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Real-world impact

"The value of an idea lies in the using of it."
—*Thomas Edison*



AIMEE OBIDZINSKI/UNIVERSITY OF PITTSBURGH

Dear Pitt Med Readers,

The e's no shortage of great ideas at Pitt Med. I learn about new ones nearly every day from the studies coming out of our labs and conversations I have with colleagues across departments. Th spirit of collaborative creativity we've cultivated at the School of Medicine is not something to take for granted.

We also excel here at pioneering research that pushes biomedical science and medicine forward. But we can't stop there. As an academic medical institution, the ultimate value of our discoveries lies in their ability to benefit patients. It's crucial we get them to market and into the clinic as efficient as possible.

In this issue's cover story (page 16), you'll learn how we are making it easier for our health sciences researchers to do that. Th ough new proactive programs like Pitt.INC (Pitt Idea Navigation to Commercialization), we're aggressively shepherding our research discoveries to market. The program provides resources and guidance to scientists as soon as they form a "commercial" hypothesis about their discovery's potential to make a diffe ence for patients. Meanwhile, our new Clinical Trials Offic is streamlining the testing of their proof of concept process in human subjects, so we can rapidly deliver much-needed new therapies to people in the region and beyond.

Oftentimes, it's not immediately clear how the discoveries we make will offer new hope to patients. When cell biologist Dr. Gary Thomas and his team discovered the function of the PACS1 gene in 1998, he had no idea that two decades later he'd be studying an experimental treatment for a rare neurodevelopmental disorder caused by a mutation in the gene. Thanks to his and the effo ts of others here, a 19-month-old girl will be the first child at UPMC Children's Hospital of Pittsburgh to receive the therapy, which targets the expression of the mutated gene. (You'll find her story on page 24.)

Pitt faculty have a storied history of improving and saving lives through their inventions, like the first successful polio vaccine and the modern ambulance service. You can read more extraordinary examples in Dr. Bartley Griffi 's reflections on the early days of organ transplantation at Pitt (page 30). Amid a shortage of donor organs, Griffit and colleagues began an artificial heart program here when they established what's now known as the McGowan Institute for Regenerative Medicine. And in 2022, he and his team performed the first genetically modified pig heart–to–human heart transplant at the University of Maryland. (Personal disclosure: I am proud to say that our son Gabriel was one of the scientists on the team that developed the genetically modified pig heart for human transplant.) This work meaningfully extended the time recipients could spend with their loved ones.

At Pitt Med, we're committed to building on this legacy by turning our great ideas into real-world innovations.

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

PITTMED

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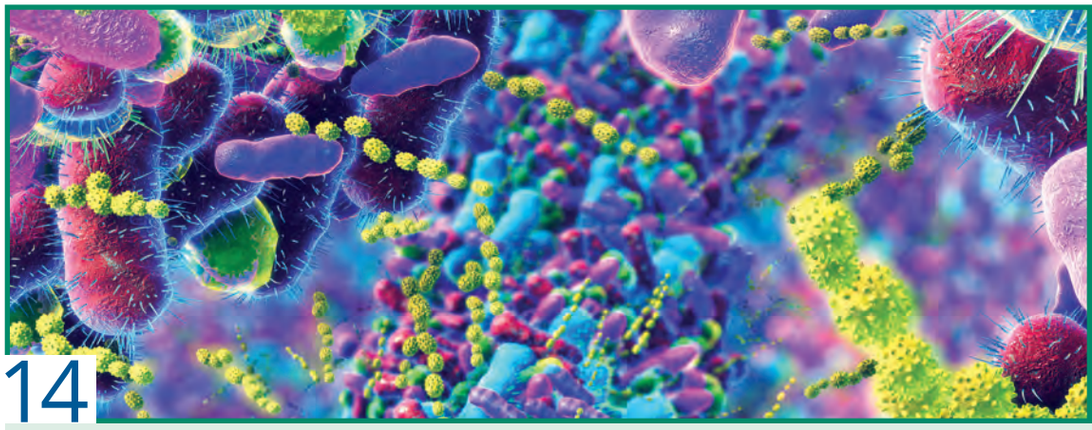
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Targeting the microbiome with dietary interventions could help improve fertility outcomes.

