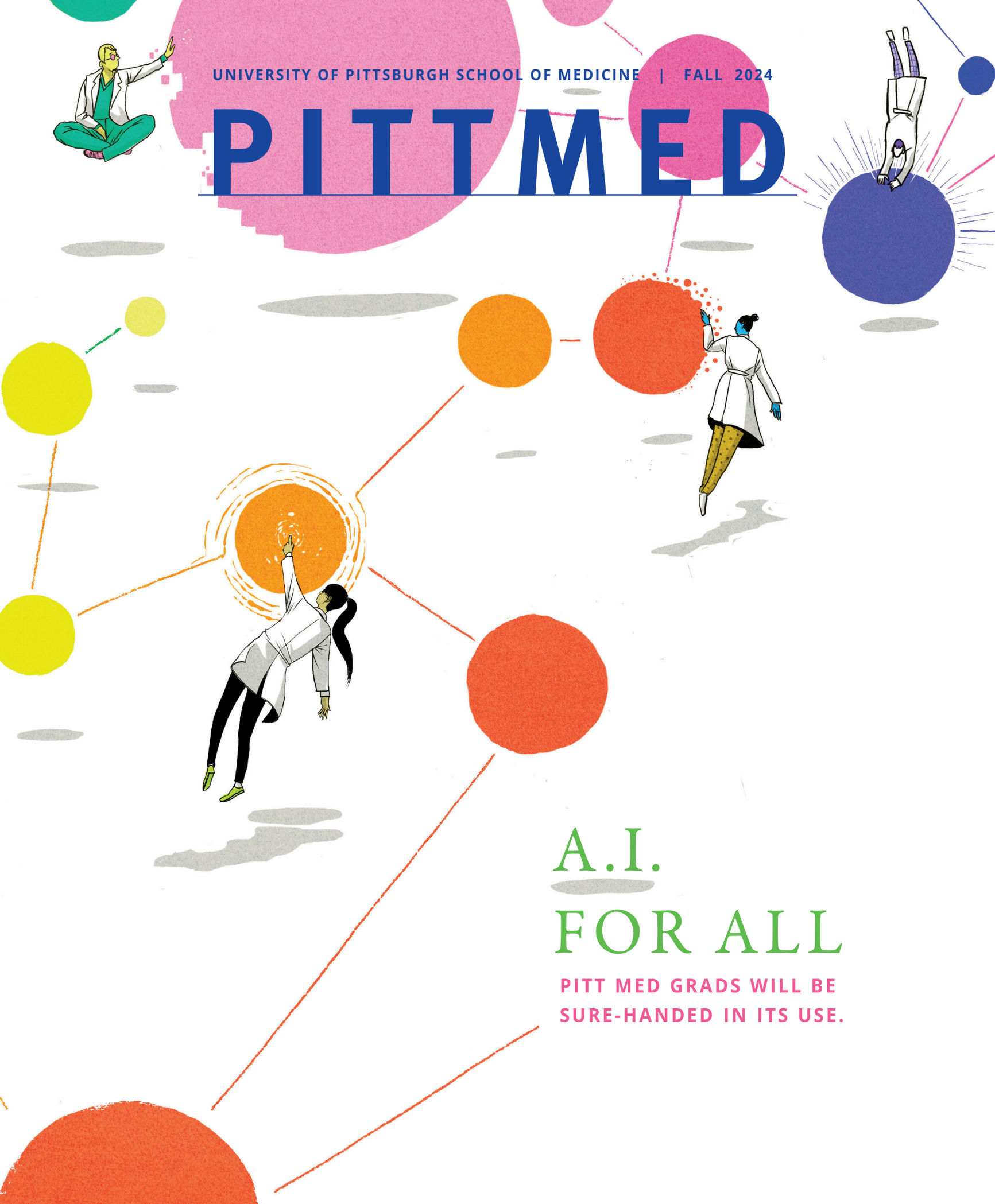
UNIVERSITY OF PITTSBURGH SCHOOL OF MEDICINE | FALL 2024

# PITTMED



## A.I. FOR ALL

**PITT MED GRADS WILL BE SURE-HANDED IN ITS USE.**

## 'IMPOSTERS' WHO TRIUMPH

All through college, I was comfortable with my academic abilities. Then came medical school, and suddenly I felt I was way out of my league. Over a third of my class had worked in a hospital. I had only been IN a hospital once. A third had also gone to grad school. Over half the class was from power-packed university programs; I'd graduated from tiny Westminster College. To say the least, I felt inadequate as a member of the Class of '71. I can't say that I ever seriously considered quitting. But did I think I could compete? I had strong doubts.

Within three weeks of starting training in radiology, I knew I had found a home.

I developed a sound reputation in my 30 years of practice, eventually serving as chair of radiology at Mercy Hospital from 1988-93. Yet, despite these and other successes, a small voice never stopped hounding me that said, "You don't measure up." I even wonder what hidden professional passions I might have uncovered if family pressures hadn't led me to medicine.

Since retiring, I read no medical literature regularly, but I keep up on medical news via multiple media sources, one of which is Pitt Med Magazine. Your recent story "Cultivating equanimity" described imposter syndrome, a malady common among medical students faced with an overwhelming workload and intense competition. BINGO! Fifty-six years after my angst ridden first year of med school, I had a name for my feelings of inadequacy.

Robert T. (Kip) Jones Jr., MD '71
Wexford, Pennsylvania

## RECENT MAGAZINE HONORS

Winner, 2024 Graphic Design USA American Inhouse Design Award (Winter 2023/24 Issue)

Winner, 2024 Press Club of Western Pennsylvania Golden Quill, Excellence in Written Journalism, Medical/Health
(E. Lloyd, "Cultivating equanimity")

Finalists, 2024 Press Club of Western Pennsylvania Golden Quill, Excellence in Written Journalism, Medical/Health
(M. Aubele, "A moving story" and A. Doerfler, "Outside influences")

## ADDRESS CHANGES/ CORRECTIONS:

ATTN: **Alex Rigby**
Email: **AMR276@pitt.edu**
**+1-412-789-5866**

## CORRESPONDENCE:

We gladly receive letters (which we typically edit for length, style and clarity).
Email: **medmag@pitt.edu**


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# AI that puts people first

"Medicine is noisy. . . . Skill and judgment helps. . . .
AI offers another promising avenue for reducing noise."
—"*Noise*" *by Daniel Kahneman, Olivier Sibony and Cass R. Sunstein*



AIMEE OBIDZINSKI/UNIVERSITY OF PITTSBURGH

Dear Pitt Med Readers,

If you've lately found yourself wary about what artificial intelligence means for your life, you are not alone. A Pew Research Center poll last year found that more than half of Americans are more concerned about it than excited; only 10% of respondents said the opposite.

The potential for well-validated AI methods that augment clinician decisions to improve the lives of patients is tremendous. Yet, when it comes to medicine, Salesforce found that more than half of adults it surveyed have concerns about AI's accuracy, security risks and effect on the doctor-patient relationship. Our challenge, as physicians, researchers, innovators and educators, is to make sure those concerns don't end up justified. We're training Pitt Med students to take the lead.

We're building AI literacy into the curriculum (learn more about that in our cover story on page 22)—and the updates aren't just meant for those who aspire to build models and algorithms. The next generation of physicians and medical researchers across disciplines will need to effectively utilize emerging technologies. To help steer progress in the right direction, they'll require a firm understanding of how AI is shaping the future of health care.

At Pitt, we're already using such technologies in more ways than we can count—for instance, to find new drugs and to prevent infections from spreading in hospitals. Meanwhile, researchers are exploring AI's potential to improve diagnosis in radiology and pathology, predict overdose risk, anticipate sudden cardiac arrest (see "Regenerating hope" on page 28), tailor cancer treatments to patients' genomes and more.

True AI literacy, however, means more than simply knowing how these tools work. That's why our students will also learn how to identify blind spots in models that could, for example, contribute to health disparities. The capabilities of AI are astonishing and expanding by the day, but their success depends on mindful practitioners.

Students can look to role models like Pitt Med alum and clinical instructor of medicine Shiv Rao; his Abridge startup developed an AI-powered app that reduces physician burnout by lessening administrative work, allowing doctors to give more attention to their patients. (You'll find a profile of Rao on page 39.)

This is AI in medicine at its best: not replacing doctors but freeing them to use their skills and knowledge more efficiently and purposefully. That's the kind of AI we're empowering our students to take even further.

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

# PITTMED

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**PUBLISHER**
Anantha Shekhar, MD, PhD

**EDITOR IN CHIEF**
Erica Lloyd, MFA

**ART DIRECTOR**
Elena Gialamas Cerri

**SENIOR EDITOR**
Andrew Doerfler

**ASSOCIATE EDITOR**
Michael Aubele

**CIRCULATION MANAGER**
Maggie Clark

**WEBMASTER**
Brandon Copp-Millward

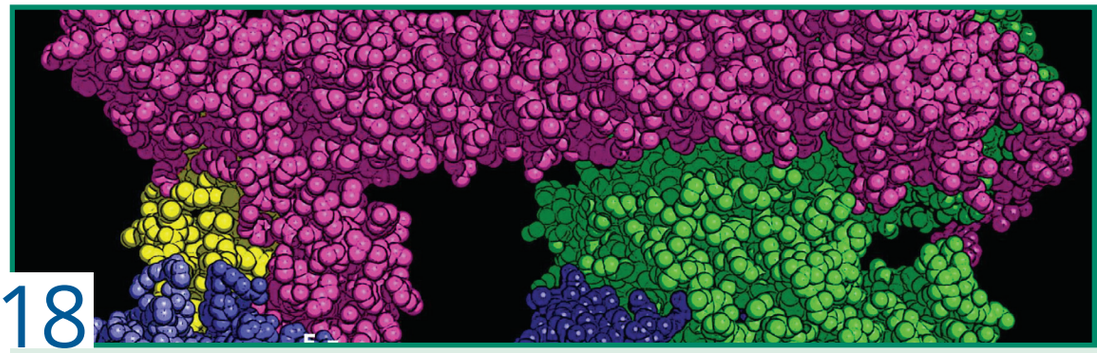
**INTERN**
Amber Frantz

**EDITORIAL ADVISORS**

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University of Pittsburgh School of Medicine

Editor’s note: School of Medicine faculty with clinical duties often have joint appointments with UPMC or the VA Pittsburgh Healthcare System, the University’s clinical partners.

**ABOUT THE COVER** Pitt Med grads will be AI fluent, so that the technology they adopt (or build) is always in the best interest of the patient. Illustration: Michael Hirshon for the University of Pittsburgh, © 2024.

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**COMIC WRITTEN BY KATY RANK LEV**

**ILLUSTRATED BY MAGGIE LYNN NEGRETE**


## CONTRIBUTORS

**KIRA GOLDENBERG** ("Hide and seek") is a writer, editor and psychotherapist whose work has also appeared in The Guardian and Columbia Journalism Review. She was the founding editorial director of Massive Science, an online publication that trained scientists to write for the public. "Scientific literacy is super important to everyone's health, safety and understanding of threats to the climate, which makes being able to translate science to the public vital," she says. A Northeast native, she now lives in San Francisco with her wife and Italian water dog.

**MARGARET (MAGGIE) MCDONALD** (Advisory Board) has been a trusted advisor and friend to the magazine since its inception—suggesting stories and reviewing every single page we've published in those 25 years. The Pitt Med Magazine Editorial Advisory Board member, potter, psychiatric epidemiologist, science writer and onetime D.C. cab driver is retiring this winter from her latest position at Pitt, which is associate vice chancellor for academic and global affairs, health sciences. In that role, McDonald was often off to the likes of Palermo, Astana or Beijing (sometimes on the same trip), so we got used to seeing her on her way out the door. Still, we will miss her.



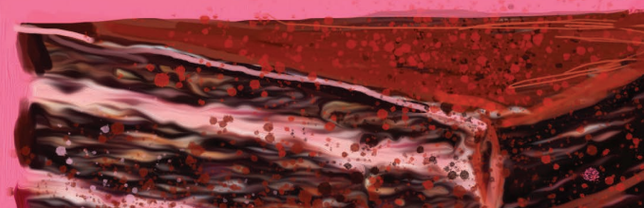
## Made from scratch

In 1999, a few of us began imagining a new magazine for the School of Medicine; we called it Pitt Med—you're reading it now. Maybe you're wondering, how can you help us celebrate a quarter century of stories about fascinating people and projects? Well, you can keep reading. To mark our 25th year of publishing, we're prepping a series that looks back at how medicine, medical science and the school have evolved in the magazine's lifetime.

And if you'd like to peruse some of our best and most important stories over the years, go to our Editor's Picks page at **pi.tt/editorspicks**. In the meantime, we'll be getting our next issue ready for you.

*—Pitt Med staff*

*—Illustration by Frank Harris*







*Devoted to noteworthy happenings at the medical school*



GETTY IMAGES

**A new whole blood test can confirm a concussion with nearly 97% accuracy in 15 minutes.**

## ‘Whole’ new game

Clinical researchers at the University of Pittsburgh were instrumental in the development of a new blood test that can identify a concussion within 15 minutes—much faster than the previous iteration, which needed to be sent to a lab.

The whole blood test, manufactured by medical device and health care company Abbott, received Food and Drug Administration approval April 1. It can confirm a concussion with nearly 97% accuracy within 24 hours of an injury using only a small venous blood draw.

The i-STAT TBI (traumatic brain injury) test measures two biomarkers from the brain that can be released into the bloodstream. Until now, measuring those proteins—called UCH-L1 and GFAP—had to be done using blood plasma or serum, which required sending blood samples to a lab for processing and testing.

“Getting FDA approval for whole blood radically changes the landscape for clinical practice,” says David Okonkwo, an MD, PhD professor of neurological surgery, who was a primary investigator on the project. Okonkwo directs the University of Pittsburgh Neurotrauma Clinical Trials Center.

The test, he says, can be used in health care settings outside a hospital emergency room and soon could be found in urgent care centers and in primary care facilities.

He expects it won’t be too far in the future before the test can be used on the sidelines at sporting events or at the scene of a car accident. The U.S. military is already using it to evaluate soldiers overseas, he says.

The “monumental” story of getting FDA approval for a whole blood TBI test, says Okonkwo, “can’t be told without the University of Pittsburgh School of Medicine.” The school played a critical role in creating a consortium dedicated to diagnosing and treating TBI that includes partners such as Abbott, the Department of Defense and the University of California, San Francisco. *—Michael Aubele*

## FOOTNOTE

Thanks to a partnership with Pitt Med since 2012, the Nazarbayev University School of Medicine (NUSOM) in Astana, Kazakhstan, has gained a rare full accreditation for five years in its first attempt. It is the only graduate-level MD program in Central Asia, where students typically go to med school directly from high school. “We are absolutely delighted,” said NUSOM Dean Massimo Pignatelli, “and extremely grateful to the team from [Pitt Med].” Maggie McDonald co-led the Pitt team, with former Vice Dean Ann Thompson, that guided the fledgling school. McDonald, associate vice chancellor for academic and global affairs, health sciences, is retiring in January 2025, but said, “I was determined that I wasn’t doing that until the school was accredited.”




UNIVERSITY OF PITTSBURGH

**Pitt BioForge CEO Ken Gabriel shares how the facility will drive innovation in biomanufacturing at a Brookings Institution panel.**

# A 'right to win' in biomanufacturing

Pittsburgh's strength in life sciences research is well established, but turning breakthroughs in the lab into companies that spur the local economy is a challenge of its own.

In a panel discussion this spring, local leaders highlighted how Pitt BioForge, the biomanufacturing innovation facility the University of Pittsburgh is building at Hazelwood Green, will help promising life sciences projects overcome obstacles to commercial success.

The conversation was part of "Issues at stake in the 2024 election: Revitalizing American industry," a Brookings Institution event cohosted by Carnegie Mellon University and the University of Pittsburgh.

At the event, Rick Siger, Pennsylvania's secretary of the Department of Community and Economic Development, identified life sciences as an industry where Pittsburgh has a "right to win," or an opportunity to successfully compete in the market thanks to local expertise.

Ken Gabriel, the inaugural chief executive officer of BioForge, explained how the facility will play a key role in stimulating local life sciences activity. The plan is to identify life sciences projects that have the potential for big impact but have been limited by hurdles in manufacturing—for example, precision biologic medicines like gene and cell therapies that are currently prohibitively expensive to manufacture at the necessary scale.

After choosing a project, BioForge will put together an interdisciplinary team and provide it with resources to spend 18 to 36 months solving the manufacturing problem. If the team hasn't demonstrated they can address the issue in that time, BioForge will give the spot on its lineup to another project. The idea is to get as many "shots on goal" as possible, Gabriel said.

BioForge needs to be agile, Gabriel added. "What seems really promising today might be in the dustbin tomorrow." BioForge expects to have 12 to 18 of these projects going on at a time.

