Most [investigational vaccines] haven't given us any signal at all of being worthwhile."

MODELS AND VISUALS

Here's how the Pitt side of the collaboration unfolded: During her postdoctoral fellowship at the Albert Einstein College of Medicine, Flynn worked with a mouse model of tuberculosis. But mice don't make granulomas or get latent tuberculosis, both central features of human disease. And it takes up to half a million bacilli to infect mouse lungs, while in humans, 10 or 20 bacilli can suffice.

So Flynn spent two decades establishing that a monkey's reaction to the disease closely resembles that of humans. When monkeys inhale active tubercle bacilli, about half develop latent tuberculosis. Of those, some reactivate. And they form granulomas. "[Flynn] was among the first to realize how important it was to use nonhuman primates as an appropriate model for human TB research," Smithgall says.

"We built the model from the ground up. We had to make it up as we went along," Flynn says.

To watch granulomas evolve over time, the team used a positron emission tomography–computed tomography (PET-CT) scanner.

In a PET scan, a researcher injects radiolabeled glucose, which is preferentially taken up by more metabolically active cells—such as the teeming inner cores of active granulomas. If a PET image is overlaid with a CT image taken at the same time, granulomas whose locations and sizes are visible on CT light up thanks to the radioactive PET probe.

"It allows you to follow not just the structure of granulomas over time, but their function, their metabolic activity over time, as well," Scanga says.

The team acquired the scanner in 2007 with funding from the Bill and Melinda Gates Foundation. It was one of the nation's first PET-CT scanners to be installed in a biosafety level 3 (BSL3) lab, according to Scanga.

Using the scanner, Flynn made a crucial discovery: Two granulomas in the same animal model can behave very differently. One might successfully contain the bacilli and control their replication, while the other may fail and allow the bacilli to enter nearby lymph nodes.

"It revolutionized how we do TB studies," Scanga says.

Paul Duprex, director of Pitt's Center for Vaccine Research and professor of microbiology and molecular genetics, compares the old approach—where researchers infect a model, then see how things turn out without having seen the disease unfold—to watching a movie with only a first and a last frame.

"Bioimaging allows them to piece together what the story is," Duprex says.

(Flynn is now working closely with Duprex and others at the Center for Vaccine Research to image COVID-19 in the lungs of animal models.)

AN UNUSUAL ROUTE

With monkeys that react as humans do to tuberculosis and imaging tools to provide unprecedented detail, Seder and Flynn were eager to test vaccines.

Seder, who is chief of cellular immunology at NIAID, suggested they break away from the usual intradermal method of vaccination and also test inhaled and IV routes.

He had good reason to think one of those routes could work. About a decade ago, he was part an effort to develop a malaria vaccine by using an inactivated form of the parasite that causes the disease. Working with monkeys, Seder gave the investigational malaria vaccine subcutaneously—similar to a mosquito bite. That didn't lead to immunity. So he asked his fellow to try the intravenous route instead, believing it might be a better way to distribute the vaccine throughout the body.

It was.

Measurable immune responses to the vaccine showed up in the monkeys' blood, and large numbers of T cells crucial to warding off malaria appeared in the liver. In 2013, Seder led a study evaluating a clinical trial of an intravenous malaria vaccine. It generated outstanding protection against malaria and is now in clinical trials in Africa.

Eventually, the Pitt team gave monkeys BCG vaccines using one of the following techniques: the intradermal route, an inhaled route, a combination of the two, or through an IV. Six months after vaccination, the researchers exposed the monkeys to virulent airborne mycobacteria. Then they waited, scanning the lungs every four weeks.

With the inhaled vaccine, results were disappointing. At first, T cells swarmed into the airways of the lung. But within months, they were gone, offering no protection.

Unsurprisingly, the intradermal vaccine resulted in partial protection from infection. The results weren't much different when that was combined with aerosol.

By stark contrast, in the IV group, nine out of 10 monkeys were clearly protected. Nine showed no signs of lung mycobacteria in the imaging scans. Six showed no lung granulomas.

When the researchers counted up viable bacilli in the lungs, the median number in the monkeys receiving the standard BCG vaccine was nearly 800,000. That went for those vaccinated by aerosol or a combination strategy, too.

But in the IV-vaccinated animals, the median was zero. In six, the researchers could find no evidence of tuberculosis in any body tissue. The monkeys had either promptly eliminated early infection or prevented it outright.

"We couldn't culture any mycobacteria from them; IV BCG elicited sterilizing immunity," Scanga says. "That was something that really hadn't been seen before in a TB developmental vaccine."

Why did the IV route work so well?

The researchers suspect that, instead of stimulating antibodies the way most vaccines do, the IV method gets T cells involved.

To keep TB infection under control, immune T cells must mount a response, learn to ward off the bacilli and remain in the body and lung over the long-term.

The common intradermal BCG vaccine doesn't provoke this response. But after IV vaccination, memory T cells took up positions in both the airways and the lung tissue—then, crucially, they stayed, poised to defend, throughout the six-month duration of the experiment.

NEXT STEPS

There are hurdles to clear before the approach can be adopted for widespread human use. First, scientists will have to prove it is safe. Then there are practical problems. Many global health workers aren't trained to perform IV injections. This vaccine also requires uninterrupted refrigeration—a tall order in parts of the world where electric power is intermittent or scarce.

Yet a target population of adolescents and adults—whose veins are easier to find than those of babies, and who are more cooperative—might ease vaccination, Seder says. If a safe, protective vaccine must be given intravenously, he says, "I do not believe [that route] is a deal breaker."