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Remember your first birthday?
Probably not.

University of Pittsburgh
Health Sciences 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 Health Sciences has been amping up its efforts to get solutions to patients faster. Now those approaches are more critical than ever. © University of Pittsburgh/Tom Altany, 2025.

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"When the geneticist came into the room, the first words out of her mouth were, 'We never would've found this. Nobody here has even heard of this.'"



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FEATURES

Universal benefi 16

Moving discoveries to market fulfills more than one mission. Pitt Health Sciences has ramped up those efforts.

COVER STORY BY MICHAEL AUBELE

Rare optimism 24

Rare diseases, taken together, affect as many as 30 million Americans, but most patients face few options. A Pitt expert in a rare neurodevelopmental disorder is helping to get an experimental therapy to one little girl for free—he hopes she's just the first of many.

BY ANDREW DOERFLER

Breathless times 30

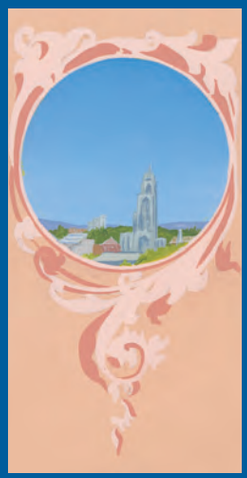
A former chief of cardiac surgery—who performed the first pig-to-human heart transplant—reflects on the early days of transplantation at Pitt, when a dearth of donor organs inspired daring and creative solutions.

BY BARTLEY GRIFFITH WITH LEE GUTKIND

CONTRIBUTORS

RAYNI SHIRING ["Overheard" and throughout the magazine] is a photographer, videographer and digital content creator with a passion for visual storytelling. She grew up playing softball, which would prove helpful in her future endeavors as a sports photographer: Today, she takes photos for the MLB and NHL. As an undergrad, she was photo editor for Slippery Rock University's student-run newspaper, The Rocket. Since 2024, she's been digital media coordinator for Pitt Health Sciences, and her photos frequently appear in Pitt Med Magazine. Shiring loves tapping into her creative side, shooting Pitt researchers in a way that captures their work and personality.

Editor **EMMALEE C. TORISK** [who proofread this entire issue] considers herself a "word nerd." Growing up in Youngstown, Ohio, she picked up an interest in collecting typewriters at the age of 12. That hobby, combined with a love for reading and an attention to detail, foreshadowed her first job as a city reporter at her hometown newspaper. Later, Torisk delved into medical writing and editing as a copy editor and then as managing editor for journals. She's been proofreading and editing for Pitt Med since 2015. Torisk, who holds a PhD in rhetoric, is also an adjunct professor of communication, preparing the next generation of "word nerds."



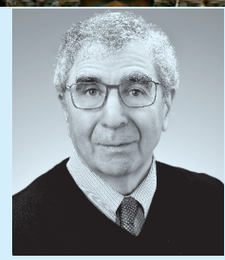
Devoted to noteworthy happenings at the medical school



ROMAOSLO/GETTY IMAGES

The Vatican invited experts in issues of aging for a global symposium.

At the Vatican on a historic day



Lopez

On May 9, a day after his election, Pope Leo XIV delivered his first papal homily to cardinals. Hundreds of thousands of people have watched video of the Mass online.

Meanwhile, the University of Pittsburgh's Oscar Lopez was at the Vatican in person that very day—for an entirely different reason.

Lopez, the Levidow-Pittsburgh Foundation Professor of Alzheimer's Disease and Dementia Disorders at the University of Pittsburgh, was among the global leaders and scientists invited to participate in "The Memory: A Symposium Addressing the Opportunities and Challenges of an Aging Population," hosted by the Vatican and AARP May 9 and 10, 2025.