Gabriel shared the stage with Sam Reiman, director of the Richard King Mellon Foundation, which is supporting BioForge with $100 million, its largest-ever gift for a single project. Reiman said the foundation wants to support a thriving life sciences ecosystem, so a future biotech entrepreneur who is educated and trained here "doesn't have to think twice about whether they want to stay in Pittsburgh." *—Andrew Doerfler*

## Preparing leaders



Merlin



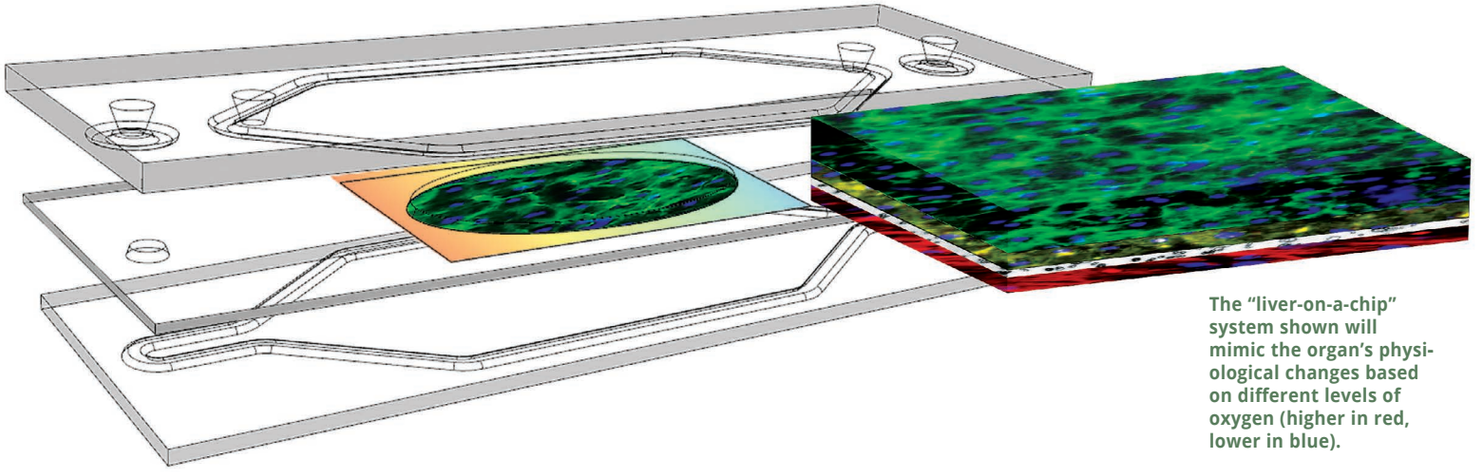
Ray

The 29th class of Hedwig van Ameringen Executive Leadership in Academic Medicine (ELAM) and Executive Leadership in Health Care (ELH) fellows includes School of Medicine faculty **Jessica S. Merlin** and **Kristin Ray**.

Merlin, an MD, PhD, MBA professor of medicine and director of the CHAllenges in Managing and Preventing Pain (CHAMPP) Clinical Research Center, focuses on the intersection of chronic pain and opioid misuse/use disorder across populations and settings.

Ray, an MD, MS associate professor of pediatrics in the School of Medicine and director of health systems improvement at UPMC Children's Community Pediatrics, researches ways to use health information technology and telemedicine to improve aspects of the pediatric health care system.

ELAM, based at Drexel University, prepares women for senior leadership roles in academic health science institutions. The University of Pittsburgh has selected and sponsored dozens of participants in ELAM's programs, usually one or two each year throughout the last two decades. Another Pitt health sciences faculty member, **Tiffany Gary-Webb** of the School of Public Health, was also part of the class. *—Megumi Barclay*



ALBERT GOUGH/UNIVERSITY OF PITTSBURGH DRUG DISCOVERY INSTITUTE.

**The "liver-on-a-chip" system shown will mimic the organ's physiological changes based on different levels of oxygen (higher in red, lower in blue).**

## Drug discovery center sets sights on liver disease

With the support of a $7.8 million grant, liver disease researchers and clinicians from Pitt and UPMC will create a drug discovery center to tackle a disease that affects 25%–30% of the worldwide population. The funding for the new Pitt Translational Center for Microphysiology Systems comes from the National Center for Advancing Translational Sciences, part of the National Institutes of Health.

The investigators will use human "liver-on-a-chip" systems in collaboration with the Food and Drug Administration to improve drug development for metabolic dysfunction–associated steatotic liver disease, the most common cause of chronic liver disease. The condition has only one drug approved by the FDA; it and those currently in development will help only a small percentage of patients.

Organs-on-chips, also called microphysiology systems (MPS), replicate the environment and functions of human organs. They can be used to predict drug responses in disease models and to evaluate drug safety while reducing reliance on animal testing.

"We will pursue a precision medicine approach in the qualification of our liver MPS considering patient genetic and lifestyle/environment characteristics in our analyses," says principal investigator D. Lansing Taylor, a PhD, Distinguished Professor and Allegheny Foundation Professor of Computational and Systems Biology. Taylor is also director of the Pitt Drug Discovery Institute, which will manage the new center.

Other principal investigators include Alejandro Soto-Gutiérrez, an MD, PhD, and Mark Miedel, a PhD, both of Pathology, as well as Lawrence Vernetti and Mark Schurdak, who are PhD faculty in Computational and Systems Biology. All are also members of the Pittsburgh Liver Research Center. *—Staff reports*

## Faculty Snapshots



White

**Douglas B. White and Paul Palevsky have been elected to the Association of American Physicians.**

White is an MD, MAS, the UPMC Professor for Ethics in Critical Care Medicine, and a professor of critical care medicine, medicine and clinical and translational science. He studies surrogate decision-making for patients with life-threatening illness.



Palevsky

Palevsky is an MD professor of medicine, critical care medicine and clinical and translational science. He has helped lead multiple clinical trials focused on the management of acute dialysis, prevention of acute kidney injury and slowing the progression of diabetic kidney disease.



Byrne

**Leah Byrne and Greg M. Delgoffe have been elected senior members of the National Academy of Inventors.** Byrne is a PhD assistant professor of ophthalmology and Delgoffe is a PhD associate professor of immunology. The recognition reflects their innovation in producing or aspiring to produce technologies that stand to benefit society.

Byrne, who is also chief scientific officer of Avista Therapeutics, is working on gene therapy for rare inherited retinal degenerative diseases that result in blindness. Her lab develops viruses that can deliver therapeutic genes to the retina and allow for more precise gene delivery and protein expression.

Delgoffe, director of the Tumor Microenvironment Center at UPMC Hillman Cancer Center, studies how tumor cells drain their local environment of nutrients, starving tumor-infiltrating T cells. He is the cofounder of the startup Novasenta, cofounder of Remplir Bio and an adviser to several biotech companies.



Delgoffe

**The American Academy of Arts and Sciences elected Yuan Chang and Patrick S. Moore as new members;** the married duo lead the Chang-Moore Lab and Cancer Virology Program. Membership of the academy, which aims to unite leaders and innovators across fields, includes more than 250 Nobel and Pulitzer Prize winners. The pair was among five Pitt faculty elected this year.



Chang

Chang is an MD, a Distinguished Professor of Pathology, an American Cancer Society Research Professor and the UPMC Professor of Cancer Virology. Moore is an MD, MPH, Distinguished Professor of Microbiology and Molecular Genetics, American Cancer Society Research Professor and Pittsburgh Foundation Professor of Innovative Cancer Research.



Moore

Their lab identified two of the seven known human tumor viruses: Kaposi's sarcoma-associated herpesvirus and Merkel cell polyomavirus, which is associated with one of the most aggressive skin cancers found in humans. *—Staff reports*



ANDREW DOERFLER/UNIVERSITY OF PITTSBURGH

**It can be hard to distinguish ear infections from other conditions in young children.**

# New app diagnoses ear infections with great accuracy

When Alejandro Hoberman's 18-month-old grandson came to visit in June, the little boy wasn't feeling well.

"I came back from my meetings, and he was coughing and sounded congested. I've seen him with a runny nose for the last 24 hours," Hoberman reported that same day. Hoberman, a pediatrician, is a University of Pittsburgh Distinguished Service Professor and executive vice chair for pediatrics.

"So I listened to his chest, and then I looked at my son and said, 'I've got to look at his ears. I've got this thing here.'"

The "thing" Hoberman had handy was an app he'd developed with Nader Shaikh, an MD, MPH professor of pediatrics and clinical and translational science. Just a few months before, they had reported in JAMA Pediatrics that the app proved to be correct in diagnosing infections of the middle ear (acute otitis media) 94% of the time in 1,151 cases, mostly children under the age of 3.

Though acute otitis media is among the most common conditions in children, it can be difficult to diagnose because of small ear canals, ear wax and wriggling patients.

Studies show clinician accuracy in diagnosis is wide-ranging, between 30% to 84%.

"Underdiagnosis results in inadequate care and overdiagnosis results in unnecessary antibiotic treatment, which can compromise the effectiveness of currently available antibiotics," said Hoberman.

Hence the app, which is built from a deep-learning network steeped in knowledge garnered from hundreds of training videos on ear infections that the team has carefully gathered over the years, as well as clinical guidelines, including those shaped by studies run by Pitt experts like the late Jack Paradise, Hoberman, Shaikh and others. (Hoberman, an MD, now holds the Jack L. Paradise Chair in Pediatric Research.)

"We trained the neural network to think the same way we think," said Hoberman.

"The app supports what I do as a physician." It's not generative, noted Hoberman. "It's not making up anything. It's predictive."

To use the app, physicians place their smartphone on a cradle attached to an otoscope. The app captures video that, in the future, might be stored in the electronic health record and shared with other physicians. It can also be shared with the family, so the parents can see what their child is going through.

The app detected an infection in Hoberman's grandson, enabling the family to get him treated right away.

Hoberman would like it to help children throughout the country. For that to happen, the team will work with a commercial partner to take it out of academia and into the clinic, with FDA approval.

*—Erica Lloyd*




**On the helipad of UPMC Presbyterian, researchers simulated an emergency rescue to test an autonomous resuscitation system.**



ANDREW DOERFLER/UNIVERSITY OF PITTSBURGH

# ‘Golden hour’ gets an extension

Time is of the essence for patients with severe traumatic injuries. Critical care doctors refer to a “golden hour”—the idea that the chances of saving these patients’ lives are much higher if they reach a hospital for advanced care within roughly an hour.

That window is brutally narrow for people badly wounded on battlefields, in remote, rural regions and in other areas that are hard to access or far from care centers. “What we’d like is to extend the golden hour,” says the University of Pittsburgh’s Ron Poropatich, an MD, director of the Center for Military Medicine Research and professor of medicine.

A recent breakthrough in trauma care from Pitt physician-scientists takes a leap toward that goal. The team developed a closed-loop algorithmic resuscitation system that kept large mammals with internal traumatic bleeding alive for more than three hours without human intervention.

The work is supported by a Department of Defense grant, with Poropatich as the overall principal investigator and Michael Pinsky, an MD and professor of critical care medicine at Pitt, as the scientific principal investigator. Their findings were published in May in the journal Intensive Care Medicine Experimental.

The researchers tested the algorithmic system, called Resuscitation based on Functional Hemodynamic Monitoring (ReFit), which was created by Pinsky, on four fully anesthetized pigs with multiple liver injuries.

To simulate an emergency rescue, the animals were transported across the Pittsburgh area from UPMC Presbyterian by ambulance and helicopter and then flown back. (Pigs were chosen because their response to traumatic injury and treatment is similar to that of humans.)

To mimic the time it would take for a first responder to reach a patient, the animals were allowed to hemorrhage for 30 minutes before they were resuscitated with ReFit, which autonomously gave intravenous fluids, blood and drugs.

The system administers drugs that a patient typically wouldn’t receive in the absence of skilled clinicians, such as norepinephrine to reverse hypotension in shock. Aside from ensuring that the pigs remained fully anesthetized throughout the experiment, the researchers didn’t manipulate the system as it functioned.

“At no time did we change treatments,” says Pinsky, who also has appointments in bioengineering and clinical and translational science. “The computer is doing the resuscitation [on its own] based on the knowledge of the experienced care doctors,” who contributed to the algorithm’s development.

The study aimed to mimic time frames and conditions for a remote trauma emergency rescue that are “as close to the real world as possible,” Pinsky says. The team confirmed that the autonomous intervention could continuously resuscitate the pigs and stretch the “golden hour” to “hours.”

The Pitt researchers developed the ReFit interface with computer scientists from Carnegie Mellon University led by Artur Dubrawski, a PhD. The team also included several Pitt emergency medicine and critical care medicine researchers.

ReFit is part of the Trauma Care in a Rucksack (TRACIR) system, which Pitt and Carnegie Mellon researchers have designed to fit inside a backpack that could be delivered by drone to remote locations.

Next, the team plans to test transporting ReFit-connected injured animals by unmanned aerial drones, to show the system’s potential to save people in locations even more difficult to access by emergency personnel. Eventually, Poropatich says, they’d like to create “an ICU without walls.”

*—Andrew Doerfler*

*This work is supported by the U.S. Army Medical Research and Materiel Command under contracts BAA W81XWH-19-C-0101 and W81XWH-19-C-0083.*

*The views, opinions and/or findings contained in this report are those of the authors; the investigators adhered to the Animal Welfare Act Regulations and other federal statutes relating to animal experiments.*



**CLOSE-UP**

**A recent adaptive climbing session at ASCEND in Point Breeze.**

# New heights

Malini Sharma can often be found scaling the rock walls at ASCEND climbing gym in Pittsburgh's Point Breeze neighborhood. The Pitt Med student finds rock climbing both physically and mentally challenging, and it offers a collaborative outlet outside of medical school. Climbing and the climbing community, she says, have helped her grow as a person. And she thinks everyone should be able to have that experience.

She really means everyone. ASCEND's adaptive climbing program is making climbing accessible for people of all abilities. Several med students, including Sharma, have gotten involved as volunteers.

The program allows climbers of all ages and skill sets to take part in the gym's climbing terrain by catering to each person's individual needs. Divya Natesan and Sharma, both third-year students in Pitt's Physician Scientist Training Program, began volunteering to share their love of climbing with others.

Even though participants have different skill sets, "we're all trying to climb the same things," says Natesan. ASCEND's facilities feature vertical and overhanging walls resembling natural rock features while allowing climbers to train in a safe environment.

In January, ASCEND partnered with the Ryan Shazier Fund for Spinal Rehabilitation for an adaptive climbing event where most of the participants were wheelchair users. Natesan recalls the joy and astonishment on their faces once they'd reach the top of a wall, up to 42 feet.

The skill set of handling a rope system to support climbers may not directly translate to her medical education, but Natesan says thinking creatively when assessing each climber's needs will help her act quickly in medical emergencies.

Natesan and Sharma hope to plan more routine adaptive climbing events and twice monthly meetups with other Pitt Med climbers. "Even those who don't have a disability might look at climbing and [think], 'I'm not strong,'" Sharma says. "Being a good climber is a mental game and not always just about strength."

*—Amber Frantz*

*—Photo by Rayni Shiring/University of Pittsburgh*






WHITE COAT PHOTOS: RAYNI SHIRING/UNIVERSITY OF PITTSBURGH



DIPLOMA DAY PHOTOS: JOHN ALTDORFER

# Goings and comings

The School of Medicine bade fond farewells and welcomed new faces at ceremonies honoring its graduating and entering classes.

On Sunday, May 19, the school's 137th graduating class and their guests gathered at Soldiers and Sailors Memorial Hall for Diploma Day. The event's speakers praised the Class of 2024, who matriculated in summer 2020, for their resilience in med school amid the challenges brought on by COVID-19.

Along with 126 students receiving MDs, 61 received master's degrees and 69 earned PhDs. The keynote speaker was Jeanne Marrazzo, director of the National Institute of Allergy and Infectious Diseases—hear more from her on the next page.

The White Coat Ceremony on Sunday, July 28, at Carnegie Music Hall celebrated the 148 new MD students who make up the Class of 2028. The students received their coats accompanied by music from members of the Pittsburgh Symphony Orchestra and enjoyed performances by members of Pittsburgh Ballet Theatre, MCG Jazz and Pittsburgh Opera.

The event was made possible with support from the Dr. Freddie and Hilda Pang Fu Endowment at Pitt. Freddie Fu (1950-2021) was a beloved Pitt Med alum and faculty member in Orthopaedic Surgery; he served as chair from 1998-2021.

Keynote speaker Kurt Weiss, vice chair of translational research and associate professor of orthopaedic surgery, urged students to choose a career path based on what fascinates them, not what they think is expected of them. "If you accomplish that, you will be exactly what the world needs. And you will set it on fire with your passion," he said. *—Staff reports*







COURTESY MARRAZZO

**Marrazzo is director of the National Institute of Allergy and Infectious Diseases.**

# AMERICA'S INFECTIOUS DISEASE DOCTOR

**JEANNE MARRAZZO SPOKE AT THE UNIVERSITY OF PITTSBURGH SCHOOL OF MEDICINE DIPLOMA DAY CEREMONY ON MAY 19, 2024.**

In August 2023, Jeanne Marrazzo, an MD, MPH, was named director of the National Institute of Allergy and Infectious Diseases (NIAID), a role previously held by Anthony Fauci, an MD. At NIAID, Marrazzo oversees a $6.3 billion budget that supports research to advance understanding, diagnosis and treatment of infectious, immunologic and allergic diseases. She previously held the C. Glenn Cobbs Chair and served as director of infectious diseases at the University of Alabama at Birmingham. As a researcher, Marrazzo's specialties are the vaginal microbiome, sexually transmitted infections and HIV pre-exposure prophylaxis.

Marrazzo was the keynote speaker at the School of Medicine's Diploma Day in May. She took time then to share her thoughts on some of the most pressing issues facing science, on infectious disease threats, on lessons learned, as well as plenty of reasons for optimism in biomedicine. *—Interview by Erica Lloyd*

**What are you excited about moving forward as NIAID director?**

It's an incredible time. I would say in the next five years we have an unparalleled opportunity to change the trajectory of some diseases that have been incredibly stubborn. The three that I think about a lot are tuberculosis, HIV and malaria.

For malaria, we have a couple of vaccines that have modest efficacy, but we are also now developing monoclonal antibodies that can be given very early in life, like at 10 months when kids lose their maternal antibodies. That's a devastatingly vulnerable time for infants, for babies, for little kids.

If you could partner those monoclonal antibodies with a vaccine, we may be able to show at scale that a combination prevention and treatment program really works and start to reduce the number of deaths from malaria worldwide. Way too many kids, in particular, still die of malaria and cerebral malaria.

Regarding TB: We've been sort of at a standstill for a long time, but in the last five years we've started having promising developments in some drugs that are long-acting that can be used for both treatment and prevention. And the Gates Foundation recently embarked on a very large study of a TB vaccine that is a new biological model that has significant promise. Some ability to control TB would be amazing. It's still the No. 1 killer of people living with HIV.

And the third one is HIV. We've done great in so many parts of the world getting treatment to people, and when people are adequately treated, they're no longer able to transmit the virus to others. We've also done very well getting PrEP, pre-exposure prophylaxis, to people, but not well enough. There are still way too many perinatal transmissions worldwide.