Moreover, understanding exactly how the vaccine confers such robust protection may help researchers develop other ways of delivering its protective effect. "We've now provided the ultimate benchmark for high-level protection with a TB vaccine, and now we can understand what they call immune correlates and immune mechanisms," Seder says. "It's a gold mine scientifically."

Duprex notes that the results will "reach into not just the TB world, but into other infection-biology worlds."

For now, the researchers will be testing whether a lower dose of BCG offers the same level of protection. They'll also work to gain a detailed look at what's happening in the lungs, looking for clues to how the vaccine functions.

"Even now, every day," says Flynn, "I learn something new about TB." ■

MATCH RESULTS
CLASS OF 2020

ANESTHESIOLOGY

Acuff, Heather
Barnes-Jewish Hospital/Washington University, Mo.
Gisi, Brittany
Vanderbilt University Medical Center, Tenn.
Gugsa, Frey
Johns Hopkins Hospital, Md.
*Aventura Hospital, Fla.
Hirsh, Angela
Virginia Mason Medical Center/University of Washington
Ibidunni, Laura
Vanderbilt University Medical Center, Tenn.
Khalid, Maria
University of Washington Affiliated Hospitals
Mater, Sara
Beth Israel Deaconess Medical Center/Harvard University, Mass.
*Lehigh Valley Hospital, Pa./University of South Florida
Olaitan, Oluwatosin
Ohio State University Medical Center
Patel, Krupa
UPMC/University of Pittsburgh, Pa.
Smith, Nicholas
McGaw Medical Center/Northwestern Memorial Hospital/Northwestern University, Ill.
Tsang, Wai Lok
Cleveland Clinic, Fla.
Wang, Sheri
UPMC/University of Pittsburgh, Pa.

DERMATOLOGY

Porter, Hannah
University of Vermont Medical Center
Zhang, Sophia
University of Texas Southwestern Medical Center
*WellStar Kennestone Regional Medical Center, Ga.

EMERGENCY MEDICINE

Bramah-Lawani, Mariam
University Hospital/Rutgers University, N.J.
DeCenso, Brendan
University of North Carolina Hospitals
Garbin, Steven
University of Virginia Medical Center
Hogan, Sarah
Prisma Health–Upstate/University of South Carolina
Keller, Aleksander
UPMC/University of Pittsburgh, Pa.
McQuaid, Alexandra
UPMC/University of Pittsburgh, Pa.
McQuaid, Neal
UPMC/University of Pittsburgh, Pa.
Mughal, Anisa
Creighton University Affiliated Hospitals, Ariz.
Porter, James
Allegheny General Hospital, Pa.
Raj, Sandesh
UPMC/University of Pittsburgh, Pa.
Spencer, David
Hospital of the University of Pennsylvania
Supnick, Harrison
UPMC/University of Pittsburgh, Pa.

FAMILY MEDICINE

Cohen, Anna
UPMC St. Margaret/University of Pittsburgh, Pa.
Dunn, Matthew
University of Colorado School of Medicine, Denver
Fowler, Benjamin
Ventura County Medical Center/University of California, Los Angeles
Henrie, Adam
McKay-Dee Hospital, Utah
McLaughlin, Todd
Poudre Valley Hospital/University of Colorado
Minney, Sarah
Strong Memorial Hospital/University of Rochester, N.Y.
Picard, Monica
Oregon Health & Science University
Solomon, Mikisa
Hospital of the University of Pennsylvania
Yohannes, Simon
Piedmont Columbus Regional, Ga.
Zuniga-Penaranda, Nicolas
MacNeal Hospital/Loyola Medicine, Ill.

INTERNAL MEDICINE

Amdahl, Matthew
Mayo Clinic, Minn.
Barrington, William
UPMC/University of Pittsburgh, Pa.
Breslin, Kristen
University of Maryland Medical Center
Cabrera, Elizabeth
McGaw Medical Center/Northwestern Memorial Hospital/Northwestern University, Ill.
Cahill, Benjamin
University of Virginia Medical Center
Cohen, Jessica
UPMC/University of Pittsburgh, Pa.
Enoh, Sheila
Johns Hopkins Hospital, Md.
Franklin, Zaneta
University of Massachusetts Medical School
Istvanic, Filip
UPMC/University of Pittsburgh, Pa.
Landau, Aaron
NYU Langone Medical Center/New York University
Lane, Katherine
UPMC/University of Pittsburgh, Pa.
Levine, Kevin
University of Washington Affiliated Hospitals
Lim, Audrey
UPMC/University of Pittsburgh, Pa.
Lisius, Grace
UPMC/University of Pittsburgh, Pa.
McDermott, Almut
UPMC/University of Pittsburgh, Pa.
Mirson, Leonid
Johns Hopkins Hospital, Md.
Patton, Perry
Hospital of the University of Pennsylvania
Peoples, Isaiah
Massachusetts General Hospital/Harvard University
Porter, Hannah
University of Vermont Medical Center
Porter, Michael
UPMC/University of Pittsburgh, Pa.
Safiullah, Zaid
Johns Hopkins Hospital, Md.
Taylor, Christy
Massachusetts General Hospital/Harvard University
Theiss, Robert
Allegheny General Hospital, Pa.
Tout, Andrew
McGaw Medical Center/Northwestern Memorial Hospital/Northwestern University, Ill.
Trandel, Elizabeth
Emory University Hospital & Grady Health System, Ga.
Varelas, Lee
UPMC/University of Pittsburgh, Pa.
Varma, Bhavya
Johns Hopkins Hospital, Md.
Yochum, Zachary
Brigham & Women's Hospital/Harvard University, Mass.
Yu, Minting
UPMC/University of Pittsburgh, Pa.