"We were so fortunate to be in Rome when the new pope was elected," says Lopez, an MD who is also a professor of neurology, of psychiatry and of clinical and translational science. "Hearing the bells of all of Rome's churches announcing Pope Leo XIV was a unique lifetime experience full of positive emotions."

Lopez, director of Pitt's Alzheimer's Disease Research Center, was selected to participate in the symposium as a leading authority on dementia.

The symposium was a priority for Pope Francis, who had signed off on its agenda and planned to attend but died in April 2025. The event included meetings with doctors, scientists, academics, nongovernmental organizations and nonprofits from more than 20 countries to address global aging issues.

The goal was to highlight the vital importance of memory, dignity and security for older adults, while urging leaders to prepare for an expanding global population of older adults—especially in low- and middle-income coun-

FOOTNOTE

In April, Heinz Memorial Chapel echoed with the debut performance of H2P Sound Bath, a wellness initiative launched by Pitt Med student Peyton Groves. The therapeutic sound program brought together students from the health sciences and undergraduate programs, all aspiring healers who view care as more than medicine alone. Guided by Carnegie Mellon University School of Music professor Monique Mead, the students completed a semester-long training in sound therapy, which uses soothing tones and vibrations to improve relaxation and ease mental strain. Their final exam? A sold-out performance with 70 singing bowls and a guest harpist from the Metropolitan Opera. This fall, the program moves to Pitt's new Recreation and Wellness Center.

—Samri Samuel

Byrd will direct UPMC Hillman Cancer Center

John C. Byrd, an internationally lauded researcher and clinical specialist in hematologic malignancies, has been appointed director of UPMC Hillman Cancer Center. His appointment begins November 2025.

As director of one of the nation's premier National Cancer Institute–designated Comprehensive Cancer Centers, Byrd will lead University of Pittsburgh and UPMC's basic, translational and clinical cancer-related research, as well as outreach and education. In addition, Byrd will serve as Pitt's associate vice chancellor for cancer affairs and is recommended to hold the Hillman Professorship of Oncology in the School of Medicine.

"We are thrilled to welcome Dr. Byrd and his extensive experience in conducting and supporting internationally influential cancer research, developing and overseeing premier programmatic efforts and elevating holistic patient care," said Anantha Shekhar, an MD, PhD, senior vice chancellor for the health sciences and John and Gertrude Petersen Dean of the School of Medicine. "The formidable breadth and quality of his leadership capabilities will prove essential to advancing a center already operating at the exceedingly high level of UPMC Hillman."

Since 2021, Byrd has served as the Gordon and Helen Hughes Taylor Professor and Chair of the Department of Internal Medicine at the University of Cincinnati (UC) College of Medicine as well as chief of internal medicine services at UC Health. He also serves as a senior advisor to the UC Cancer Center, where he spearheaded the development and launch of its comprehensive blood cancer center.

Byrd has published more than 700 papers on leukemia and experimental therapeutics research and runs a highly translational laboratory focused on chronic lymphocytic leukemia and drug development in hematologic malignancies. He has been part of the successful development of multiple therapeutics, holds 23 patents and serves on the scientifi advisory boards of seven therapeutics companies, two of which he founded.



Byrd

Byrd earned his MD from the University of Arkansas for Medical Sciences and completed his residency and fellowship at Walter Reed Army Medical Center, followed by translational laboratory training at Johns Hopkins University.

—Staff reports

tries, where rising longevity and dementia will intersect with social and environmental challenges like inequality, pollution and isolation.

Sessions led by members of the World Health Organization, United Nations, Human Rights Watch and Alzheimer's Association centered on a wide range of topics like supporting family caregivers, economic implications and addressing ageism on a global scale.

At the conclusion of the event, global leaders from the Pontifical Academy of Life, AARP and the Muslim Council of Elders signed a declaration formalizing an international commitment to advancing aging-related policies that safeguard the dignity and well-being of older generations.

"We agreed that we are on the verge of a significant social and medical problem that will require financial resources," Lopez says, "not only for health issues but also for the training of caregivers who can help families take care of patients with dementia."