And even in the United States, in the South, where I was most recently, and in challenged urban areas, we're still seeing an incidence that is completely unacceptable.

We're moving into an era where we now have better tools for prevention. We have long-acting injectables. We're studying long-acting pills. And if you pair that with some of the advances in the vaccine and monoclonal antibody field, those may be closer to seven, eight, 10 years away. It comes together as a very encouraging picture for global prevention.

**You've spoken of the importance of meeting people where they are. Can you talk about how that translates to the pandemic?**

We often, as scientists and physicians, just assume that because we think something is the right thing to do or the best thing to do that everybody will just take our advice and believe it. I don't think that's true anymore.

**We often, as scientists and physicians, just assume that because we think something is the right thing to do or the best thing to do that everybody will just take our advice and believe it. I don't think that's true anymore.**

First of all, because you had a spectrum of opinions from physicians—there are plenty of people who were pushing therapies that we know from good evidence-based trials are completely ineffective and, in fact, sometimes harmful.

But why were people doing that? Would it have made a difference to hear information from a peer? From somebody who was more representative of their communities? I don't know. But all those questions are really important to talk about and engage with.

**Are there any disease threats that keep you up at night? Like bird flu, or a new variant of COVID or measles?**

JOHN ALTDORFER



Marrazzo with Pitt Med's recently retired vice dean, Ann Thompson.

All of it. There's a baseline of infectious diseases that could come back and bite us at any time. Measles is a good example. Polio is a good example. These are things that we thought we had under control and, obviously, we're not quite there.

You can't forget the coronavirus has continued to evolve, and even SARS-CoV-2 continues to evolve. There's always a possibility that there will be enough immune evasion in that virus or another coronavirus that will cause a similar scenario.

Everybody's really laser-focused on the avian influenza situation. We don't really understand how cows became infected. At this moment, there's no evidence of a very worrisome genetic mutation, but this virus is so crafty and has established worldwide domination in the avian population very quickly.

So to see it spill over into cows and also into peridomestic animals like cats, that is worrisome. No. 1, it increases the possibility for further pressure—for the virus to evolve, to adapt. No. 2, it increases opportunities for us humans to interact with these species.

And it increases the likelihood that you can involve another species, like pigs. Pigs are sort of the holy grail for influenza genetic reassortment. All of this is making many people in the public health world hypervigilant.

We're all working very hard to ramp up our antiviral discoveries, as well as vaccines and monoclonal antibodies. We have a stockpile that's substantial, but we need to make sure we have plan B and C and D.

We ignore, in particular, the massive die-offs we're seeing of marine mammals at our peril, because that's not normal.

**The well is not as deep as the need in terms of funding for science generally. Physician-scientists and PhDs may feel like they're fighting for their research lives. Where do we go from here?**

[When I was in training,] we expected to be in training for a long time, but not forever. And we also didn't expect to be in debt in the same way, like hundreds of thousands of dollars. We're asking people to live a model that is almost no longer tenable.

We have to look very hard at the disincentives. We've relied for a long time on the incentives, right? Because we think it's fantastic. It's fun. Science is great: We're making a difference. But there are some disincentives to getting into this work.

**What should new grads going into medicine be optimistic about?**

In addition to what I've mentioned, I think that evolving technology is probably going to make life better, easier and more interesting. So when I say that, I mean the technology for interventions for developing cancer drugs (which are completely amazing right now), for imaging, for developing vaccines. Those technical tools are just going to keep getting better and better because the pace of discovery is really quick right now.

The other thing is, I hope that some of the drudgery that has characterized the last 20 years of shifting to the electronic medical record is likely to be relieved by AI. For every five minutes you spend with a patient, you spend [about] 20 on documentation.

The recent pig-to-human kidney xenotransplantation is pretty amazing. They basically took all the porcine retroviruses out of that pig using CRISPR. The ability to carefully curate what you're doing as you transplant an organ—it's a game changer.

**What would your advice be to new doctors generally in this polarized environment where medical authorities aren't necessarily trusted anymore? And then there are, of course, populations who didn't really trust them all along.**

If you're doing what you love, and you feel like you're making a difference and having an impact on people's lives, you really can't go wrong. You could be in research. You could be in clinical practice. You could be working for a pharmaceutical company. You could be doing global health and working with a nonprofit. You could go into policy. If you're bringing your best self to whatever is happening at that moment, and that's translating to an enhancement of someone's life—

There are so many interactions I've had, particularly with patients, that have refueled me and mean so much more than some of the more traditional honors that I've gotten. I don't think about the awards. I think about my patients, and I think about my trainees, my students. That's what really keeps me motivated. ■

*This interview has been edited for length. See more of the conversation with Jeanne Marrazzo at pi.tt/marrazzo.*

# Top flight

The School of Medicine is just one of six Health Sciences schools at the University of Pittsburgh preparing researchers, administrators and providers who are among the best in the world. Together, these schools are a powerhouse, reinforcing each other's many strengths. When it comes to Health Sciences at Pitt, the whole is greater than the sum of its parts. Yet there's plenty to brag about regarding the separate parts, too. Keep reading, you'll see what we mean.

*—Compiled by Elvira Hoff*

## THE SIX SCHOOLS

- **School of Dental Medicine**
- **School of Health and Rehabilitation Sciences**
- **School of Medicine**
- **School of Nursing**
- **School of Pharmacy**
- **School of Public Health**

## AMONG THE BEST (*U.S. News & World Report rankings*)

**School of Medicine ranks Top Tier for research.**

**7 subjects ranked globally in Top 30 based on research and reputation.**

Surgery is No. 7, Clinical Medicine is No. 19, and Infectious Diseases is No. 20.

**Several programs and specialties ranked nationally in Top 20, for instance:**

- No. 16 Public Health Schools
- No. 11 Nursing Schools: Doctor of Nursing Practice
- No. 10 Bachelor of Science in Nursing Programs
- No. 10 Obstetrics and Gynecology Programs[1]
- No. 9 Pharmacy Schools
- No. 8 Physical Therapy Programs
- No. 7 Psychiatry Programs[1]
- No. 6 Audiology Programs
- No. 5 DNP Nurse Practitioner: Psychiatric/Mental Health, Across the Lifespan Programs
- No. 5 Speech-Language Pathology Programs
- No. 2 Nursing-Anesthesia Schools
- No. 1 Occupational Therapy Programs



## RESEARCH MIGHT

- Top 2% of U.S. universities in externally funded R&D expenditures ($1.16 billion); Health Sciences accounts for nearly 80% ($918.4 million) of Pitt's total
- 24 years in the Top 9 most funded institutions by the National Institutes of Health (NIH)[2]
- No. 6 in NIH funding to universities ($658.3 million); $618.2 million generated by Pitt Health Sciences
- No. 6 in NIH funding to schools of medicine, when including funding to School of Medicine faculty in the Department of Obstetrics, Gynecology and Reproductive Sciences[3]
- 12 disciplines ranked in Top 10, and 18 disciplines in Top 20 in NIH funding

**LEADING MINDS:** 6 National Academy of Sciences Members, 9 National Academy of Inventors Fellows, 15 National Academy of Medicine Members, 9 Best Female Scientists in the World[4]

## TOTAL ENROLLMENT = 5,986

### INCOMING CLASS AS A PERCENTAGE OF APPLICANTS:

Dental Medicine DMD Program: 4%
Health and Rehabilitation Sciences: 27%
Medicine MD Programs: 2%
Medicine PhD Programs: 4%
Medicine MS Programs: 35%
Nursing (BSN): 5%
Nursing (MSN and DNP): 36%
Pharmacy PharmD Programs: 36%
Pharmacy PhD Programs: 8%
Pharmacy MS Programs: 24%
Public Health PhD Programs: 8%
School of Public Health MPH Programs: 18%
School of Public Health (BSPH): 5%
*Does not include all certificate and degree programs.*

FOOTNOTES:

[1] 2023 is most current data point, others are 2024.

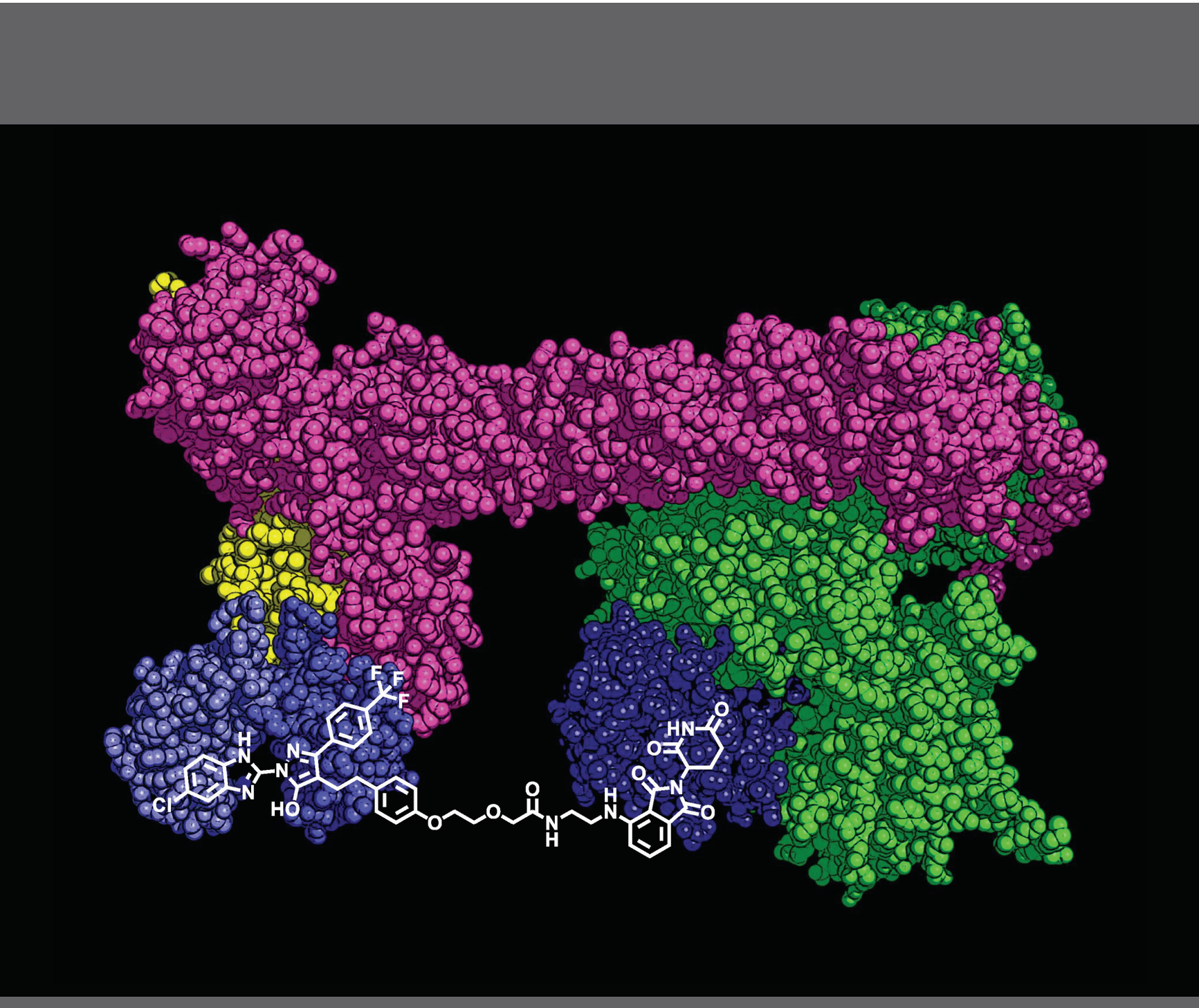
[2] Pitt has ranked in the Top 9 since 1999, except for ranking No. 11 in 2021.

[3] Blue Ridge Institute for Medical Research ranks the School of Medicine No. 8 when not including funding of faculty in the Department of Obstetrics, Gynecology and Reproductive Sciences.

[4] Research.com 2023 ranking.



**A DREAM DEAN TEAM:** (From left) Amy Seybert, dean of Pharmacy, Anthony Delitto, dean of Health and Rehabilitation Sciences, Christine Kasper, dean of Nursing, Marnie Oakley, dean of Dental Medicine, Maureen Lichtveld, dean of Public Health, and Anantha Shekhar, dean of Medicine and senior vice chancellor, Health Sciences. (Photo by John Altdorfer.)




**A viral protein (blue in the lower left) helps HIV escape the immune system's detection. Pitt researchers found a drug candidate (overlaid in white) that can mark that protein for destruction by the host cell's machinery (in yellow, pink, green and dark blue).**

# HIDE AND SEEK

## HOW TO KILL THE PROTEIN THAT CONCEALS HIV FROM THE IMMUNE SYSTEM

BY KIRA GOLDENBERG

Treatment for people living with HIV, the virus that causes AIDS, has improved drastically since it was first detected in humans in the early 1980s, shifting it from a death sentence to a chronic condition. Current antiviral drug regimens can render viral loads undetectable for years.

But these medication cocktails can't completely vanquish HIV lurking in the body, where it evades notice by the immune system. And over time, the treatment takes a toll—long-term patients can become immune to antiretroviral drugs, and they are more likely to suffer from some cancers, heart disease and other diseases common in aging than their HIV-negative peers. The discrepancy grows in significance as the first generation of chronic HIV patients age.

Thanks to research being conducted at the University of Pittsburgh School of Medicine, it may one day be possible to kill latent HIV in infected patients, potentially creating a reality where the virus isn't only manageable but curable.

The Pitt team, in partnership with Doylestown, Pennsylvania-based company Fox Chase Therapeutics Discovery, has identified a drug candidate, called a proteolysis targeting chimera (PROTAC), whose molecules can bind to the protein crucial to helping HIV hide from a body's immune defenses. The work was supported by a small business technology transfer grant from the National Institutes of Health.

That protein, called HIV Nef, helps HIV spread and thrive in host cells by assisting the virus in hiding from a body's immune system, facilitating the progression from HIV infection to AIDS. HIV Nef is difficult to target with drugs because it lacks a defined binding site for drugs to act on.

Traditionally, a drug would act as a key to a binding site's lock, but a different approach was needed here. The team found that, when HIV Nef is combined with the Nef PROTAC, it facilitates binding HIV Nef to the host cell's machinery and can signal the cell to destroy it.

"PROTACs take our classic Nef inhibitors and tether them to another drug that actually can target this protein for destruction," says first author Lori Emert-Sedlak, a PhD research associate professor of microbiology and molecular genetics at Pitt. Getting rid of HIV Nef then resurfaces the "red flags" on HIV-infected cells that signal a foreign invasion in the body, Emert-Sedlak says. And that might allow a patient's own immune system to help clear the virus.

The work is an extension of senior scientist Thomas Smithgall's career-long study of tyrosine kinases, enzymes that help proteins, like HIV Nef, collaborate with viral invaders inside of host cells. After years spent exploring how Nef wreaks chaos, his lab's current work looks at the opposite: how to potentially target Nef for destruction.

"You're deliberately sending it to be chopped up and destroyed. By eliminating it you essentially can shut down all its functions," says Smithgall, a PhD and the William S. McEllroy Professor in the Department of Microbiology and Molecular Genetics.

To find the part of the PROTAC that binds to HIV Nef, the team had to screen hundreds of thousands of potential molecules. Serendipitously, they found some candidates.

"At this point we have a handful of molecules that show promise," Smithgall says. Now, they're trying to land more funding to look at the molecules' pharmacology. "We have not yet tested our PROTACs in animal models of HIV infection, and we don't know what's going to happen when we try that."

"My career in the last 15, 20 years has been very focused on early stage drug discovery and development," Smithgall adds. "You get to this point, and you really need to cross the next barrier where you have a true drug candidate" to test in vivo.

Their hope, says Emert-Sedlak: that "we could combine that with some standard therapies, and it would solve a lot of the issues of resistance in patients." ■



Smithgall



Emert-Sedlak

**"You're deliberately sending [HIV Nef] to be chopped up and destroyed."**

COURTESY SMITHGALL.



Fare play: As these two stories show, shifting the balance of fat, protein and carbs in your diet brings potential benefits for some conditions and risks for others. "Precision nutrition" may be the key to finding the right menu.

GETTY IMAGES/TBRALNINA

# BRAIN FOOD

## COULD A CHANGE IN DIET HELP PEOPLE WITH BIPOLAR DISORDER?

BY ANDREW DOERFLER



Phillips



McClung



Freyberg

When Mary Phillips first heard buzz about ketogenic diets, she mostly lumped them in with fads she'd seen come and go to help people slim down. After all, they share some features of the Atkins diet, the low-carb regimen that boomed in the early 2000s but lacked scientific backing for sustained weight loss.

But shedding pounds is not the goal for many who follow keto diets. Their high-fat, low-carb and moderate-to-high-protein approach has been used for over 100 years as a therapy for children with epilepsy, supported by research showing less frequent seizures for about half of followers.

In recent years, Phillips, an MD/MD (Cantab) and the Pittsburgh Foundation-Emmerling Professor in Psychotic Disorders, began to hear that the diets also had potential for one of her areas of expertise: bipolar disorder. What really intrigued her were stories from fellow researchers who themselves suffered from the condition and found relief by going keto.

"They didn't make any magic claims about it," says Phillips, who is also a Distinguished Professor of Psychiatry and a professor of clinical and translational science and bioengineering. "But they said, 'Look, it worked for me.'"

In the last year, those personal testimonials have found support in promising studies from scientists at the University of Edinburgh, Stanford University and elsewhere.

Now, Phillips and other Pitt researchers have joined the hunt for answers. They're supported by a $6 million grant from Baszucki Group to conduct a clinical trial of ketogenic therapy in bipolar disorder. The organization's founders, David Baszucki and Jan Ellison Baszucki, have a son whose bipolar symptoms subsided after he adopted a keto diet.