INTERNAL MEDICINE/EMERGENCY MEDICINE

Hagerman, Thomas
Henry Ford Hospital, Mich.

INTERNAL MEDICINE/PEDIATRICS

Mandelkern, Talya
UPMC/University of Pittsburgh, Pa.

NEUROLOGICAL SURGERY

Jacobs, Rachel
UPMC/University of Pittsburgh, Pa.
Sisterson, Nathaniel
Massachusetts General Hospital/Harvard University
White, Michael
St. Joseph's Hospital/Barrow Neurological Institute, Ariz.

NEUROLOGY

Ahmed, Humza
UPMC/University of Pittsburgh, Pa.
Ebbert, Patrick
Mount Sinai Hospital/Icahn School of Medicine at Mount Sinai, N.Y.
Liu, Yuzhe
McGaw Medical Center/Northwestern Memorial Hospital/Northwestern University, Ill.

OBSTETRICS AND GYNECOLOGY

Gowda, Tejasvi
Rochester General Hospital, N.Y.
Smith, Ayanna
University Hospitals Cleveland Medical Center/Case Western Reserve University, Ohio
Thomas, Jacob
Presence Saint Francis Hospital/AMITA Health, Ill.
Wolgemuth, Tierney
McGaw Medical Center/Northwestern Memorial Hospital/Northwestern University, Ill.

OPHTHALMOLOGY

Thermozier, Stephanie
Illinois Eye and Ear Infirmary/University of Illinois

The pandemic couldn't stop the Class of 2020 from celebrating virtually, and Pitt Med's student ambassadors (see page 9) posted pictures of their classmates enjoying the moment. From left to right: Mikisa Solomon holds up a laptop showing confirmation of her match to the Hospital of the University of Pennsylvania in family medicine. Lee Varelas matched with UPMC for internal medicine. And Megan Bannon matched with Lurie Children's Hospital of Chicago at Northwestern University.

ORTHOPAEDIC SURGERY

Bayer, Stephen
UPMC/University of Pittsburgh, Pa.
Beckwitt, Colin
UPMC/University of Pittsburgh, Pa.
Cook, Alyssa
Brooke Army Medical Center, Texas

OTOLARYNGOLOGY

Schwarzbach, Hannah
Hospital of the University of Pennsylvania
Strober, William
Barnes-Jewish Hospital/Washington University, Mo.

PATHOLOGY—ANATOMIC AND CLINICAL

Jobbagy, Soma
Massachusetts General Hospital/Harvard University

PEDIATRICS

Auvil, Daley
Portsmouth Naval Hospital, Va.
Bandi, Kiran
Cincinnati Children's Hospital Medical Center/University of Cincinnati, Ohio
Bannon, Megan
Lurie Children's Hospital of Chicago/Northwestern University, Ill.
Brienza, Ashley
University of Utah Health
Burley, Cassie
Children's Hospital Colorado/University of Colorado
Hum, Stephanie
Children's Hospital Colorado/University of Colorado
Kwon, Jane
UPMC Children's Hospital of Pittsburgh/University of Pittsburgh, Pa.
Mpamaugo, Chinenyenwa
University of Washington Affiliated Hospitals
Qi, Yan
WMed Health/Western Michigan University
Scott, Gordon
University of Maryland Medical Center

PLASTIC SURGERY (INTEGRATED)

Barnett, Joshua
Mount Sinai Hospital, Icahn School of Medicine at Mount Sinai, N.Y.
Fisher, James
UPMC/University of Pittsburgh, Pa.
Kenny, Elizabeth
UPMC/University of Pittsburgh, Pa.

PHYSICAL MEDICINE AND REHABILITATION

Milleville, Kristen
UPMC/University of Pittsburgh, Pa.
Pearson, Elise
UPMC/University of Pittsburgh, Pa.
Theiss, Robert
Carolinas Medical Center, N.C.

PSYCHIATRY

Binner, Anika
UPMC/University of Pittsburgh, Pa.
Hsiung, Kimberly
Vanderbilt University Medical Center, Tenn.
Kruckenberg, Katherine
UC San Diego Medical Center/University of California, San Diego
Kulkarni, Kritika
Brigham & Women's Hospital/Harvard University, Mass.
Pemberton, Jacob
University of Cincinnati Medical Center, Ohio
Rice-Stubbs, Mara
UPMC/University of Pittsburgh, Pa.
Shearer, Annika
UCSF Medical Center/University of California, San Francisco
Zollman, Joshua
Massachusetts General Hospital/Harvard University

RADIOLOGY—DIAGNOSTIC

Berning, Aric
UPMC/University of Pittsburgh, Pa.
*UPMC Altoona/University of Pittsburgh, Pa.
Iarrobino, Nicholas
Duke University Medical Center, N.C.
*Indiana University
Thomas, Joel
Barnes-Jewish Hospital/Washington University, Mo.
*Indiana University
Ward, Rebecca
Hospital of the University of Pennsylvania
*UPMC/University of Pittsburgh, Pa.
Wei, Zhiyang
Brigham & Women's Hospital/Harvard University, Mass.
*UPMC/University of Pittsburgh

SURGERY—GENERAL

Alexander, Wyeth
UC San Diego Medical Center/University of California, San Diego
Arakelians, Aris
Jackson Health System/University of Miami, Fla.
Bell, Yamira
Mount Sinai Hospital, Icahn School of Medicine at Mount Sinai, N.Y.
Donnelly, Conor
NYU Langone Medical Center/New York University
Kheng, Marin
Rutgers University, N.J.
Lutfi, Waseem
Hospital of the University of Pennsylvania
Oak, Sangki
Brigham & Women's Hospital/Harvard University, Mass.
Sansosti, Alexandra
New York-Presbyterian Medical Center/Columbia University Medical Center
Taylor, Crystal
University of Michigan Hospitals

SURGERY—PRELIMINARY

Demino, Cory
Allegheny General Hospital, Pa.