—Kat Procyk

Next gen

A new liver cancer treatment is in clinical trials—and work by a Pitt Med MD/PhD student helped get it there. **Brandon Lehrich**, who recently defended his PhD dissertation and started his third year of med school, was the first author on a paper in Nature Communications in May that found precision targeting of the protein β-catenin to be an effective treatment for hepatocellular cancer in organoids and mouse models. The CTNNB1 gene, which encodes β-catenin, is mutated in nearly half of hepatocellular carcinomas.



Lehrich

Satdarshan (Paul) S. Monga, an MD professor of pharmacology and chemical biology whose lab Lehrich worked in, is the senior author of the paper. Monga is also director of the Organ Pathobiology and Therapeutics Institute and director of the Pittsburgh Liver Research Center. The study comes out of two decades of work from his lab.

The publication paved the way for the first biomarker-driven clinical trial to treat CTNNB1-mutated hepatocellular carcinoma. The trial will use Alnylam Pharmaceuticals' novel therapeutic ALN-BCAT. (Employees of Alnylam Pharmaceuticals contributed synthesis, characterization and analysis to the paper, and the company has provided research grants to Monga.)

"If successful, this would be the first precision medicine–guided therapeutic for [hepatocellular cancer] that has great potential to help a significant subset of patients," Lehrich says. "Current treatment regimens include chemotherapy and immune checkpoint inhibitors, which are not targeted to the specific underlying tumor biology observed in patients."

Lehrich's work was supported by a National Institutes of Health F30 grant—he received a perfect score on that application, which is highly unusual. *—Andrew Doerfle*



NASA's Kate Rubins and Sylvain Costes, formerly of NASA and now with Vizzhy, appeared at Pitt's "From Space to Earth" symposium.

RAYNI SHIRING/UNIVERSITY OF PITTSBURGH

Pitt Med shoots for the stars

NASA and the commercial spaceflight industry are determined to get humans on Mars before 2040. Yet we will have to learn a lot more about what space does to the human body to make it happen, and Pitt has positioned itself as a major player in that quest.

Astronauts, scientists, entrepreneurs and other forward-thinking experts shared their visions of what the rapidly growing field of space biomedicine means for humanity at "From Space to Earth—Biology as the Bridge," a symposium hosted by the University of Pittsburgh School of Medicine on July 7.

Researchers at Pitt's Center for Space Biomedicine, launched last year, are finding ways to allow humans to withstand challenges like radiation exposure and bone loss that the space environment poses to health, especially during the longer-term missions that space agencies and companies are planning.

"A leading biomedical research institution needs to be prepared for humanity's needs in the 21st and 22nd centuries," said Anantha Shekhar, senior vice chancellor for the health sciences and John and Gertrude Petersen Dean, School of Medicine, in opening remarks. "We have to start thinking about extraterrestrial environments to be successful."

Afshin Beheshti, director of the Center for Space Biomedicine and formerly of NASA Ames Research Center, pointed out that space offers an accelerated model for diseases and processes like aging, and that advances and interventions designed for astronauts can translate directly back to the clinic.

"Everything we're doing in space really impacts what happens here on Earth," said Beheshti, a PhD.

Describing the advances from the last five years of research on the International Space Station, NASA astronaut and microbiologist Kate Rubins emphasized that space missions drive innovation in creating robust, resilient and compact devices that could make biomedical research and health care more accessible.

"Think about where you could use that kind of hardware on Earth," said Rubins, a PhD. She pointed to rural clinics, low-resource countries and military settings.

Experts from a range of fields will be necessary to make possible the mission Beheshti outlined for the Center for Space Biomedicine: "to make space travel safe for all, while driving scientific and medical breakthroughs that translate directly into advanced therapies for patients here on Earth." *—AD*

Faculty snapshots

The American Society for Clinical Investigation announced that Stephen Chan, an MD, PhD, was elected as its new vice president.