Scientists don't know why it may help, but they suspect it has to do with the way the diets shift the body's main energy source. Keto diet followers use ketones converted from fats as fuel more than glucose from carbohydrates, possibly boosting mitochondrial function.

That change also may influence the brain's reward circuitry, which goes out of whack in bipolar disorder, Phillips says. An excess of the neurotransmitter dopamine—which increases in the brain during a wide range of exciting activities—is associated with the disorder's impulsivity, risk-taking and mania.

Early findings suggest keto diets seem to stabilize the brain's dopamine production, which parallels how many drugs for epilepsy and bipolar work. The team wants to understand how swapping carbs for fat could make that happen.

"You can get to changes in dopamine in a lot of different ways," says Colleen McClung, one of Phillips' collaborators and a PhD professor of psychiatry and of clinical and translational science.

They're tackling the mystery from multiple levels. Phillips uses functional imaging and magnetic resonance spectroscopy in patients to look at the concentration of different chemicals that inhibit dopamine in the brain. McClung is putting mice on a keto diet and tracking molecular mechanisms that may reverse manic behavior.

And Zachary Freyberg, an MD, PhD associate professor of psychiatry and cell biology, uses new imaging techniques to "glimpse the machinery of energy production" in mitochondria, he says. Another collaborator, Ana Andreazza, a PhD from the University of Toronto, is building hunks of brain tissue grown from the cells of people with bipolar disorder; Freyberg will peer into these organoids to see how their cells and molecules interact.

Together, they hope to learn not just how the diet helps, but whom it helps. Bipolar presents itself in different ways, and patients respond differently to current treatments. "We still really struggle as a community to understand what makes one person different from the other," says Freyberg.

That's important considering the lifestyle change keto entails. Although the diet likely avoids many side effects of pharmacological treatments, overhauling your daily menu is more complicated than taking a pill.

The team is working with dietitians to understand the hurdles. The absence of most grains and high-carb fruits in keto diets can lead to constipation and, if those foods are not swapped for nutrient-rich replacements, deficiencies in several vitamins and minerals. Phillips also says there's often an "unpleasant, initial foggy-like experience" before the body adjusts to the new energy source.

By identifying the mechanisms at play, the team hopes to find predictive markers for which patients will most benefit from keto. Says Phillips, "That's where clinicians become really interested." ■



GETTY IMAGES/TATSIANA HANCHAROVA

# HARD ON THE ARTERIES

## EATING TOO MUCH PROTEIN CAN STIFFEN THE VESSELS

BY ANA GORELOVA

Americans generally consume a lot of protein, mostly from animal sources, according to a survey of their average diet over the last decade. Nearly a quarter of the population receives more than 22% of all daily calories from protein alone.

That trend is likely driven by the popular idea that dietary protein is essential to healthy living, says Babak Razani, an MD, PhD professor of medicine at the University of Pittsburgh. But new research shows that overreliance on protein may not be good for long-term health.

Razani and other researchers found a molecular mechanism by which excessive dietary protein could increase the risk of atherosclerosis, or stiff, hardened arteries. The findings were published in Nature Metabolism in February.

The study, which combined small human trials with experiments in mice and cells in a petri dish, showed that consuming over 22% of dietary calories from protein can lead to increased activation of immune cells that play a role in atherosclerotic plaque formation, driving the disease risk.

"Our study shows that dialing up your protein intake in pursuit of better metabolic health is not a panacea.

"You could be doing real damage to your arteries," Razani says. "Our hope is that this research starts a conversation about ways of modifying diets in a precise manner that can influence body function at a molecular level and dampen disease risks."

Razani's laboratory first showed that excess dietary protein increases atherosclerosis risk in mice in research from 2020. His next study delved deeper into the potential mechanism and its relevance to the human body in collaboration with Bettina Mittendorfer, a PhD and metabolism expert at the University of Missouri, Columbia.

Led by first authors Xiangyu Zhang, a PhD research assistant professor, and Divya Kapoor, an MD at Washington University in St. Louis, Razani's and Mittendorfer's groups teamed up to combine their expertise.

"We have shown in our mechanistic studies that amino acids, which are really the building blocks of the protein, can trigger disease through specific signaling mechanisms and then also alter the metabolism of these cells," Mittendorfer says.

Based on initial experiments in healthy human subjects to determine the timeline of immune cell activation after they ingest protein-enriched meals, the researchers simulated similar conditions in mice and in human macrophages, immune cells that are shown to be particularly sensitive to amino acids derived from protein.



Razani



Zhang

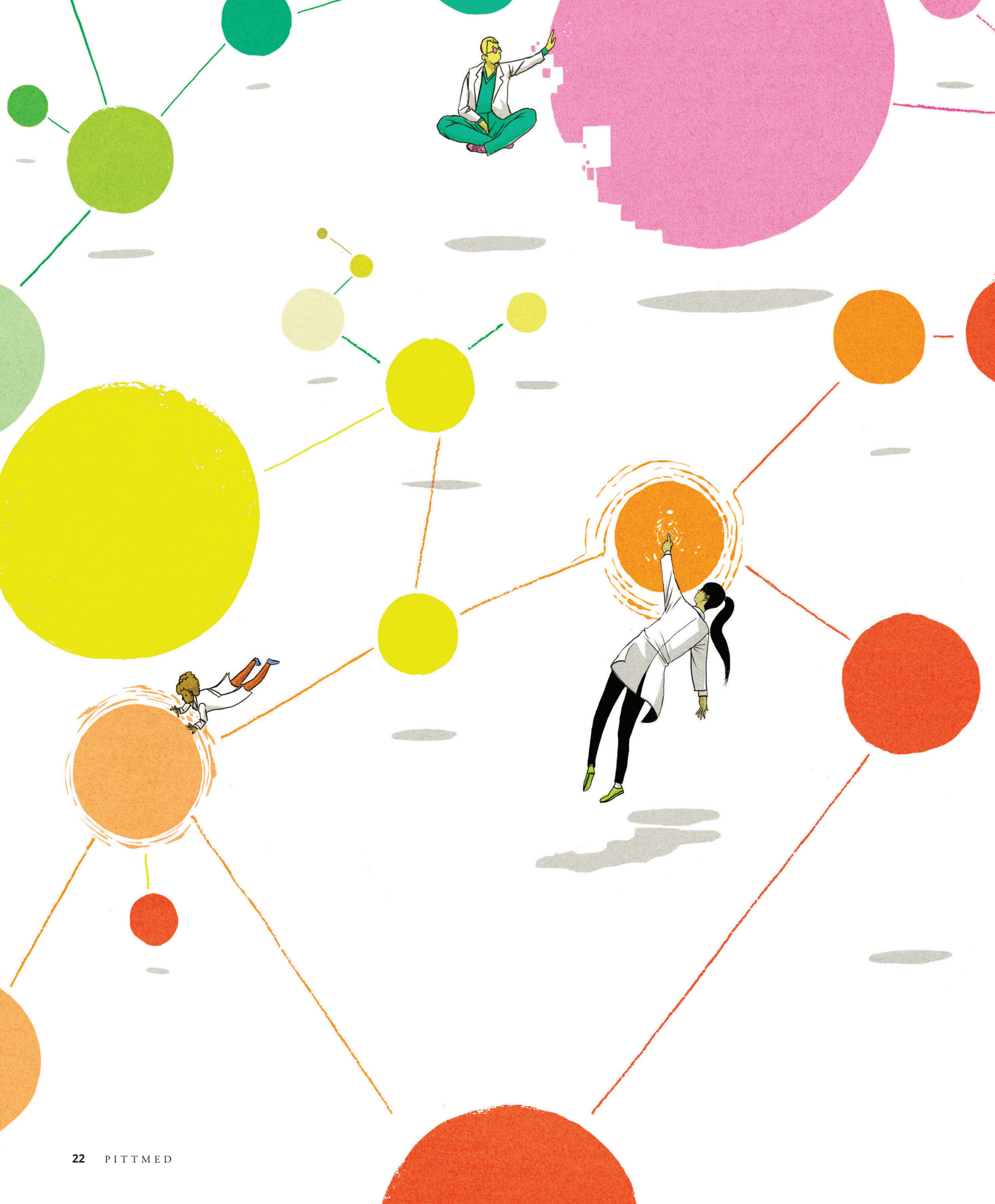
Their work showed that consuming more than 22% of daily dietary calories through protein can trip up macrophages that are responsible for clearing out cellular debris. This leads to the accumulation of a "graveyard" of those cells inside the vessel walls and worsens atherosclerotic plaques over time.

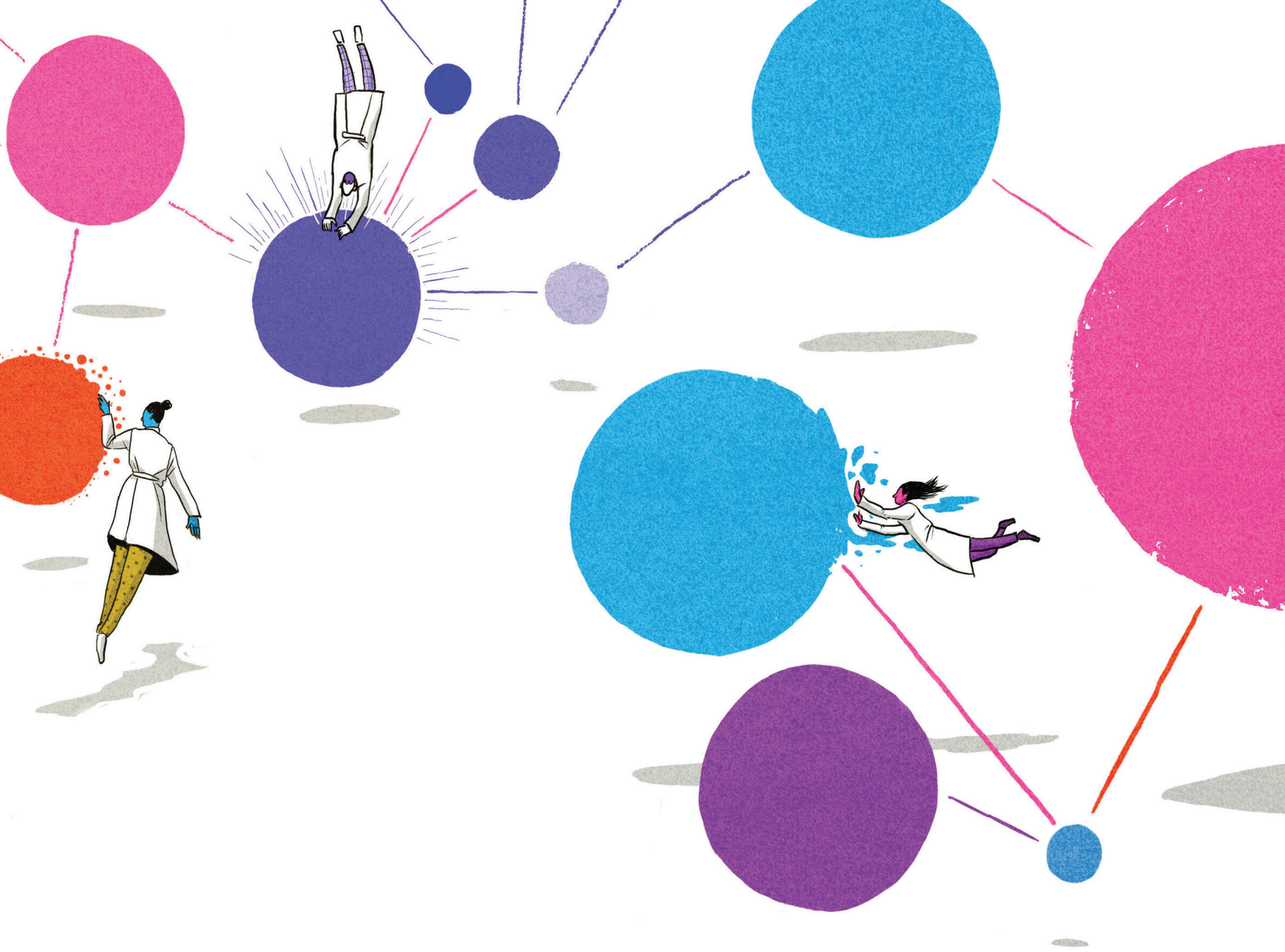
An analysis found that leucine—an amino acid enriched in animal-derived foods like beef, eggs and milk—is primarily responsible for the risk, suggesting a potential avenue for further research on personalized diet modification, or "precision nutrition." Differences in leucine levels between diets enriched in plant and animal protein might explain the differences in their effect on cardiovascular and metabolic health.

The findings are particularly relevant in hospital settings, where nutritionists often recommend protein-rich foods for the sickest patients to preserve muscle mass and strength.

"Perhaps blindly increasing protein load is wrong," Razani says.

"Instead, it's important to look at the diet as a whole and suggest balanced meals that won't inadvertently exacerbate cardiovascular conditions, especially in people at risk of heart disease and vessel disorders." ■



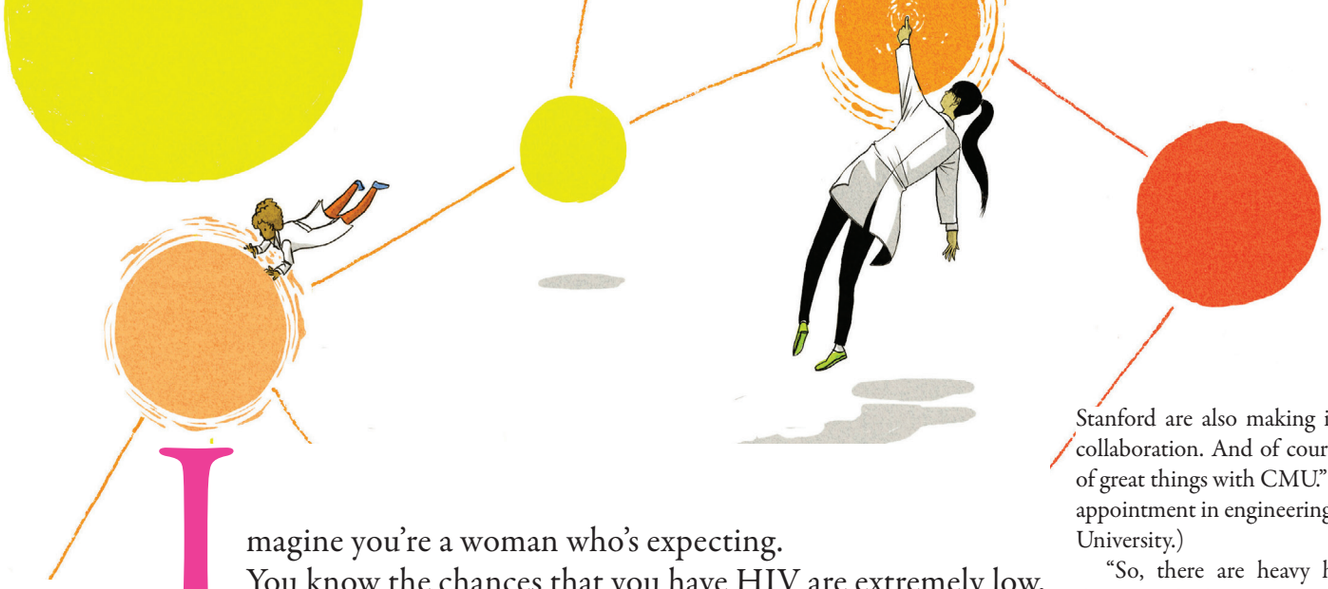


# A.I. FOR ALL

**PITT MED GRADS WILL BE SURE-HANDED IN ITS USE.**

**BY MICHAEL AUBELE**

**ILLUSTRATIONS BY MICHAEL HIRSHON**



Imagine you're a woman who's expecting.

You know the chances that you have HIV are extremely low, but you consent to being screened for the virus because the CDC recommends it for pregnant people.

Then your world implodes. The test comes back positive, and the doctor tells you the baby you're carrying could have HIV, too. So you panic, and you can't stop wondering, *how*?

You learn later that the test was a false positive.

Not only that, you discover the same thing happens to more pregnant patients than you might think, considering a low prevalence in this populaton.

It turns out, artificial intelligence, properly applied, could've prevented the turmoil you ended up going through.

**Sarah Wheeler**, a PhD and associate professor of pathology at the University of Pittsburgh, decided to put AI to the problem, which she describes as one that "can be incredibly stressful."

To better identify false positives, Wheeler and **Murat Akcakaya**, a PhD associate professor of electrical and computer engineering, applied machine learning to more than 60,000 test results from 2016 to 2018. The algorithm accurately identified 94% of the false positives and 92% of the true-positive screens.

Although not being used right now at hospitals (Wheeler's goal is to get it there), the tool could signal to clinicians a need to research the situation more closely before giving the results to the patient and ordering a confirmatory test.

The Wheeler team algorithm is just one of the multitude of ways artificial intelligence could be used to help patients and physicians. For instance, at Pitt and elsewhere, AI is already employed for drug discovery, in preventing the spread of hospital infections and in reducing the administrative burden of physicians.

Applications of AI at Pitt Med are too numerous to track—meanwhile, AI's potential is, of course, ballooning.

Recognizing that, **Anantha Shekhar**, an MD, PhD who is Pitt's senior vice chancellor for the health sciences and the John and Gertrude Petersen Dean, School of Medicine, has taken steps to ensure tomorrow's physicians and scientists understand how AI is shaping medical care and how to best use it.

"We want Pitt to be known not just for transplants and the like, but for AI," says **Liron Pantanowitz**, an MD, PhD, MHA who is the Maud L. Menten Professor and Chair of Pathology and a global leader in computational pathology.

As a starting point, Shekhar and Pantanowitz recruited **Hooman Rashidi**, an MD, MS who has built his career around AI, to serve as Pitt Med's associate dean for AI in medicine.

Shekhar has charged him with making Pitt Med "a world leader in AI literacy," which Rashidi admits might seem heady, hard to quantify and bound to turn heads at other elite universities.