THORACIC SURGERY

D'Angelo, Michael
NYU Langone Medical Center/New York University

UROLOGY

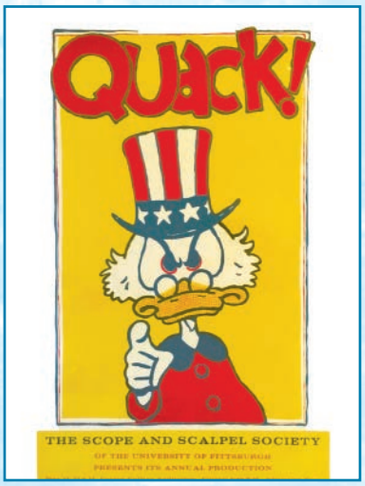
Akomolede, Olutiwa
Vanderbilt University Medical Center, Tenn.
Orikogbo, Oluwaseun
UPMC/University of Pittsburgh, Pa.
*UPMC/University of Pittsburgh, Pa.
Pace, Natalie
Vanderbilt University Medical Center, Tenn.
Rogers, Devin
Virginia Commonwealth University

VASCULAR SURGERY

Lowenkamp, Mikayla
UPMC/University of Pittsburgh, Pa.
Pandya, Yash
UPMC/University of Pittsburgh, Pa.

*Indicates location of transitional or preliminary year of medical or surgical training.

CLASS NOTES



Playbill from 1970 Scope and Scalpel production of "Quack!"

'70s

We've heard from a few members of the Class of 1970, which is marking its 50th anniversary this year. (In September, the Class of '70 had a group video chat with Emeritus Dean Arthur S. Levine. The in-person reunion has been rescheduled for fall 2021. Check @pittmedalum or maa.pitt.edu for updates.) **Daniel Hirsen** (MD '70), a rheumatologist and internal medicine specialist, retired in 2018 after working in private practice for 35 years and maintaining one of the last solo rheumatology practices in the Chicago area. **Howard Grindlinger** (MD '70), a retired psychiatrist in Arizona, has fond memories of cowriting the 1970 Scope and Scalpel show "QUACK!" with the late **James Kaskin** (MD '70), who was an emergency medicine physician in San Francisco before his death in 2015. Grindlinger says the show touched on everything from music to civil rights protests to the Vietnam War. It was "a wonderful melding of so many things that were going on in our lives," he says. Classmate **Michael Linver** (MD '70), director emeritus of the Breast Imaging Center of X-Ray Associates of New Mexico and clinical professor of radiology at the University of New Mexico, received the 2020 Gold Medal from the Society of Breast Imaging. He has advocated for fair breast cancer screening procedures for patients in New Mexico and nationally. He served on the National Mammography Quality Assurance Advisory Committee to the FDA and as president of the New Mexico chapters of the American College of Radiology and the American Cancer Society.

'80s

Louis Tripoli (MD '84, Internal Medicine Resident '88), rear admiral of the U.S. Navy and command surgeon general with U.S. Indo-Pacific Command, is retiring in October after 24 years of service. He has been addressing coronavirus outbreaks in the Indo-Asia-Pacific region. Louis says his career was inspired by his father, **Charles Tripoli** (MD '55), a retired family physician and lieutenant commander of the U.S. Navy Medical Corps Reserve who participated in 13 mission trips to Latin America as a volunteer with the Catholic Medical Association. Charles Tripoli celebrated his 90th birthday this year. Louis remembers going on house calls with his dad as a kid. Following residency, Louis worked in private practice with his dad for five years. "Being able to come back and practice with him was one of the greatest experiences a son could ever have," he says.

Louis Tripoli (in naval uniform) at his promotion to admiral in 2016 with family, including (from left) son, Louis Philip, wife, Michelle, daughter Marissa, mother, Rita and father, Charles.

McLaughlin

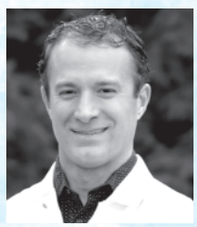
'90s

Mark McLaughlin (Neurosurgery Resident '99) is the founder of the Princeton Brain, Spine and Sports Medicine neurosurgical practice in New Jersey. His first book, "Cognitive Dominance: A Brain Surgeon's Quest to Outthink Fear," was released in late 2019. "Neurosurgeons," he says, "work in a 'judgment jungle,' where we constantly make so many life and death decisions." McLaughlin wrote "Cognitive Dominance" to understand "the right amount" of fear, he says, that's needed to excel not just in medical settings, but in business and beyond.

Raja

'00s

Siva Raja (MD '04, PhD '04) is the surgical director of the Center for Esophageal Diseases, an associate professor of thoracic surgery and a thoracic surgeon, all at the Cleveland Clinic. In addition to his focus on esophageal cancer, Raja is also frequently sought out to treat achalasia, a rare disease in which the sphincter at the esophagus's base cannot regularly open and close. He credits inspiration for his career to his time at Pitt Med: "I was inspired by Jim Luketich," an esophageal surgeon. "I met him as a third-year medical student. Twenty years later, that's what I'm doing, too."