Chan directs Pitt's Vascular Medicine Institute and is the Vitalant Professor of Vascular Medicine in the Department of Medicine at Pitt. He will serve on the ASCI council for four years and will assume the role of president in the 2027-28 cycle. In his new roles, Chan will lead and shape programs to advocate for and empower U.S. physician-scientists.


Chan


Thurston


Muniz

Two Pitt faculty members are among the latest class of a selective national program designed to train leaders in academic medicine.

Rebecca Thurston was named a fellow of the Hedwig van Ameringen Executive Leadership in Academic Medicine (ELAM) program. In the School of Medicine, she is the Pittsburgh Foundation Professor of Women's Health and Dementia, assistant dean for women's health research, and a PhD professor of psychiatry and of clinical and translational science. Thurston is also director of the Center for Women's Biobehavioral Health Research.

Gysella Muniz Pujalt, an MD, MBA, was named a fellow of the ELAM program's Executive Leadership in Health Care (ELH) track. She's an associate professor of pediatrics and UPMC regional director of quality newborn care.

ELAM is the only longitudinal program in North America dedicated to preparing women for senior leadership roles in schools of medicine, dentistry, public health and pharmacy.

Last year's class included five Pitt School of Medicine faculty: JoAnne Flynn, Health Sciences Chair of Microbiology, Ulka Sachdev of surgery and Carla Spagnoletti of medicine were ELAM fellows; Abeer A. Azzuqa of pediatrics and Naudia Jonassaint of medicine were ELH fellows. *—Staff reports*



Even in active adults, sedentary behaviors are linked to declines in cognition and brain volume associated with Alzheimer's disease. (Photo: Rayni Shiring/ University of Pittsburgh)

Overheard Sitting risky

Marissa Gogniat (shown above) might be more surprised by the intense public interest in her study than its findings: Even if they exercise regularly, aging adults who sit around more have faster declines in cognition and brain volume in regions associated with Alzheimer's disease.

The study was published in Alzheimer's & Dementia: The Journal of the Alzheimer's Association in May. Stories about it appeared in nearly 150 news outlets, according to a University of Pittsburgh Health Sciences media report. The research inspired thousands of comments and a quip on "Saturday Night Live's" Weekend Update. The coverage potentially reached more than 674 million people, according to the report.

Now a Pitt PhD assistant professor of neurology, Gogniat was a postdoctoral fellow at Vanderbilt University Medical Center when she analyzed data from 404 people 50 and older who continuously wore an activity tracker for 10 days and had cognitive assessments and brain scans in the years that followed.

The team found that aging slowed naming ability and cognitive processing speed in everyone, but the decline was more rapid in those who were most sedentary at baseline. That was true even for people who exercised at least 150 minutes per week and was worse for those who carried at least one copy of the APOE4 gene, a known risk factor for Alzheimer's disease.

What was the public's reaction to the paradox that those who are exercising regularly may still be too sedentary for brain health?

It really hit a nerve! This is the first study to show that even if you are active, that doesn't mitigate all the risks if you sit a lot the rest of the time. We think, "If I work out every day, I'm good." But this showed that's really not enough. I got emails from all over the country asking, "What should I do? I have a desk job." I tell them sedentary behavior is one very, very small piece of a super-complex, big puzzle that we're still trying to fi - ure out. It's good to know, but I wouldn't let it keep you up at night.

Is sedentary behavior the chicken or the egg in Alzheimer's progression?

It's tough to know for sure. We looked at it longitudinally, so that helps a little bit because people were coming into this study when they were healthy. If you have physical limitations already, or if you have depression that maybe makes you not move around as much, are those other factors contributing something? What if you already have the early signs of Alzheimer's? Are you moving around less because you're not interacting with your environment as much?

I'm trying to work with some people more in the tech space [to track activity] so I can get a better sense of the type of sitting, because it probably does matter. Maybe there's something different about sitting and watching TV versus sitting and reading something or playing a cognitively stimulating game. (Gogniat uses a walking pad at her desk.)

What comes next in this research?