"People often ask, 'Why should you be the leaders in AI?'" Rashidi says. "It's a fair question, especially when you consider the significant advancements being made by institutions like Harvard and MIT. UC Davis, UCSF and Stanford are also making impressive strides in collaboration. And of course, we're doing a lot of great things with CMU." (Rashidi also has an appointment in engineering at Carnegie Mellon University.)

"So, there are heavy hitters in the field, there's no doubt."

One of those heavy hitters is Cleveland Clinic. Rashidi came to Pitt from there; it's where he helped to build the Center for Artificial Intelligence and Data Science, which is not only a cutting-edge AI research facility but also focused on AI literacy.

Rashidi, whose love for teaching comes through in any conversation with him, brings a breathless enthusiasm to Pitt's plan to be an AI epicenter. The type and scale of the education that Pitt provides will differentiate it, Rashidi says.

Rashidi is rolling out an AI curriculum in three phases for MD students: He's delivering several AI "must know" lectures in 2024; introducing a self-paced elective in 2025, which requires absolutely no programming or machine learning experience; and launching a more specialized elective in 2026—one that does involve coding and other computational skills.

"This three-phase approach will ensure the maximum participation of all students and a true path forward to AI democratization," says Rashidi.

The lecture series planned for fall 2024 will give a general overview of AI and explain how it's being used in medical research and clinical practice. While more expansive, it will be akin to a talk Rashidi gave in May to Pitt Med graduate students, touching on different machine learning models, the necessity of responsible research and explaining the importance of knowing how to use AI tools well enough to collaborate with AI experts.

Rashidi envisions eventually offering similar workshops and other educational opportunities to already practicing physicians and scientists and to students and professionals in other health sciences fields.

**Shyam Visweswaran**, an MD, PhD professor of biomedical informatics at Pitt, says there are compelling reasons to educate medical students in AI, notably: knowledge overload,



RAYNI SHIRING/UNIVERSITY OF PITTSBURGH

Hooman Rashidi plans to make Pitt Med a leader in AI literacy.

data overload and administrative overload.

Physicians need the most current and relevant knowledge to provide the best care. However, the rate at which medical knowledge is growing threatens to overwhelm their capacity. Visweswaran says the doubling time of medical knowledge was estimated in 1950 to be 50 years then decreased to 7 years in 1980. By 2020, it was just 73 days.

For instance, diagnosing breast cancer today requires a more robust understanding of the molecular classifications of the disease beyond the histological classifications that were the benchmarks perhaps only 10 years ago, Visweswaran explains.

"In the older classification system for breast cancer, the number of categories was few and the features that we used were based on what you see under the microscope and the symptoms that the patient has," he says. "The newer classification system, which is becoming more and more useful for both diagnosis and treatment, involves cellular features and genetic features. It has a lot more categories. It's rapidly evolving."

He says the amount of clinical data per individual patient is increasing, too, thanks to new lab tests and more imaging data—which are "captured in great granularity in modern electronic health record systems."

And on top of that, the administrative tasks physicians are responsible for can consume up to five hours in a 12-hour workday, he says. (See page 39 to learn how Pitt Med alumnus Shiv Rao is using AI to streamline such tasks.)

Rashidi says the importance for students to understand AI and how to use it boils down to "improving patient outcomes and generating scientific discoveries more efficiently."

But he doesn't expect every future clinician or researcher to write code and build machine learning models from scratch. Prebuilt models—automated machine learning (AutoML) software—exist that make some onscreen aspects of conducting research almost as simple as dragging and dropping.

Visweswaran likens the situation to when MRI became commercially available in the 1980s: "The physicians weren't expected to know spin particles and the physics behind it. They needed to know when to use it, how to interpret the results and how to share those results with peers and patients." (By the way, Paul Lauterbur, a Pitt grad, shared a Nobel Prize for work that made the development of MRI possible.)

**The doubling time of medical knowledge was estimated in 1950 to be 50 years then decreased to 7 years in 1980. By 2020, it was just 73 days, notes Shyam Visweswaran.**

## POTENTIAL AND ALSO LIMITATIONS

**Dipu Patel** is a DMSc professor and vice chair for innovation, Doctor of PA Studies Program, in the School of Health and Rehabilitation Sciences. Patel teaches her students and other faculty how to use AI tools—and consider their ethical implications.

She and others note that the responsible use of this technology is crucial. For instance, building biases into research models related to such factors as race or gender could ultimately have a negative effect on patient care and health policy. And while these risks exist outside the bounds of AI, they can be more problematic within AI because the models build on the information they've been given.

Already, there are numerous examples of bungled applications of AI in health care. One of the best known involves IBM's Watson, which reportedly made poor treatment recommendations for some cancer patients. No patient deaths were attributed to the problem, though the company abandoned the project in 2016.

In this instance, Watson was mining patient records and scientific literature and using that information to suggest therapies. However, issues with the electronic health records Watson used and difficulty in deciphering doctors' notes and patient histories created too many problems to keep the system in place.

Pitt Med students will learn about AI's limitations and be comfortable assessing such models. "Most importantly, they will be protective of the patient," Rashidi says. "If the wrong tool comes into play, you now have a group of people who can potentially call out things that might not be in the best interest of a patient."

In short, Pitt Med grads will know how to use AI wisely.

They have a model modeler in Rashidi. Before he joined Cleveland Clinic, Rashidi was director of artificial intelligence and professor and vice chair of informatics and computational pathology for UC Davis Medical Center, where he led AI and machine learning studies that spawned numerous products and patents, including the AutoML software MILO, which has been licensed to several companies and academic institutions for clinical quality improvement and educational projects.

He also developed a machine learning platform known as STNG (Synthetic Tabular Neural Generator, intellectual property of the Cleveland Clinic), which gives researchers the means to launch pilot studies and simulate clinical scenarios with synthetic rather than actual patient data.

But how do tools like these and ones coming



Summer schoolers build an AI model.

## KNEE-DEEP IN POTENTIAL

**Late in June, a casual conversation about artificial intelligence between a reporter and two recent high school graduates escalated quickly into a technical discussion about the localization and classification of the knee joint.**

**Less than two minutes in, the reporter recognized he was clearly outclassed by the teenagers and, trying not to sound too flustered, asked them to explain in layperson's terms.**

**They responded that "basically" they had trained an AI model to identify a knee joint within radiographs for pre- and post-surgery purposes.**

**"We got a taste of the practical application of AI, especially with relation to medical imaging—its real-world significance," said Aaron Peng, who is headed to the University of Pittsburgh in the fall to study computer science.**

**Peng and his friend Darren Wang, who will start his first year at the University of Pennsylvania in the fall also pursuing an education in computer science, were among 24 high schoolers who spent a week at an AI summer school led by Pitt's Computational Pathology and AI Center of Excellence, its School of Health and Rehabilitation Sciences health informatics faculty and the IEEE (Institute of Electrical and Electronics Engineers) Computer Society.**

**The program not only drew students with an interest in AI from Pittsburgh, it also attracted some from as far away as Ohio, Florida and even Indonesia.**

**In the week's time, the students went from an introduction to the foundations of artificial intelligence to hands-on coding instruction to training the knee model, which was their culminating project.**

**Ahmad P. Tafti, a School of Health and Rehabilitation Sciences assistant professor of health informatics, says the AI summer school was designed to give students exposure to burgeoning fields, while "enhancing their competitiveness for future academic programs and offering insights into potential careers in health care and technology, particularly in AI-powered medical imaging informatics." *—Michael Aubele***

down the pike avoid the same pitfalls that beset Watson and other AI systems built with intentions to improve health care?

"We've discovered a great deal from such experiences," says Rashidi, noting that the AI community can use those lessons to forge "a strategic and multifaceted approach" to creating better outcomes. Rashidi says that to ensure future models are trustworthy, they should incorporate 10 key components. We won't list them all, but some to chew on include realistic expectations and appropriate use cases, transparency and explainability, robust validation and a commitment to the education and training of everyone involved—once again, that focus on AI literacy.

"Interdisciplinary research to build trustworthy AI is an active endeavor at Pitt Med and across campus," says **Shandong Wu**, a PhD associate professor of radiology, biomedical informatics and bioengineering at Pitt. He leads the Center for AI Innovation in Medical Imaging. This Pitt Momentum Funds initiative allows groups from various University departments to address issues such as the safety and explainability of AI across a number of medical specialty areas.

Research shows that no matter how great it seems to be, if providers and patients don't trust new tech, it doesn't get used.

## IN DEMAND: HUMANS WHO ARE AI SAVVY

AI biomedicine experts are inevitably asked: As it becomes more powerful, will AI one day replace physicians?

Visweswaran doesn't see that happening.

"It's clear that AI is not going to replace the physician but augment and assist them," he says. "The physician still has to integrate the information with the clinical context. AI is making life easier, because it's bringing the knowledge together and helping the physician apply it at the right point in care."

Patel says, "The most important skills for the future will be adaptability and flexible thinking paired with curiosity; this applies to the teacher and the learner.

"AI is not a change in the quality of care, rather an evolution in the practice of it."

What's needed are critically thinking humans who are AI savvy.

Rashidi jokes that he started working within the realm of health informatics—a broad term for the field that uses data analytics to drive innovations in health care—nearly 30 years ago, and that at the time, "No one in the medical world really cared about it." And now, it's like he's "swimming

in chocolate," he says of the opportunities to collaborate.

Rashidi earned his MS in molecular biology (bioinformatics) at the University of California, San Diego, and his MD at UT Health San Antonio's Long School of Medicine. He completed his internship in internal medicine at Harvard University, followed by a pathology and laboratory medicine residency at Yale and a fellowship in hematopathology at UCLA.

Rashidi's role here in Pittsburgh goes beyond associate dean. He is a Pitt professor of pathology, executive vice chair for computational pathology and executive director of the Computational Pathology and AI Center of Excellence, or CPACE. (Wheeler is CPACE's director of Lab Medicine AI.)

The center, a joint Pitt-UPMC venture, brings together experts who can transform medicine by using AI to detect disease earlier and more accurately and to enhance personalized treatment plans to improve patient care.

Just a few months in, Rashidi's team had already collaborated on generative AI studies, and he'd developed a framework for Pitt GPT, "that will, hopefully, soon allow us to better use such generative AI tools."

Rashidi's initial three-year plan for CPACE involves integrating AI and machine learning applications into clinical studies and quality assurance projects. "The number one goal for it is to be a problem-solving entity," he says.

"This is the future," he says of AI's influence in medicine. "We have to be leaders."

"But again, when it comes to building the latest, greatest tools . . . there aren't just one or two places [nationally]. It's probably 10-plus places; and we all try to collaborate and learn from each other to enhance best practices within AI and medicine," he says.

"That's not all we're after.

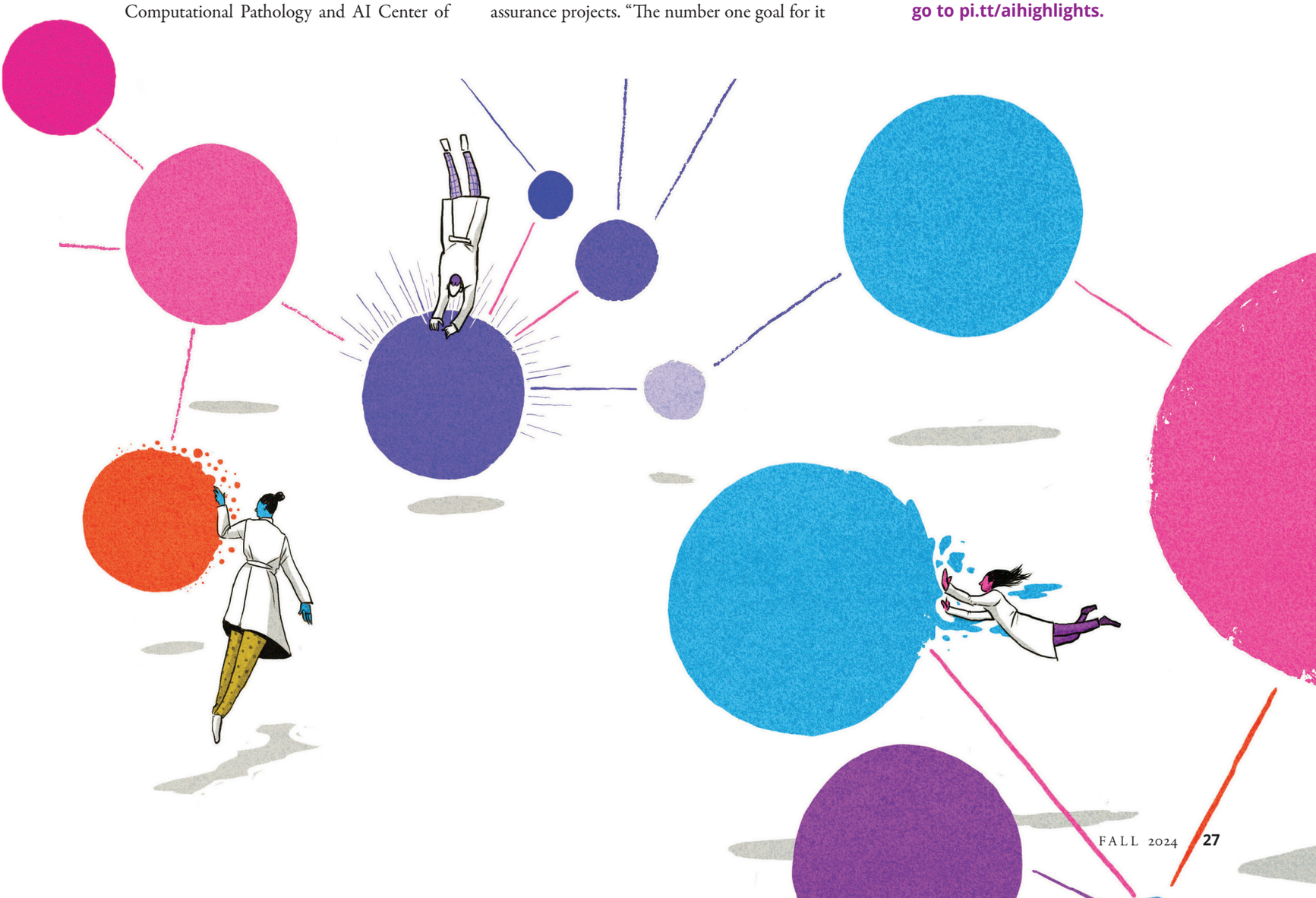
"We aim to make AI accessible to everyone. By educating our medical students, our graduate students, and eventually our physicians, nurses, physical therapists and staff—empowering them to be part of this journey and understand the field—is how you truly force multiply."

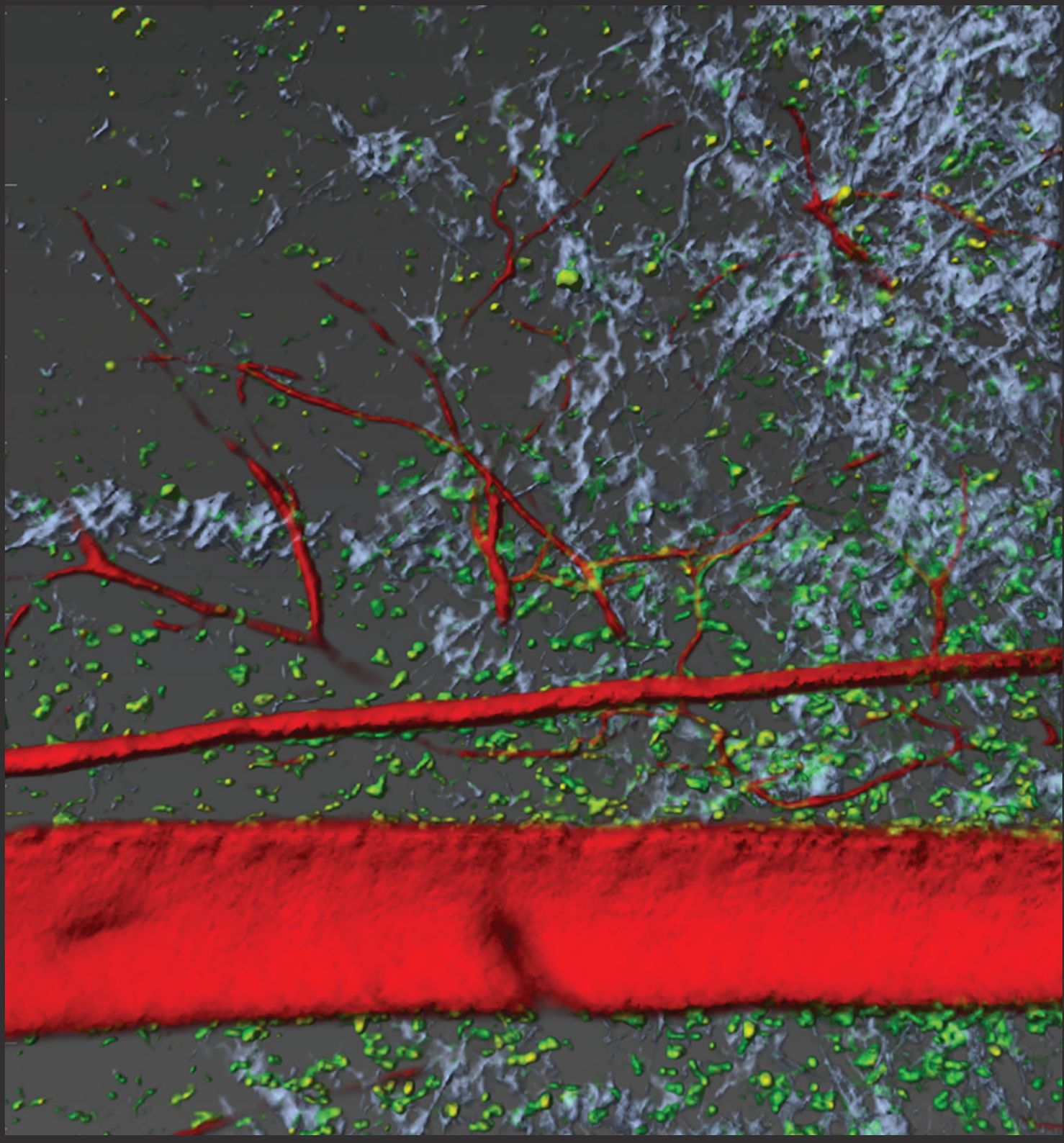
They, he says, are the future AI champions. ■

**Research shows, no matter how great it seems to be, if providers and patients don't trust new tech, it doesn't get used, Shandong Wu points out.**

## LEARN MORE

**To read about AI research applications at the med school that caught our eye, go to pi.tt/aihighlights.**





This image shows a vascular wound in mouse skin. Sen is advancing new approaches to wound healing while expanding access and equity for patients today.