Shaffer

Jonathan Shaffer (PhD '08) works at biotechnology company QIAGEN, where he's a director in research and development. He leads a team that develops genomic and transcriptomic solutions for cancer-related research that enable detection of DNA

variants, RNA fusions and gene expression. "Challenges remain for cancer researchers," he says, "because samples used in cancer research are often of poor quality or limited quantity." Why biotechnology? For Shaffer, it's all about effecting rapid change: "I love the pace of the work," he says. "I love to see science moving almost faster than life itself."

'10s

"Metastasis is what kills cancer patients," remarks **Yvonne Chao** (MD '12, Internal Medicine Resident '15), "but current treatments are not targeted toward metastatic biology." A postdoctoral thoracic oncology fellow at the University of North Carolina at Chapel Hill, Chao is improving models of metastasis. She and her colleagues have implicated an epigenetic regulator, histone deacetylase 11 (HDAC11), as a promoter of breast cancer metastasis in mice. "We think there's something special about the lymph-node environment that upregulates HDAC11, allowing cancer to survive and then leave lymph nodes for the lungs, liver, brain, wherever." Chao hopes to develop future therapies aimed at this mechanism.

Chao

Luke Johnson (MD '13) serves as assistant professor of dermatology at the University of Utah School of Medicine. He's also an enthusiastic podcaster: As cohost of the podcast Dermasphere, alongside dermatologist Michelle Tarbox, Johnson tackles "all aspects of dermatology," he says. A podcast that's "by dermatologists, for dermatologists," he notes, as well as for "the dermatologically curious," Dermasphere just recorded its 33rd episode. Johnson and Tarbox host ongoing literature reviews and discussions about professional best practices; the've also reported on the safety of tattoo ink and a melanoma-detecting dog.

Johnson

Melanie Peffer (PhD '14) is a research faculty member at the University of Colorado Boulder whose new book, "Biology Everywhere: How the Science of Life Matters to Everyday Life," was published in February. The book covers topics from the ecological impact of reusable grocery bags to the interconnectedness between nature and the visual arts. "The unifying theme of my career," Peffer says, "centers on empowering people to engage with biology content."

Peffer

—John Hansen, Maggie Medoff and Rachel Mennies

SPOTLIGHT

PLENTY TO GAIN

Will artificial intelligence replace radiologists? As AI's deep-learning technology has evolved to read radiological images and identify pathologies, a lot of people are asking that question. But radiologists, says **Geraldine McGinty** (Res '93), have nothing to fear from AI—and plenty to gain. "There's been a lot of hype about machines replacing radiologists," she notes, "but I do not see radiologists as being afraid. From the inception of our specialty we have always embraced innovation."

McGinty, who recently completed her term as the first woman to chair the American College of Radiology's (ACR) Board of Chancellors, now serves as ACR president, representing more than 38,000 radiologists. She's also associate professor of clinical radiology and population health sciences as well as chief strategy officer for the Weill Cornell Medicine Physician Organization. For this leader of radiologists, answering AI questions is paramount for the future of their profession. "I'm excited to influence the beginning of this journey," she says, "by leading the ACR during this period of rapid change."

MARK LEDZIAN

McGinty is the American College of Radiology's new president.

One key issue is addressing diversity: not just that of practitioners, but also of patients and their data. "AI is not only prone to bias," she says, "but it can actually amplify and propagate bias." Fighting bias with diversity means mindfully collecting data that considers not just patients' ethnic and gender backgrounds, but also where patients live. Imaging findings, she notes, don't always indicate the same diagnoses in disparate regions of the country. For example: the diagnosis of histoplasmosis, also known as Ohio River Valley Fever because of its proliferation in that area. It can cause lung nodules that "might be confusing," says McGinty, "without the context of knowing the patient's geography."

As part of her commitment to medicine's future, McGinty views mentorship as "a critical part" of her career. She received Cornell's Jessica M. and Natan Bibliowicz Award for Excellence in Mentoring Women Faculty in 2019. She attributes the mentorship of Jules Sumkin, chair of Pitt's Department of Radiology, to her own professional growth: From him, she says, "I learned so much about what it means to be a radiologist." *—Rachel Mennies*

STEVEN BEERING

AUG. 20, 1932–APRIL 3, 2020

Beering

Steven Beering's idea of retirement was to advise the president and Congress as chair of the National Science Board and to join Pitt's Board of Trustees as chair of the Health Sciences Committee and the Board of Visitors for the School of Medicine. The academic leader who served as a physician to a president and astronauts died in April at age 87.

Although Beering was behind in high school when he immigrated to Pittsburgh from Germany after World War II, he quickly caught up and went on to attend Pitt, where he graduated summa cum laude in 1954 and earned his MD in 1958. To cover tuition, Beering tutored French and German, drove a cab, worked in a steel mill and translated medical articles. Decades later, he received an honorary doctorate from Pitt (and nine other universities), and was named a Pitt Legacy Laureate, as well as a Distinguished Alumni Fellow.

After medical school, Beering became a lieutenant colonel in the Air Force Medical Corps, where he treated President Eisenhower and the first NASA astronauts. He served as dean of the Indiana University School of Medicine and 18 years as president of Purdue University.

Arthur S. Levine, dean emeritus of the School of Medicine, says Beering "combined a European elegance and classicism with an American ease, intellectual hunger and abundant leadership ability."

—Samantha Paige Rosen

PAUL CAPLAN

NOV. 21, 1912–MARCH 7, 2020

Caplan

Paul Caplan's (MD '36) hallmark was listening. After graduating from Pitt Med, Caplan began his internship at Montefiore—the only Pittsburgh hospital hiring Jewish physicians in the 1930s. There, notes his great-nephew Joshua Levenson (MD '11, Res '14), "he learned the skill, the art, of medicine … being able to talk to people and comfort them."