# REGENERATING HOPE

## CHANDAN SEN'S PUSH TO HELP CHRONIC WOUND PATIENTS TODAY AND TOMORROW

BY ANDREW DOERFLER

PHOTOGRAPHY BY RAYNI SHIRING UNIVERSITY OF PITTSBURGH



Sen on balcony of the Bridgeside Point II building in South Oakland.

Chandan Sen was already well into his career in wound healing research when he first witnessed one of the most dramatic consequences of the very problems he was studying. Before he came to the University of Pittsburgh, colleagues at one of his previous institutions took him to observe an amputation.

"You see a whole person going in, and they come out without a leg. It left a very big impact on me when I saw that the first time," says Sen, who is a PhD, MS and a cellular and molecular biologist by training. The look on the faces of the patient's grandchildren especially stuck with him.

For Sen, not a physician himself, the experience helped connect the scientific questions he was wrestling with to the real-world consequences for people. About 85% of amputations in people with diabetes are preceded by a chronic wound, most commonly a foot ulcer. About half of these amputees don't live more than five years past the procedure.

Even for patients who don't need to have a limb removed, a chronic wound can lead to dying tissue, sepsis, cardiovascular diseases, steep challenges navigating the world and disruptions to quality of life. Chronic wound treatment costs at least $28 billion annually, according to a 2017 analysis.

SEN/SINGH, MCGOWAN INSTITUTE FOR REGENERATIVE MEDICINE.

Despite these urgent issues, Sen finds that wound healing is too often an afterthought. "Wound care is not an actual specialization in medical education or training," he says. "There is no accredited fellowship or residency for it.

"We need champions in this area," he says.

He's determined to mobilize researchers, clinicians and philanthropists in a concerted effort to transform care for patients.

Now the director of Pitt's McGowan Institute for Regenerative Medicine and chief scientific officer of UPMC Wound Healing Services (Pitt's clinical partner, UPMC, operates 20 wound centers), Sen sees an opportunity to make that happen right here in Pittsburgh. Gayle Gordillo, one of his closest collaborators over the last two decades, shares his excitement.

"Pitt, through its resources like McGowan and the Clinical and Translational Science Institute and obviously its partnership with UPMC, is uniquely positioned," says Gordillo, an MD professor of plastic surgery and UPMC's senior medical director of Wound Services. "We have the opportunity to do things on a scale that really no other academic institution can."

To succeed, Sen and his team plan to pair forward-thinking, sometimes futuristic-sounding, regenerative technology that he's spent his career developing with initiatives to expand access, equity and awareness so that the best care reaches the patients who need it most.

## TNT THAT PACKS A GENETIC PUNCH

Sen arrived at Pitt in 2023 after five years at Indiana University, where he served as a Distinguished Professor and the inaugural director of the Indiana Center for Regenerative Medicine and Engineering. Before that, he made strides in wound healing and regenerative medicine over the course of 18 years at the Ohio State University.

His signature achievement was a breakthrough in the world of regenerative medicine: a technology that reprograms the skin to take on functions of other kinds of cells and tissue. Called tissue nanotransfection, or TNT, the technique uses a 1-square-centimeter silicon chip that touches the skin and delivers genetic codes to cells through electrical pulses within a fraction of a second, instructing them to acquire new functions. Sen and his collaborators first reported the technology in a 2017 paper in Nature Nanotechnology.

Scientists at Stanford University, Columbia University and elsewhere had previously found that they could convert mature cultured skin cells into other types of cells in a lab.

TNT, though, was the first to reprogram tissues while they're still in the body using electrical pulses. The work has spurred the field of in vivo tissue reprogramming. "The skin can now act as a bioreactor," says Sen, who is also a professor of surgery and plastic surgery. What's more, the tissue grows under the watch of the body's own immune system, lessening the risk that it will attack new cells.

Beyond the possibility that TNT presents to heal wounds more effectively by restoring damaged or diseased tissue, Sen excitedly shares a list of other potential uses. It could be used, for example, to grow a stroke patient's own nerve cells to help restore lost function. "We grow them in your body. And after three weeks, we see they're ready. We take a biopsy of the skin, harvest the neural cells and put them back in the brain." The researchers have seen promising results for this application in mouse models.

With collaborators, he will soon publish a paper showing the possibility of using TNT to create an apparatus under the skin that regulates blood sugar, mimicking a function of the pancreas.

TNT, which has been successful in preclinical studies, is licensed for commercial use. But to allow it to reach its full potential for patients, Sen sees another challenge: fostering an economy that will bring these kinds of next-generation approaches to medicine to the patients who need them. The old model of drug production, he says, won't cut it for more advanced, personalized treatments.

It's a big part of what drew him to Pitt. Anantha Shekhar, an MD, PhD, John and Gertrude Petersen Dean of the School of Medicine and senior vice chancellor for the health sciences, has made translation and commercialization key priorities.

Along with partnering with UPMC Enterprises and other organizations that develop and invest in medical technology, Pitt is building BioForge, a biomanufacturing innovation facility under construction in Greater Hazelwood. Sen has already had discussions about collaborating with BioForge's anchor tenant, the Massachusetts-based company ElevateBio, about the workforce it would take to manufacture regenerative treatments he works on. Sen also serves as associate vice chancellor for life sciences innovation and commercialization.

Shekhar, who came to Pitt from Indiana University himself in 2020, sees Sen's work as part of his vision for the health sciences here.

"It's impossible to encapsulate the collective impact of Chandan's pioneering research and continuing breakthroughs in tissue repair and regeneration," says Shekhar. "The work of the Sen team will accelerate Pitt's momentum in research areas that are key to the future of the region and drive collaboration with other biomedical innovators, including Carnegie Mellon University."

Sen has hit the ground running. He counts Theresa Mayer, who moved from Purdue University to Carnegie Mellon as vice president for research a few months before Sen came to Pittsburgh, as a close friend and collaborator. They're working together to explore ways to use artificial intelligence to move research forward.

## DRIVEN BY NATURE

Sen is in some ways an unlikely fit to lead the McGowan Institute for Regenerative Medicine. For one thing, he began studying wound healing, and from there regenerative medicine, by accident. "I was just a molecular cell biologist at UC Berkeley, which didn't have a medical center," he says. "And I was very happy in my world of genes and cells and fundamental biology and to have nothing to do with health care."

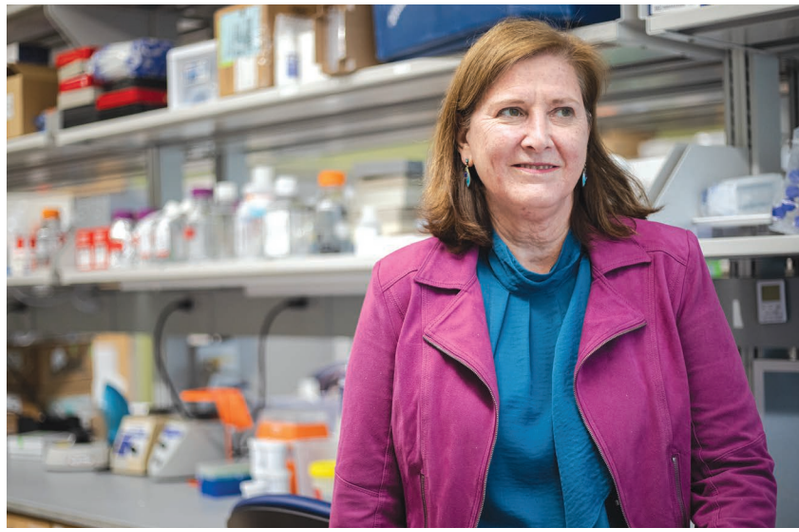
One day, though, he got a visit from a surgeon from the University of California, San Francisco. Thomas K. Hunt, widely recognized as a giant in the world of wound healing, thought Sen's work on a cellular mechanism of tissue repair was relevant to a large National Institutes of Health grant he was applying to renew. He asked Sen to join on as a project principal investigator of an NIH Center Grant.

Sen was six months into his faculty position and had never worked with a clinician before.

Hunt was unfazed, Sen recalls. "He said, 'I want you to lead this because then you will take it into the future.'

"I didn't know the guy at all. I'd never met





**LEFT: Sashwati Roy (left) and Deeptankar DeMazumder (center) are exploring unexpected avenues to regeneration. BELOW: Gayle Gordillo runs a number of clinical and translational research studies.**

him [before]." But Sen couldn't turn down the opportunity.

Through Hunt, he had access to the program of Mike Harrison and Michael Longaker, whose research into prenatal surgery to treat dangerous conditions or save the life of a fetus had found injured fetuses could perfectly repair themselves without any scarring until the third trimester. Harrison was the director of UCSF's Fetal Treatment Center, and Longaker, then a mentee of Harrison, went on to become codirector of the Stanford Institute for Stem Cell Biology and Regenerative Medicine. Working with this cast of medical all-stars was Sen's first foray into wound healing.

Hunt's gamble, it seems, paid off. Sen moved that early wound healing work into regenerative techniques he's now known for. "Hunt never talked about regeneration," Sen says. (Hunt died in 2019.) "Over time, it occurred to me that repair can be even better if we can turn on some of these fetal factors in the adult body." That idea has guided much of his research since and helped lead to TNT.

So, Sen's path into medicine was accidental. He also readily admits he does not have the mind of an engineer. (Though he was elected a Fellow of the National Academy of Inventors.) McGowan's past directors have all had bioengineering backgrounds.

But he says his trajectory helps inform his approach to regenerative medicine, which attempts to replace or restore damaged tissue and organs through tools like tissue engineering, cellular therapies and artificial organs. Sen's approach involves finding ways to repurpose aspects of developmental biology in adult tissues.

A wildlife photography hobbyist, he looks to leverage capabilities lying in wait in nature in his work: "If you can take the wind of nature behind you, it becomes more effortless. . . . Can I cooperate with nature as opposed to struggle with nature?"

Some animals, like many amphibians, spiny mice and tetra fish, are superstar regenerators, sprouting new tails, ears and other body parts. They are also frequent study subjects for this reason. (Pitt's own Stephen Badylak, a PhD, DVM, MD professor of surgery and deputy director at McGowan, looked to salamanders in his studies to regrow mammalian digits.)

If certain animals can do it, and human fetuses can do it, Sen wondered, why can't adult humans heal themselves just as well? No one had shown why it wouldn't be possible to reactivate that prenatal ability.

"I had it when I was in the womb. I'm the same person," Sen says. "Did nature delete all of that? Or did nature hide it? And we found that nature was hiding it."

Sen also wants to learn from the other extreme end of the lifespan: death.

"When a human dies, the entire body does not die. All the tissues and cells don't die," Sen said in a talk hosted by the Center for Bioethics and Health Law in April 2024, called "Human Death Ushering in the Dawn of New Life."

Bones, skin and cartilage can survive for a long time, he says. And the way their cells and tissue strive for life after death, Sen thinks, could point to new potential regenerative approaches.

Again turning to the skin, their team has data suggesting that during slow, natural deaths, fibroblasts activate developmental pathways that encourage the survival of cells. "Developmental pathways in the womb seem to come back after we die," Sen says. Understanding these processes better could, for example, improve outcomes for organ donation recipients.

At Indiana University, Sen pursued these questions with support from a $1.8 million grant from the John Templeton Foundation. He led a team that included experts in experimental data generation, bioinformatics and philosophy.

He is well aware that looking to death to improve life sounds counterintuitive (like something out of a "crazy idea competition," he says). However, he says: "Originality is the lifeblood of innovative science."

## DRESS FOR SUCCESS

Sen didn't arrive in Pittsburgh alone. Forty-three of Sen's colleagues from Indiana have joined him at Pitt and McGowan, including 14 faculty members. Many are working to end biomedical science's lackluster streak in the world of wound care. It's been about 20 years, Gordillo says, since a new class of products truly made a difference for patients whose wounds won't heal.

Among the most promising prospects they're working on is a new form of wound-dressing that uses an electrical field to fight some of the hardest-to-treat infections.

Many wounds are plagued by bacteria that band together to form a layer called a biofilm. The canopy of bacteria acts as an effective shield against immune cells and antibiotics that try to combat the infection. Using electrical signals, the bacteria communicate to hold the film together.

"One of the questions that came to our mind early on is, Can you scramble the electrical signals that these bacteria are using to communicate with each other, so that you can disrupt the biofilm structures?" says Sashwati Roy, a PhD, MS professor of surgery who studies inflammation and chronic diabetic wounds.

Working with Sen, who is her husband, Roy has packed those signal-jamming electrical charges into dressings that cover wounds. A 1-volt version, made of a silk that gets its charge from dots of silver and zinc in the fabric, is already being commercialized. She was the senior author on a clinical trial showing it to be more effective than standard of care. Breaking up the biofilms allows antibiotics and immune cells to penetrate where they couldn't before.

They're now going further with an amped-

up, battery-powered dressing that they hope will break up nastier biofilms. "With the battery power, the electrical field penetrates deeper, and you can reach, maybe, deeper infections that are already set in there," Roy says.

They are analyzing data from a Navy-funded clinical trial that they expect to publish in the fall. Sen also received a technology commercialization award from the Department of Defense to test the technology to manage infection of war wounds in Ukraine.

What does this have to do with regenerative medicine? Roy has an answer: The researchers are looking at a molecular mechanism the dressings encourage that promotes the migration of cells involved in wound healing.

"It is not only an infection management tool, but it is also creating a regenerative environment within the wound to start making the cells heal more quickly," she says.

## UNMIXING THE SIGNALS

Others in Sen's orbit are also pursuing unexpected avenues to regeneration. Deeptankar DeMazumder, an MD, PhD associate professor of surgery and medicine, is studying the cross talk between the heart and the brain to better predict a patient's risk of sudden cardiac arrest. (He was awarded an NIH Director's New Innovator Award to pursue this work.)

He's developing artificial intelligence algorithms that decode signals captured by electroencephalograms and electrocardiograms. "Eavesdropping" on conversations between the brain and the heart, DeMazumder says, could reveal hidden signatures that point to a higher chance of cardiac arrest, allowing doctors to set up patients with a defibrillator in advance.

However, DeMazumder points out, "the defibrillator shock resets the rhythm, but it doesn't treat the underlying issue." That's where his connection to Sen's regenerative work comes in. DeMazumder is interested in using Sen's signature technology, TNT, to implant nanotechnology in the brain. The nanotechnology would read the signals he's studying and then use optogenetics—applying light to control the activity of neurons—to "enhance the signaling, alter the pathology and enhance cardiovascular function" to prevent cardiac arrest, he says.

It's a bold idea, but the willingness to take big swings attracted him to working with Sen in the first place. Just as important, he says, is Sen's focus on forwarding ambitious ideas to make real change for patients.

"A lot of research gets done on so many topics, for billions and billions of dollars, and only a fraction ends up making an impact where it enriches the lives of people," DeMazumder says. "Those opportunities are not as common as we think."

**Sen and his team are not waiting for shiny, new technology and radically novel approaches to help patients.**

## PEOPLE NEED HELP TODAY

Sen and his team are not waiting for shiny, new technology and radically novel approaches to help patients. "I'm interested to see how we can take care of chronic wounds, especially diabetic foot ulcers, such that we have fewer amputations today," Sen says.

He's the national vice chair and chair-elect of the Diabetic Foot Consortium, a multicenter network that aims to improve wound care for the more than 29 million people in the United States who live with diabetes, which impairs the healing process especially for foot wounds. Minor cuts, without proper care, can turn into chronic, debilitating issues that can become fatal. Some estimates say a third of those with diabetes will have a foot ulcer at some point in their lives, and more than half become infected.

Sen is focused on ensuring that patients from all backgrounds throughout Pennsylvania receive the finest care: "The first thing is adherence to standards of care. We have to disseminate awareness to make sure the people who need care are referred to the right clinics."

Sen has teamed up with Nancy Gauvin, associate dean for equity, diversity, inclusion and community engagement in the School of Health and Rehabilitation Sciences, and recently visited a Black church in Pittsburgh, speaking with people who shared stories of mistreatment by the health care system. That history, Sen says, has led to lower participation in clinical trials. "I have to do something to make sure that the right population, the right community, engages," he says.

His team at Pitt received a supplemental $1 million from the NIH dedicated to enrolling underrepresented minorities in clinical trials. They are also opening research sites in communities like Jameson, Pennsylvania, rather than expecting those living in rural areas to come to Pittsburgh, and starting patient-based research programs in Altoona and Erie. "So, I'm traveling all across Pennsylvania," Sen says.

His goal is to bridge the gap between pioneering research and practical considerations for patients: "On one end, you have scientific ingenuity and innovation that sometimes disregards the practical aspect and implementation. On the other end, you learn from patients what the need really is in the marketplace. These two [ingenuity and practicality] come from opposite ends, and the goal is to make them approach each other."

He recalls that the institute he directs arose, over 30 years ago, from a question posed by William McGowan, an entrepreneur who became a transplant patient.

"We have Pittsburgh storied for its contribution to transplantation science. [McGowan] asked, 'Hey, what's the future?'" Sen says. "It is not an academician that asked that question."