Caplan was probably Pitt Med's oldest graduate when he died at age 107 in March.

During World War II, Caplan treated wounded D-Day soldiers on Omaha Beach as a captain with the U.S. Air Force. Decades later he returned to Europe as the Pittsburgh Symphony Orchestra tour physician.

A professor of medicine at Pitt for 66 years, Caplan taught from 1946 to 2012 and was named a Master of the American College of Rheumatology. With a National Institutes of Health grant, he researched osteoarthritis in Pennsylvania coal miners in the 1960s. He traveled to Haiti, where he treated patients outside of rheumatology: "I carried a textbook and learned as I went," Caplan told the Pitt Medical Alumni Association upon receiving the Lifetime Achievement Award in 2017.

"I asked questions and, more importantly, I listened."

Caplan retired at age 96. Levenson—who remembers Caplan as a "second grandfather"—remarks, "If he could have kept going, he would have done it forever."

—John Hansen

JAMES L. FUNDERBURGH III

JUNE 30, 1945–NOV. 27, 2019

James Funderburgh had a musical laugh that rang through the halls—sometimes even reaching the floors above and below his office. As Paul Kinchington, who holds Pitt's Joseph F. Novak, MD, Chair in Ophthalmology Research, remembers: "Jim laughed a lot. Loud and often. I could hear him from 50 feet away."

That laugh "always inspired me to enjoy my work," notes Funderburgh's mentee Yiqin Du, Pitt associate professor of ophthalmology and developmental biology.

A self-described "born scientist," Funderburgh was a professor of ophthalmology and the founder of Pitt's Corneal Cell Biology Lab. He shared his passion for corneal research with his wife and lifelong lab and research partner, Martha Funderburgh. They developed a groundbreaking treatment for corneal scarring: the injection of adult stem cells directly into the cornea. The treatment has brought healing to patients in India.

The discovery led to other landmark ophthalmologic procedures, including one affectionately termed "eye teeth"—the use of stem cells extracted from teeth to heal corneas. "Jim was very good at thinking outside of the box," remembers his co-"eye teeth" researcher Fatima Syed-Picard, assistant professor in Pitt's School of Dental Medicine. That work is featured on the "Cornea-copia" episode of this magazine's podcast, Pitt Medcast, from 2016.

Funderburgh

The Department of Ophthalmology has established the Funderburgh Corneal Regeneration Project, which, says Kinchington, "will continue in his name with the goal to use stem cells to restore corneal transparency in patients."

—Rachel Mennies

W. CORY M. JOHNSTON III

FEB. 25, 1973–FEB. 25, 2020

Johnston

Cory Johnston's life was defined by his loved ones, his patients and the mountains. He grew up skiing in Colorado. After college at Yale, he joined a Utah ski patrol and witnessed a medical team treat an injured skier. In that moment, he decided to go to medical school.

At Pitt Med, Johnston (MD '06) was a top student. "He dazzled the surgeons," remembers neurologist and classmate Jordan Reichman (MD '06). Joan Harvey, retired associate dean for student affairs, says Johnston's evaluations highlighted his diligence, infectious enthusiasm and clinical judgment. Several said he was the best student they had ever worked with.

Cardiologist and classmate Kia Afshar (MD '06) remembers when they were third-year students and Johnston was asked to do a trauma survey. "You'd imagine [the surgeon] would go to the ER resident and attending on call, but he looked to Cory," says Afshar. "Cory did it so smoothly, as if that was his 50th one. And he was so humble."

At the University of Utah, where he did his general surgery residency, Johnston won the residency-wide teaching award. He completed a hepatobiliary and pancreatic surgery fellowship. Until his death from a skiing accident on his 47th birthday, he was a general surgeon at Providence Hood River Memorial Hospital in Oregon.

He was also husband to surgeon Pippa Newell and dad to Rocky, 6, and Bode, 4.

Afshar remembers him as a "phenomenal" researcher, educator, doctor, outdoorsman, family man and friend. *—SPR*

FORGOTTEN LIVES HUNT-TOBEY RECOVERS HISTORY

BY DEBORAH M. TODD

MICHAEL BARNES/COURTESY OF THE SMITHSONIAN INSTITUTION

Hunt-Tobey (left) piecing together people's stories.

When Bridget Hunt-Tobey took a course on human anatomy as part of Pitt's Biomedical Masters Program in fall 2018, her goal was to gain a more solid understanding of the human body. She later came to learn how anatomy could reveal glimpses of lives disregarded by American history.

Hunt-Tobey (MS '19), now a research technologist studying chronic kidney disease at Northwestern University, spent the summer of 2019 studying the remains of enslaved and free African Americans who'd worked at the Catoctin blast furnace in Maryland. Hunt-Tobey was an intern with the Smithsonian American Women's History Initiative Because of Her Story program.

"You don't typically understand history through analysis of bones, you understand it from documents and artwork and storytelling, and this is one more way to do it. But for a population like enslaved African Americans, for whom there's very little documentation in the first place, it's one of the only options now," says Hunt-Tobey.

The charcoal blast furnace, which operated from around 1776 until 1903, forged iron for items ranging from household tools to the cannonballs fired by George Washington's troops. The proprietors were slave owners who did not maintain records on the lives of laborers. By the mid-1800s, European immigrants began filling roles at the furnace, and the presence of the enslaved and free African Americans diminished.

"The absence of the story of the enslaved and free Black labor force at the furnace is one of the tragedy of slavery writ large: namely, the lack of a descendant community and erasure of the Black population and collective heritage from an era," says Kari Bruwelheide, a Smithsonian specialist in skeletal biology and Hunt-Tobey's mentor.

The process of rediscovering those stories began in earnest in 2015—four decades after the Maryland State Highway Administration uncovered remains during a road expansion. By then, techniques such as forensic facial reconstruction were available to researchers.

Hunt-Tobey used genetic marker information, data gleaned from the skeletons' structures, potential environmental contaminants at the furnace and information from medical literature to paint a broader picture of what the laborers' everyday lives might have looked like. Some cases, such as skeletons with elongated skulls caused by craniostenosis—a condition where an infant's skull bone fuses over its brain too early—will help researchers study potential genetic implications of the condition. Hunt-Tobey also saw telltale calluses on femurs, indicating that the person likely worked as a cobbler and used a leg as a platform for hammering out soles.

One woman's femur was misshapen from Legg-Calve-Perthes disease, which disrupts blood flow to the hip joint, resulting in brittle hip and femur bones. Typically, the flow returns and the bones heal. Yet, at the furnace, recovery time wasn't an option for the woman. "Instead of forming the classic ball shape you see in a femur, it looked like a mushroom head," said Hunt-Tobey. "She was able to walk and lived to be 35 or 40 years old, but she most likely walked with a limp and had some pain in her hip."

Hunt-Tobey credits her Pitt anatomy course and Sandra Murray, professor of cell biology, with giving her an eye for detecting abnormalities in bone. (Murray also demonstrated soft skills that Hunt-Tobey aspires to emulate today.)

"The reason anthropologists can learn as much as they do about an individual and extrapolate that to a population is by really focusing on minute details. That has already been something I've needed at this new job," Hunt-Tobey says. ■

—Adapted from Pittwire

IN MEMORIAM

'40s

WILLIAM B. ZEILER, MD '45
MAR 24, 2020

CHARLES E. CLARKE, MD '46
JUL 26, 2020

E. KENNETH VEY, MD '48
MAY 10, 2020

'50s

ROBERT M. YANCHUS, MD '50
FEB 9, 2020

CHARLES A. BRADLEY III, MD '54
APR 17, 2020

WILLIAM R. WRIGHT, MD '54
MAR 31, 2020

CHARLES R. WILSON JR., MD '55
APR 17, 2020

BERNARD GOTTLIEB, MD '56
JUL 25, 2020

RUDOLPH E. M. JANOSKO, MD '56
MAR 8, 2020

MARTHA D. NELSON, MD '56
AUG 6, 2020

GEORGE J. PAVLIC, MD '56
MAR 27, 2020

EDWARD A. JAEGER, MD '57
JUN 11, 2020

MURRAY SACHS, MD '57
FEB 13, 2020

KEITH K. BUCK, MD '59
APR 23, 2020

DENNY W. WALTERS, MD '59
JAN 24, 2020

'60s

STANLEY J. CHESLOCK, MD '60
MAR 8, 2020

LAWRENCE FERLAN, MD '60
JUL 2, 2020

ROBERT N. MOYERS, MD '62
MAR 25, 2019

EDWARD R. MCFADDEN JR., MD '63
FEB 3, 2020

ALEX AZAR, MD '64
APR 6, 2020

BERTRAM H. LUBIN, MD '64, RES '66
JUN 27, 2020

RONALD O. GILCHER SR. RES '66, FEL '68
MAY 7, 2020

MOLLY T. VOGT, PHD '67
FEB 9, 2020

'70s

BRYAN JAMES STEVENS, MD '71
MAR 15, 2020

BARRY J. KRAYNACK, MD '73
JUN 26, 2020

DANIEL C. POSTELLON, MD '74
APR 22, 2020

PHILIP MEYERS LANDAU, MD '76
FEB 11, 2020

MAXINE K. OBLESKI, MD '76
MAR 15, 2020

THEODORE W. UROSKIE, RES '76
JUN 3, 2020

'80s

HARVEY J. BALTHASER, MD '80
OCT 26, 2019

SUSAN BASSION, MD '80
MAR 10, 2019

DARRELL REED, FEL '83
MAR 26, 2020

BENEDICT J. SEMMES III, FEL '83
JUN 18, 2020

TABITHA A. HENDERSON, RES '86
JUL 31, 2020

THEODORE P. CORCORAN, MD '89
JUL 19, 2020

DANIEL I. KAUFER, RES '89
JUL 2, 2020

'90s

MARK R. DAGOSTINO, RES '91
JUN 28, 2020

AILEEN D. CHANG, RES '94
MAY 1, 2020

FACULTY

CARL R. FUHRMAN, MD '79
JUN 27, 2020

MIROSLAV KLAIN
MAY 18, 2019

ARTHUR J. KOVEL
APR 1, 2020

BING LIU
MAY 2, 2020

UMA N. M. RAO
APR 7, 2020

Coproducer Aris Arakelians holds his cat, Leo, as he presents the Anus Equinus Award during Scope and Scalpel. That award, for the "most annoying Pitt Med experience," went to COVID-19. The cat reached out to scratch Arakelians as he said those words. To see actual performers, go to www.pittmed.health.pitt.edu/fall-2020.

THEATRICAL DISTANCING

By late March, it seemed like Scope and Scalpel—the annual production put on by graduating med students—would end its 66-year streak of roasting all things Pitt Med. Would 10 months' preparation for "The Lyme King" (a satire of "The Lion King," of course) be for nothing?

But director Josh Zollman (MD '20) suggested substituting cast members' living rooms for the stage. Kristen Milleville (MD '20), stage manager, thought it was a "crazy idea."