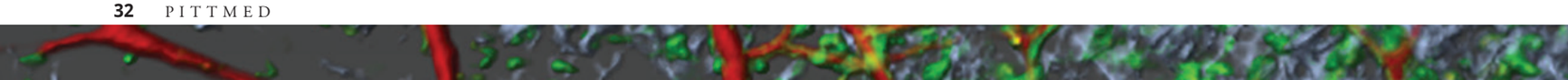
Bill McGowan's practical yet visionary foresight brought forth innovations in artificial organ development. The institute's successes include a rotary blood pump, which has helped tens of thousands of patients worldwide, and the Hemolung Respiratory Assist System, which is used as a bridge to lung transplant. Under past directors Alan Russell and William Wagner, the institute expanded to include tissue engineering, spurring researchers to find new ways to regenerate nerves, muscles and more using biological scaffolding.

Sen intends to carry on that legacy as he considers his own. "How many more years do I have in my career?" the 58-year-old asks out loud. "Now is the time to rise to a larger challenge."

As he put it in his inaugural address as director of McGowan, "Our work here at Pitt McGowan will not only be about mending tissues and restoring function; it will be about renewing the hope of the people we serve." ■

*—Brandie Jefferson contributed reporting.*





*Accidental discovery should help aneurysm patients*

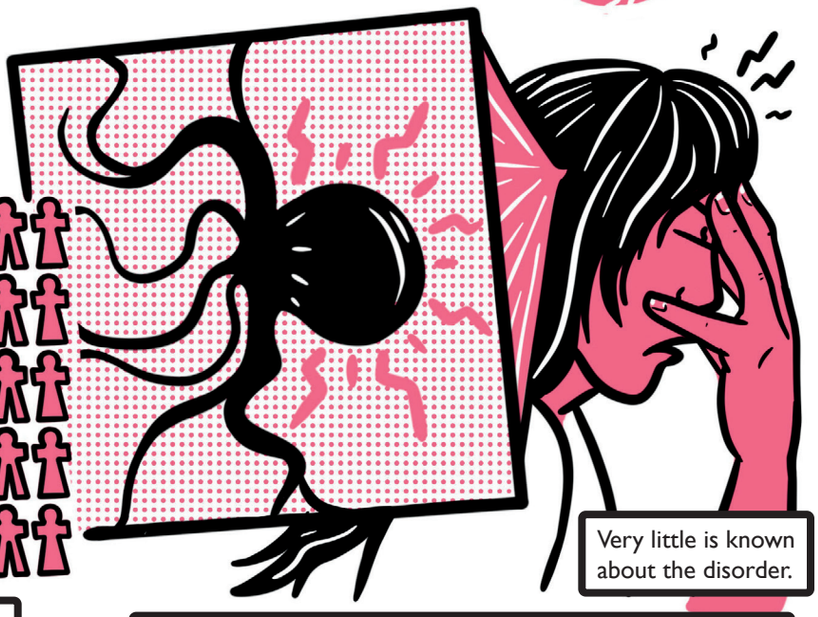
# IDEAS to REALITY

Written by Katy Rank Lev • Drawn by Maggie Lynn Negrete




Up to 5% of the U.S. population suffers from brain (cerebral) aneurysms. Women are nearly twice as likely to have one. When these bulging blood vessels burst, it's deadly–up to half of these patients do not even make it to the hospital for surgery. Of the ones who do, two-thirds are left with lifelong, profound disabilities.





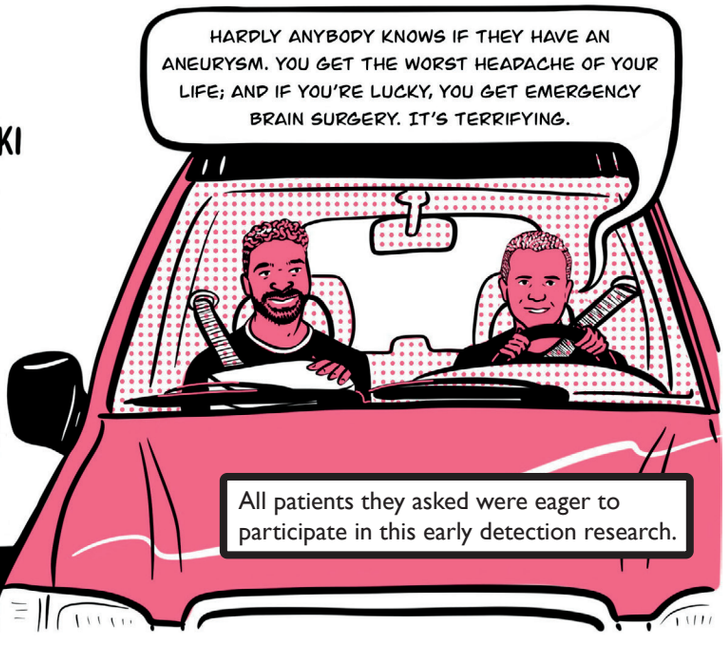
Very little is known about the disorder.

Currently, brain surgery is the only available treatment for aneurysm, and detection is complicated. In 2019, University of Pittsburgh medical student Aditya Mittal and UPMC neurological surgery resident Kamil Nowicki, an MD, PhD, were researching potential aneurysm medications with Robert Friedlander, MD Distinguished Professor and chair of neurological surgery.

Once the pair realized aneurysms leave fingerprints in the blood, they rushed to get Institutional Review Board approval to collect more samples from Pittsburgh hospitals treating aneurysm patients surgically.

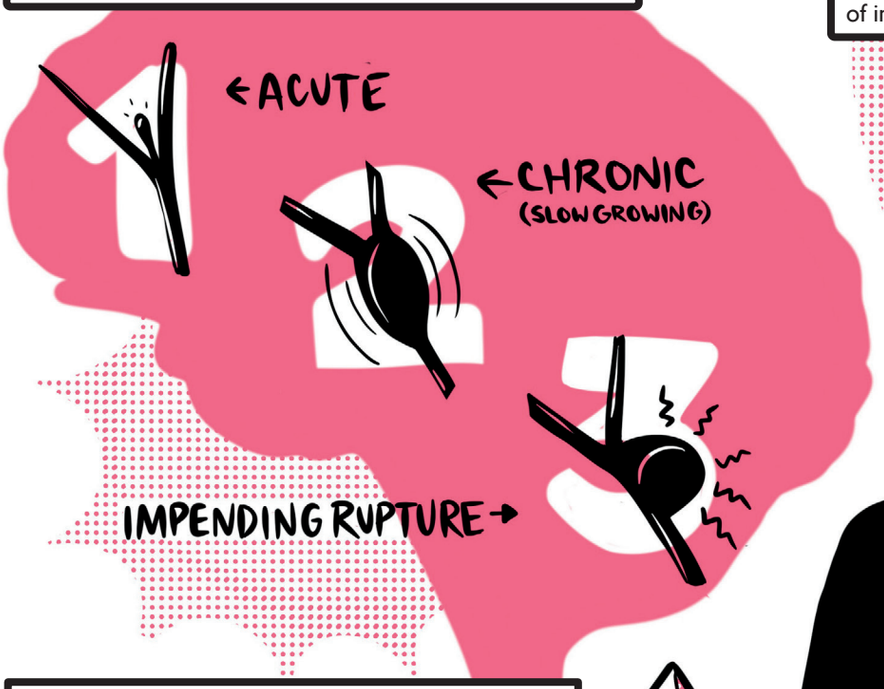



They realized some samples had different inflammatory markers.




All patients they asked were eager to participate in this early detection research.

Nowicki and Mittal realized they could not only identify the presence of an aneurysm in the blood samples, but they could classify the severity of the problem. With guidance from Michael McDowell (Res '21, Fel '22), an MD assistant professor of neurological surgery, they identified three fingerprints, each indicating a phase of inflammation.



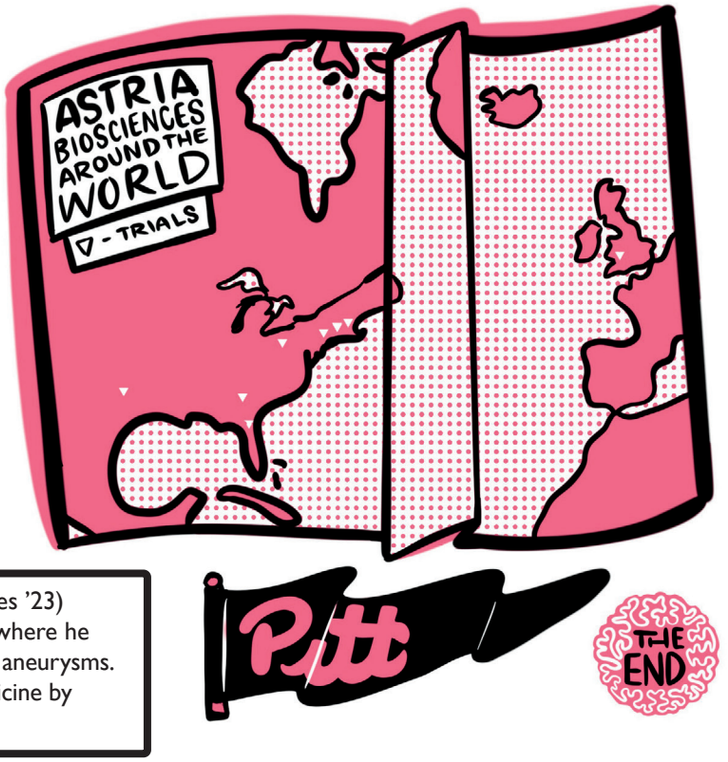

Mittal and Nowicki each took a year off from their studies and training to develop a test, named CAT-7, that they hope becomes routine. Their work included conversations with aneurysm patients and their families, who described "ticking time bombs" lurking in their blood. Aneurysms tend to run in families, who live in fear of invasive surgery, impaired lifestyle and sudden death.



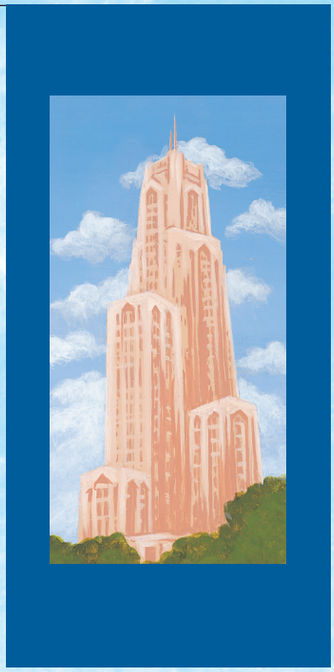

Their test received support from entrepreneurial competitions and took first place at the National Inventors Hall of Fame's 2023 Collegiate Inventors Competition. Under Friedlander's supervision, CAT-7 also nabbed a 2023 National Science Foundation Small Business Innovation Research Phase I award.

Astria Biosciences–a startup founded by Nowicki and Mittal–is setting up a multisite clinical trial throughout the United States and United Kingdom. They aim to apply for FDA approval for CAT-7 in 2026.




Mittal is now a fourth-year medical student. Nowicki (Res '23) just finished an endovascular surgical fellowship at Yale, where he estimates one-third of his cases were related to cerebral aneurysms. Both men hope CAT-7 will transform neurovascular medicine by reducing the need for emergency aneurysm surgery.





Roth



Vogel



Dascombe



DeKosky

# CLASS NOTES

## '60s

**Lou Catalano** (MD '67) might be an octogenarian, but he argues he can be twice as productive as neurologists who are half his age. Catalano was among several members of his class who were granted the chance to pursue the research interests of their choice during their final year at Pitt Med. He spent that final year studying neuropathology and within a few years found himself working as a researcher in a neurovirology lab at the National Institutes of Health. He left there after two years to complete his residency at the Neurological Institute of New York at NewYork-Presbyterian/Columbia University Irving Medical Center. In 1973, he started private practice in Greensburg, Pennsylvania. Now 82, he's still practicing as part of Excela Health. He says he gets to the office about 6:45 a.m. each day, "and I probably don't get home until 7 or 8 at night."

This pediatrician was the first woman editor in chief of JAMA. She published more than 250 peer-reviewed articles. And in 2016, **Catherine DeAngelis** (MD '69) published a memoir, "Pursuing Equity in Medicine: One Woman's Journey," described as a must-read for women interested in breaking the glass ceiling in medicine and for "any man who wants to understand what his female colleagues must endure." The Johns Hopkins University Distinguished Service Professor Emerita credits her father for encouraging her to pursue a career in medicine. Despite numerous degrees and accolades, DeAngelis has never lost sight of what was important to her: human rights of patients, health professionals and the poor. Today DeAngelis serves on the U.S. Government Accountability Office advisory board and the University of Pittsburgh Board of Trustees.

## '70s

**Norman Wolmark** (Surgery Resident '76), an MD, received the Medallion for the Advancement of Surgical Care from the American Surgical Association in April. Wolmark has contributed to numerous advances in surgical oncology over the past four decades. He joined the faculty at Pitt Med in 1979. He became chair of the National Surgical Adjuvant Breast and Bowel Project in 1994, a position he still holds. Among his other notable accolades are a Giant of Cancer Care Award from OncLive, a Distinguished Service Award from the Society of Surgical Oncology and the Gianni Bonadonna Breast Cancer Award from the American Society of Clinical Oncology.

## '80s

Mayor Ed Gainey proclaimed Oct. 10, 2023 as **Ronald Roth** Day in Pittsburgh, celebrating Roth's (MD '82, Emergency Medicine Resident '85) two decades of service as medical director of the Department of Public Safety. Roth is professor emeritus at Pitt Med and in Pitt's School of Health and Rehabilitation Sciences. He's also team physician for the Steelers. He formerly served as medical director for the Pittsburgh Marathon. One of the most rewarding moments of his career was during the marathon, when he resuscitated a young man out of cardiac arrest. The man later moved to Pittsburgh and invited Roth to his wedding. In 2022, Roth was honored for his Outstanding Contribution in EMS by the American College of Emergency Physicians.

## '90s

**Tracey Vogel** (MD '93) is an obstetric anesthesiologist, as well as director of Allegheny Health Network's Perinatal Trauma-informed Care Clinic. Vogel focuses her work on postpartum patients who are survivors of trauma. As an advocate for implementing trauma-informed care across specialties, she's made it her mission to educate others on the topic. Next on her agenda is bringing trauma awareness to medical students. She now serves on Pennsylvania's HEAL PA Coalition—the governor-appointed task force working to make Pennsylvania a trauma-aware state.

A blizzard that swept through Hershey, Pennsylvania, in 1994 gave **Bill Dascombe** (Plastic Surgery Resident '94), an MD, "a chance to chill" with some people he looked up to, professors and other mentors. Thirty years later, Dascombe remembers getting snowed in at a conference and being forced to spend two or three extra days in the middle of the state. He fondly recalls going for a run in "a couple feet" of snow with Richard Restifo (Plastic Surgery Resident '93). He eventually followed one of the snowed-in plastic surgery professors, Richard Greco (Plastic Surgery Fellow '90), an MD, to Savannah, Georgia. The two now are partners (among a total of six) at the Georgia Institute for Plastic Surgery. Dascombe has performed more than 25,000 operations and focuses on skin cancer excision, reconstruction and cosmetic surgery, especially breast surgery. "I am 65 years old and hope to continue doing plastic surgery for at least another 10 years," he says.

## '00s

Before completing her medical education, **Allison DeKosky** (MD '08), Pitt assistant professor of medicine, worked in health policy in the U.S. Senate. But when she thought about how she could best inspire change, DeKosky decided to become a physician. As a clinician educator with teaching roles at the medical school and in the residency, fellowship and faculty development realms, DeKosky champions advocacy in medicine. She reflects on her time on the Hill and at Pitt, saying, "The most important thing for anyone in medicine is a recognition and a tolerance of its complexity. Advocacy for a patient to get a medication covered by an insurance company is just as important as going and meeting with your congressman."

When **Jonathan Weinkle** (MD '04, Medicine-Pediatrics Resident '08) was a medical student, he learned about the biopsychosocial model and whole-person care. Those ideas, and his work with a diverse population at the Squirrel Hill Health Center, sparked the inspiration for his 2018 book, "Healing People, Not Patients." In his book, Weinkle discusses how to build a partnership between healers and those they heal, drawing from his Jewish faith. Weinkle, who is also a Pitt clinical assistant professor of family medicine and pediatrics, shares this philosophy with undergraduates through his religious studies course, Healing and Humanity. His second book, "From Illness to Exodus," is set to publish in 2025. "The story of the Exodus from Egypt . . . gives us hope that we can go from being stuck in a narrow place to being free to live lives of meaning and purpose," Weinkle says. He adds that it can help us "envision a path from the narrow place of illness to the wide-open space of thriving—both for those who are ill and for the healers who care for them."



Sanders

## '10s

As a physician-scientist, **Jason Sanders** (PhD '12, MD '14) has embraced a full-time role in clinical development for cystic fibrosis (CF). Sanders was a pulmonary and critical care physician before he pivoted to the biotech industry. He credits his current position in drug development at Vertex Pharmaceuticals to the Vertex Physician Investigator Program, an opportunity that allowed him to explore developing therapies for diseases that lacked sufficient treatment. Sanders is currently working on advancing the treatment of CF in the form of what Vertex hopes will be a once-daily pill, vanzacaftor. (On average, CF patients take eight to 10 medications each day.) Reflecting on his time at Pitt and career in industry, Sanders says, "In order to be a really good drug developer, you just have to be, I think, really curious."

*—Sarah Lindley, Amber Frantz and Michael Aubele*

## PLAYING THE REBEL

### NATALIE GENTILE



Gentile

**Natalie Gentile** (MD '14) didn't want to perpetuate diet culture or body type expectations when she opened a wellness studio.

She wanted Rebel Wellness to provide an inclusive, evidence-based space to teach the pillars of lifestyle medicine.

During her family medicine residency at Mayo Clinic, Gentile found that most patient conversations revolved around their daily habits. That discovery led her to sit for the American College of Lifestyle Medicine's inaugural board exam.

"All of a sudden, there was a name for how I was practicing, and there was an actual body of evidence and literature and practice guidelines that I could use to really support the way I already intuitively practiced medicine," she says.