During an emergency crew meeting over video chat, Zollman convinced skeptics by outlining how it might work: Throughout the course of two weekends, the cast would record themselves with smartphones. At the same time, they'd be interacting with other cast members through a Zoom call.

Milleville is now a physical medicine and rehabilitation resident at UPMC. She and a few others organized the costumes and props from the crew's storage unit and purchased fabric to function as green screens in the cast members' apartments. The art team fashioned hand-drawn backgrounds. Milleville says, though she was alone in her apartment, she couldn't keep a straight face during rehearsals—particularly during scenes featuring Jessica Cohen dressed like a shaman mandrill (Rafiki)—"I laughed every time." Apparently, Cohen really nailed Rafiki while delivering a "perfect portrayal" of beloved Pitt Med prof Elmer Holzinger (MD '54).

Filming proved easier than synchronizing each scene, according to Zollman, a psychiatry resident at Massachusetts General Hospital. For a month, he spent several hours a day on video edits, with lines like these from the neurology clerkship scene running through his head: "Is there a lesion somewhere giving you that gaze? Or am I ugly, and you can't look at my face? Dance for me, dance for me, dance for me. Oh oh oh. I've never seen anyone move their limbs that way before." (That earworm is to the tune of "Dance Monkey" by Tones and I.)

The final product was uploaded to YouTube in May; see pi.tt/lymeking. Opening night was atypical, but Zollman believes "The Lyme King" was worth the effort.

"During med school, we all get pushed and pulled in different directions," he says. "[Scope and Scalpel] is a chance where we can all work together on a creative project." Proceeds from this year's show went to the Greater Pittsburgh Arts Council's Emergency Fund for Artists.

—John Hansen

Double joints are just one, actually.

GETTY IMAGES

MAA SAYS

"YOU GOT THIS"

Hey alumni, remember how being a medical student is, like, WHEW, hard? "Go to your memory banks and think of how just a little bit may have helped you at that time," says David Metro (MD '94), MAA executive committee board president. "You think of the expenses of school, but think of some of these new expenses students have. They're doing all these things that we didn't even think of," like presenting research at national conferences. And the pandemic has put more pressure on students.

Pitt Med students need your financial support and mentorship. The MAA has been developing digital programs to offer student networking by specialty and help third-year students get in touch with alumni who are now in their residencies. (That way students can get the scoop on programs they might not get to visit.)

So alums, whether you've got a dime or time, drop MAA director Alexandra Rigby a line: amr276@pitt.edu. *—Cara Masset*

FOR REAL! TWEEN SCIENCE

Among his other cool abilities, a DC Comics superhero named Plastic Man can bend floppily in any direction. It's a (made-up) talent that (real-life) double-jointed people might relate to. They can bend and stretch like they're made of Silly Putty. They don't have two joints in one. They're hypermobile. Lots of kids have hypermobility that they outgrow.

Our joints are where two bones come together. One bone ends in a rounded shape. It fits into the other bone, which ends in a socket, like a ball in a catcher's glove. If the socket is shallow, your joint could be very loose, giving you a lot of motion. This kind of hypermobility is common in our shoulders and helps baseball and tennis players swing hard and fast.

Ligaments wrap around our joints to hold them together as we move. If these ligaments are extra stretchy, that's another way joints can be hypermobile. Dancers and gymnasts might have this kind of hypermobility in their hips and knees.

Cool as hypermobility is, we should try not to overstretch, even if it doesn't hurt. Over time it can lead to painful conditions like your joints slipping out of place . . . which isn't fun at all. *—Lela Nargi*

Bryson Lesniak, associate professor of orthopaedic surgery at Pitt, helped us bone up on hypermobility.

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Katherine Lane (MD '20) won the Matthew Eric Piraino Award.

Personal. Powerful.

The last two years before Beth Piraino's son, Matthew Piraino, died from complications of an immunodeficiency, he was in and out of the hospital with brutal, snowballing infections. In 2009, he died at age 28.

"It was a hard thing to accept," Beth Piraino says.

So that her son's memory would endure, she established the Matthew Eric Piraino Award for Excellence in Infectious Diseases. Its recipients, students who have shown excellence in this area, are selected by members of Pitt's Division of Infectious Diseases—many of whom provided care to Matthew. Katherine Lane (MD '20), now a UPMC internal medicine resident, is a recent awardee. Her studies have already contributed to understanding barriers to screening teens for STDs.

Beth Piraino

Piraino (Res '80, Fel '82) is a Pitt professor of medicine and associate dean of admissions and financial aid. Again and again through the years, Pitt Med has benefited from her generous spirit. She established another endowment within her own specialty, nephrology; that fund is named for her beloved Pitt mentor Jules B. Puschett. She and Vice Dean Ann Thompson also recently mobilized several faculty to join them in contributing to an emergency fund for students during the pandemic.

And this summer, the passions of the students so inspired her that she reached out to Michelle Kenney. Kenney is the mother of Antwon Rose II, an African American Pittsburgh teen who was fatally shot by a police officer in 2018. The two moms related over their profound losses.

"She's such a lovely person, dealing so gracefully with her grief," Piraino says. Kenney agreed to Piraino's proposal: that a new award recognizing student commitment to social justice would be named for Antwon.

"The students mean a lot to me. I've been here at this medical school for my whole career," Piraino says. Helping our next generation of doctors, she adds, "that's something everyone should be interested in."

To make a gift, contact Jen Gabler: 412-802-8317, jag188@pitt.edu, Giveto.pitt.edu

PHOTOGRAPHY: TOM ALTANY/UNIVERSITY OF PITTSBURGH