She put her education to work when her father, Tony Gentile (MD '69), a retired obstetrician/gynecologist, suffered a heart attack during her residency. She spoke with him about managing stress and developing a plant-centered dietary pattern to reduce atherosclerosis and improve coronary artery function. "We talked about how you have nothing to lose making some of these changes," she says.

Gentile opened a primary care office in 2019 when she returned to Pittsburgh and engaged with the community through programs like Walk with a Doc, a free national program in which medical providers briefly discuss a health topic before taking a stroll with anyone who wants to participate. In 2022, her husband, Amir Toussi (MD '14), an assistant professor of urology at Pitt, suggested it was time she open the wellness studio.

A 3,200-square-foot space in Shadyside houses her practice, Direct Care Physicians of Pittsburgh, and her business, Rebel Wellness. She leases the rest of the space to four independent mental health professionals.

Having these resources integrated in one building offers a meaningful way to serve the community, says Gentile. Anyone—not just her patients—can come to Rebel Wellness for group fitness, yoga, cooking classes or mindfulness sessions.

"If you have a passion and a dream . . . there are lots of ways to effect change as a physician," she says. *—Sarah Lindley*

## Attention class!

**If you have news about an exciting career advancement, honor, publication or gratifying volunteer work, let us know. And we love to hear your Pitt memories. Please share updates with our Alumni News editor, Michael Aubele, at mia97@pitt.edu.**

**Note: "Res" and "Fel" designations after names refer to training at UPMC sites or the VA Pittsburgh Healthcare System.**

## SWEPT BACK TO THE WINDY CITY
### ROBERT HIGGINS

The possibility put a smile on **Robert Higgins**' face when approached with it. But the opportunity meant even more because it offered him a chance to serve a student population largely underrepresented in medicine.

Higgins (Res '90), an MD, MSHA, assumed the role of president and chief academic officer of Rush University and chief academic officer and senior vice president of Rush University System for Health in April 2024. The UPMC-trained surgeon now oversees more than 24 degree programs in medicine, nursing and allied health sciences and more than 60 postgraduate training programs.

"This is a homecoming for me," Higgins says, noting that he served as chief of cardiovascular and thoracic surgery there from 2003 to 2010. "To come home to the West Side of Chicago where there's a strong commitment to health equity, and to be a leader in this space where we're serving communities of color, for me it's a real opportunity to have high impact.

"[At Rush,] we recruit from all walks of life and serve and identify with those communities."

Underrepresented students in medicine account for 25% of the student population at Rush, he says, and the university has made a commitment to recruit and retain faculty that represent such a diverse student body.





**Higgins is now president and chief academic officer for Rush University.**

Prior to returning to Rush, Higgins served as president of Brigham and Women's Hospital, executive vice president of Mass General Brigham and as the Elizabeth G. and Gary J. Nabel Family Professor of Surgery at Harvard Medical School.

All three of his children live in Chicago. (His oldest son is a chief resident in orthopaedic surgery at Rush.)

"We spent a good part of the kids' lives in Chicago," Higgins says. "They're all successful here. It was a great opportunity for me to come back to a place I had a very warm sense of appreciation and value for."

*—MA*

**STEP UP: PITT MED TRIVIA**



GETTY IMAGES/CAMPWILLOWLAKE

## Can you answer these without going online? (We encourage you to call doctors-in-the-know for consults.)

**1.** What Abraham Verghese book included a lead character loosely based on Thomas E. Starzl, the famed transplant surgeon?

**2.** How many living alumni does Pitt Med have? About 6,000? 20,000? More like 11,000?

**3.** Combine the movie title with the building name to make a new title—sharing the last word of the first answer with the first word of the last answer. (For instance: Wakanda-set Marvel smash + upper campus dormitory = Black Panther Hall.) Got it? Solve this:

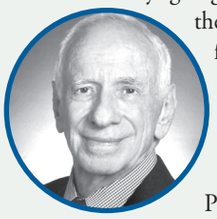
Will Smith-led 1999 action-comedy + the newest addition to the School of Medicine's facilities.

**4.** Pitt Med Magazine is coming up on its 25th anniversary. How many editors in chief has the publication had in its lifetime?

**Done? Now, check our inside back cover to find out if you aced this one. And if you have an idea for a Pitt Med-related trivia question, send it our way; we're all ears: medmag@pitt.edu.**

## CHARLES D. BLUESTONE

APRIL 4, 1932 – JUNE 15, 2024



Bluestone

Achy ears, scratchy throat, stuffy nose: These common minor illness symptoms mark most childhoods and those semi-routine trips to the pediatrician. We have Charles Bluestone (MD '58)—considered by many to be the father of pediatric otolaryngology, a specialty born in Pittsburgh—to thank for many of the standard treatment protocols that were, and are still, used for their care. He died in June at 92.

Bluestone served as the University of Pittsburgh's first Eberly Professor of Pediatric Otolaryngology. He was the founding director of the Division of Pediatric Otolaryngology at UPMC Children's Hospital of Pittsburgh—a role he held for 40 years. As director, Bluestone shaped the department and hospital into a pioneering powerhouse for the treatment of ear, nose and throat conditions, particularly for middle ear infections, or otitis media.

Bluestone was also a prolific researcher whose findings on otitis media, adenoiditis and tonsillitis have shaped current treatment practices. He founded the National Institutes of Health-funded Pittsburgh Otitis Media Research Center in 1980 and established a pediatric otolaryngology fellowship at Children's, the first-ever subspecialty otolaryngology training program to receive accreditation.

Jonas Johnson, an MD Distinguished Service Professor Emeritus and former chair of the Department of Otolaryngology, recalls the transformative role that Bluestone and his findings played at Pitt.

"He was a leader in Eustachian tube research whose work helped practicing physicians better care for children with otitis media and serous otitis media," Johnson says.

He adds that Bluestone's research in collaboration with Jack Paradise, an MD and professor of pediatrics and otolaryngology who died in 2021, "laid the groundwork for our understanding of the limited benefits of tonsillectomy for most children."

Bluestone's legacy lives on at Pitt through the fellowship and research center and in pediatricians' offices throughout the world. *—Rachel Mennies*

## CYRIL H. WECHT

MARCH 20, 1931 – MAY 13, 2024

"You're going to be a doctor," the grocer Nathan Wecht repeatedly told his young son, an influence that Cyril Wecht later recalled in a 2017 interview with the Journal of Legal Medicine. Wecht not only earned an MD, he became a nationally known forensic pathologist. He died on May 13, 2024, at the age of 93.

Born in Pittsburgh in 1931, Wecht (A&S '52, MD '56, Law '62) grew up in Bobtown and McKees Rocks, Pennsylvania, before moving to Pittsburgh's Lower Hill District. He was the only child of Nathan Wecht and Fannie Rubenstein.

Wecht graduated from Fifth Avenue High School as class valedictorian and came to Pitt for his undergraduate studies. He received degrees from Pitt Med and Pitt Law. While at the University, he was president of Phi Epsilon Pi fraternity, concertmaster of the orchestra, business manager of The Pitt News and president of the YMCA.



Wecht

After medical school, he served in the Air Force at Maxwell Air Force Base in Montgomery, Alabama, and met the woman who would become his wife, Sigrid Ronsdal. They married in 1961 at Temple Rodef Shalom in Pittsburgh.

In a career that spanned medicine and politics, Wecht operated a private pathology practice and held elected positions, including coroner of Allegheny County and chair of the Allegheny County Democratic Committee. He served as president of the American College of Legal Medicine and president of the American Academy of Forensic Sciences.

Over the course of his career, he performed and consulted on tens of thousands of autopsies.

Wecht's reputation—in Pittsburgh and across the country—comes in part from his forays into the public eye. Quick to give his opinion on high-profile deaths, he was particularly well known for challenging the Warren Commission and its conclusions about the assassination of President John F. Kennedy.

The outspoken Wecht also weighed in on the deaths of celebrities such as Elvis Presley, Sharon Tate and Kurt Cobain. In 1998, he collaborated with Charles Bosworth Jr. to write "Who Killed JonBenet Ramsey?" The book was one of many by Wecht.

Wecht held faculty positions at Pitt, Duquesne University and Carlow University. In 2000, Duquesne established the Cyril H. Wecht Institute of Forensic Science and Law, an interdisciplinary center that hosts educational events for students, professionals and the public.

*—This obituary, by Kelly Loftus, was adapted from Pitt Magazine.*

## IN MEMORIAM

### '40s

**JOHN J. MCCARTHY JR., MD '49**
**JULY 17, 2024**

### '50s

**CHARLES P. ASHE, MD '59**
**MAY 6, 2024**

**JOSEPH A. MARASCO, MD '57**
**JULY 15, 2024**

**CYRIL H. WECHT, MD '56**
**MAY 13, 2024**

### '60s

**JAMES R. CALLISON, RES '67**
**MARCH 27, 2024**

**LOIS M. DAVIES, MD '62**
**MAY 26, 2024**

**JAMES HUTCHISON, MD '62**
**MAY 25, 2024**

**JOHN J. ROBERTSON, MD '61**
**MARCH 1, 2024**

**DANIEL S. SHRAGER, MD '68, RES '75**
**JUNE 20, 2024**

**Please send In Memoriam notices to mia97@pitt.edu.**

# SHIV RAO USES AI TO ENHANCE THE DOCTOR-PATIENT CONVERSATION

**By Michael Aubele**



COURTESY ABRIDGE

Shiv Rao's Abridge has formed partnerships with EHR company Epic and tech giant NVIDIA.

"Dialogues drive everything in health care," says **Shiv Rao** (MD '07, Fel '13). "They're upstream of diagnostics, therapeutics, coding and risk adjustment, clinical trials, experiences and ultimately even outcomes."

Building on that premise, Rao, a cardiologist and Pitt clinical instructor of medicine, founded Abridge in 2018 to give clinicians and patients a way to have better conversations in the exam room.

It works like this: A doctor walks into an exam, launches an app called Abridge and uses it to record a conversation with a patient. When the appointment ends, the patient is likely to walk away with a clearer understanding of the diagnosis and treatment, and the doctor moves on to the next appointment with peace of mind.

Why? Abridge allows docs to offer their full attention to the patient, because the app records, transcribes and summarizes the discussion—information the patient and doctor can both use. How? Generative artificial intelligence (like ChatGPT).

Abridge's software creates its easy-to-digest summaries through a large language model that can recognize, translate, predict or generate text. The software relies on a neural network that learns context and meaning by tracking relationships in sequential data like words in a sentence.

But back up a moment to where the doctor walks out of the exam with peace of mind because of the neatly synthesized note generated by the wonders of AI. That note, Rao says, is key to preventing physician burnout, a growing problem in health care largely attributed to administrative requirements.

"Clerical work ends up being the first, second and third reasons for burnout," Rao says. The American Medical Association and other physician organizations have reported on rising levels of clinician burnout, and each of the surveys has shown that bureaucratic requirements—time spent behind a computer, on a phone or filling out paperwork rather than being physically present with patients—are primary factors.

"This is not a trivial issue," says Rao's colleague Suresh Mulukutla, MD (Fel '03), associate professor of medicine at Pitt. "We entered the medical field to help patients and develop that provider-patient relationship, and that's hard to do if we are having to document information while seeing the patient simultaneously."

Abridge has begun to measure whether its product helps clinician well-being. It's found that clinicians spent 60% less time on documentation outside of work hours and that burnout rates dropped by 40%.

Rao got his first taste of using tech to improve health care during his cardiology fellowship when he became involved in a startup (working off hours to avoid the perception he wasn't fully committed to cardiology). He eventually parlayed that experience into a role with UPMC Enterprises as executive vice president. That job exposed him to commercial investments and products, including the possibilities of machine learning.

While his passion for clinical work still percolates, Rao is focused on having Abridge make its impact at scale.

In February of this year, Abridge announced a partnership with electronic health record company Epic. The collaboration involves a new product called Abridge Inside, which integrates with Epic technology to embed AI-generated notes in patient electronic records.

Abridge has formed a partnership with tech giant NVIDIA, too. These relationships helped Abridge grow the network of health systems it works with—systems such as UPMC, Emory Healthcare and Yale New Haven Health.

Rao says Abridge has been successful "because we're equal parts health care native and AI native." Meaning, the people creating and perfecting the company's software include physicians like Rao and machine learning experts like Zachary Lipton, a PhD at Carnegie Mellon who also serves as the chief technology/science officer for Abridge.

"We've got a lot of depth," Rao says. "There's no ceiling to what we can achieve." ■

## '70s

**DOUGLAS M. DACKO, MD '71**
**MAY 17, 2024**

**ROBERT C. HESLOP JR., MD '70**
**MAY 25, 2024**

**SIROOS SAMADANI, FEL '70**
**JULY 2, 2024**

## '80s

**CHARLES F. DIEDERICH, RES '87**
**APRIL 2, 2024**

## FACULTY

**CHARLES D. BLUESTONE, MD '58**
**JUNE 15, 2024**

**EDMUND P. GARVEY, MD, RES '75**
**JUNE 10, 2024**



GETTY IMAGES/HOWTOGOTO

Lyme disease is a "ticky" situation

# FOR REAL! TWEEN SCIENCE



**You come home from a hike on a summer day and notice a little black dot on your leg that you can't brush off.**

**Eek! It's a tick! And you've heard that ticks can cause Lyme disease. Is this tick going to make you sick?**

**In reality, while ticks do spread Lyme disease, they don't cause it—that's the work of Borrelia burgdorferi, bacteria that some ticks carry.**

**When ticks hatch out of their eggs, they need to feed on a small animal host, like a mouse, to grow and continue their life cycle. If a host has been infected with B. burgdorferi, the bacteria can be transmitted to the tick through its bite.**

**Then, about a year later, when ticks are in the nymph stage, they typically feed on larger animals—like dogs or humans. Ticks that have become infected can then transmit the bacteria to their new host when they bite.**

**It turns out that Lyme disease cases have become more frequent in recent years. There are lots of reasons why this might be. As populations rise, we build more and branch out into tick-heavy environments. Deer hunting has also declined, and since deer are a common host, more deer may mean more ticks. There's a climate effect, too—when winters are warmer, more ticks survive.**

**Don't be afraid if you get bitten—most bites won't actually transmit the bacteria. And if you do get Lyme disease, there are effective medicines to treat it. Kids tend to heal very well from Lyme disease, but it's best to avoid it in the first place by checking for ticks often and removing any you find trying to hitch a ride. —*Sarah Lindley***

**Thank you to Andrew Nowalk (PhD '97, MD '99, Res '02, '03, Fel '05), associate professor of pediatrics at Pitt and infectious disease expert at UPMC Children's Hospital of Pittsburgh, for telling us what we need to know about these bloodthirsty critters. Nowalk researches how to improve Lyme disease testing and treatment.**

# CALENDAR

**COLLABORATION, COMMUNITY AND CONNECTION: PARTNERING TO ADVANCE RESEARCH**
**SEPTEMBER 9-10**
**ctsi.pitt.edu/research-community-forum**

**REUNION WEEKEND AND HOMECOMING**
**SEPTEMBER 20-21**
**pi.tt/hsalumniweekend**

**DICKSON PRIZE IN MEDICINE LECTURE**
**SEPTEMBER 27**
**Honoree: Leslie B. Vosshall, PhD**
**Alan Magee Scaife Hall**

**VANSCOY WINTER ACADEMY**
**FEBRUARY 13, 2025**
**Healthy Aging: Live Long, Live Well.**
**Naples, Florida**

**To find out what else is happening at the medical school, visit health.pitt.edu and maa.pitt.edu.**



## Pitt Med Trivia *(from page 37)*

**Answers:**

1. "Cutting for Stone"
2. 11,160 as of June 2024
3. Wild Wild West Wing
4. One—Erica Lloyd

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# Purposeful. Powerful.

The Hunter Prize advances research in neurobiology—specifically in getting therapies from concept to the clinic. This year's awards were given to projects designed to restore mobility.

Sue Hunter says her father "believed strongly in the power of capitalism to do good in this world," and that taking something from concept to commercialization "required early investment and patience."

As an investment industry icon and founder of Pittsburgh-based wealth management firm Hunter Associates, her father, David Hunter, would've known. He died in 2013, but his daughter is likewise impassioned about making profound change through strategic investments. Top of mind for Sue Hunter: helping Pittsburgh stake its claim as not only a clinical, research and robotics powerhouse, but also a global leader in life sciences commercialization.

In 2022 she established the Hunter Family Foundation Traumatic Brain Injury Translational Research Program at the University of Pittsburgh to support early stage developments in neurobiology. The first two grants from that fund were awarded in June 2024 to Jennifer Collinger, a PhD associate professor of physical medicine and rehabilitation, and Marco Capogrosso, a PhD assistant professor of neurological surgery.

Collinger aims to restore arm and hand function in people with quadriplegia. She'll use her award to further develop brain-computer interfaces that enable patients to move a robotic arm and hand to perform tasks just by thinking about it.

"What I'm really excited about is that this award is allowing us to focus on things that can have practical clinical impact," Collinger says. "We want to make progress in getting these things we're working on from the lab to the home.

"I'd like to work on improving our ability to control a robotic arm for reaching and grasping . . . and get it to a state where it's much easier to use and much more robust."



Jennifer Collinger, Sue Hunter and Marco Capogrosso

Capogrosso is developing neurotechnologies to enable spinal cord injury and stroke patients to regain control of their hands after paralysis—it's research that builds on what he's done with spinal cord stimulation to restore arm and hand movement in stroke patients.

Capogrosso says his newer approach, currently in preclinical testing, is designed to provide stimulation in the brain and along the spinal cord to treat patients with more severe effects from stroke or injury, essentially attacking the problem from above and below at the same time.

"This gives us the freedom to explore something that's high risk," he says of the award. "If it works, we can keep fueling this opportunity with other funds."

**To make a gift to the medical school:**
**giveto.pitt.edu/medmaggive**
**Or call Jen Gabler: 412-864-5547**