My grant looking at sedentary behavior and its interaction with neighborhood characteristics on risk for Alzheimer's disease was recently funded by the University Center for Social and Urban Research. I also want to look at the biological mechanisms for this [sedentary] effect and what might be driving it, whether that's vascular dysfunction, increased inflammation, synaptic connectivity. Those kinds of pathways are not well understood or studied.

—Interview by Anita Srikameswaran. The conversation has been condensed and edited for clarity.



Dickson prize winner Sir Cato Laurencin touring labs at Pitt.

Dickson Prize winner regenerates fingertips and more

Scientists can already induce the regrowth of skin, bone and other tissues. The tantalizing next step is putting them all together for the "moonshot" of limb regeneration, says Sir Cato T. Laurencin, an MD, PhD who is chief executive office of the Cato T. Laurencin Institute for Regenerative Engineering at the University of Connecticut.

Laurencin, recipient of the 2025 Dickson Prize in Medicine, the University of Pittsburgh School of Medicine's highest honor, discussed progress in using inductive materials in the field of regenerative engineering in his Dickson Prize lecture at Pitt on July 11. The prize is awarded annually to an American biomedical researcher who has made significant progressive contributions to medicine. Many recipients have gone on to receive other major accolades, including the Nobel Prize and the Lasker Award.

Laurencin is the Albert and Wilda Van Dusen Distinguished Professor of Orthopaedic Surgery at UConn and also holds appointments in engineering. In 2025, he received knighthood under the auspices of King Charles III of England by the governor general of Saint Lucia.

His team has had success in its digit program for regenerating injured fingertips. For heavy limb regeneration, his institute is working on what it calls the Hartford Engineering a Limb project, or HEAL.

"We know that a newt can regenerate an entire limb in seven to 10 weeks. And we need to harness that in terms of regenerative engineering, in terms of having this broad toolbox," he said. Some of the approaches, he said, "can be really out of the box."

Laurencin explained the use of graphene composite matrices and calcium phosphate for bone and soft tissue regeneration. He's enthusiastic about the use of synthetic artificial stem cells as drivers for regeneration, particularly because of his success in using them for osteoarthritis treatment.

Before his lecture, Laurencin toured the Bethel Musculoskeletal Research Center and the UPMC Rehabilitation Institute at UPMC Mercy Pavilion. A panel discussion after his talk at Pitt School of Medicine included his former mentee MaCalus Hogan, an MD, MBA and the David Silver Professor and Chair of Orthopaedic Surgery. Laurencin inspired him in his work and his fashion choices: Both favor bowties. *—Staff reports*

Students collab with Special Olympics

Students from throughout the University of Pittsburgh teamed up with Special Olympics Pennsylvania to collect health data for Project ALL STAR, a new initiative designed to analyze Special Olympics programming's effec on the health and well-being of its athletes.

Project ALL STAR, which stands for Active Life and Longevity: Special Olympics Transforming Athlete Results, is a longitudinal study involving athletes with intellectual and developmental disabilities across six states. It measures their physical, socioemotional and mental health over several years. Project ALL STAR's first event in the Special Olympics Pennsylvania's Three Rivers Region took place in May and brought together 36 student volunteers from the School of Health and Rehabilitation Sciences, School of Medicine, School of Public Health and the School of Education (in the exercise science program).

The volunteers staffed six fitness stations, served as "buddies" for athletes during the assessments, provided demonstrations and set up Fitbits for athletes to use throughout the project. Students were also responsible for measuring and recording details such as the athletes' height, weight and blood pressure.

"I really loved the energy. Everyone was super happy and excited, and cheering each other on," says Ethan Richlak, a second-year medical student who volunteered at the event. "As a future physician, being able to spend time with individuals who have intellectual and developmental disabilities and learn more about how to work with them. . . was very helpful and interesting."

"The goal was to take an interprofessional approach here," says Kevin Conley, professor and chair of sports medicine and nutrition and associate dean for undergraduate studies, School of Health and Rehabilitation Sciences. After he initially reached out to public health and exercise science students, interest expanded to other schools.

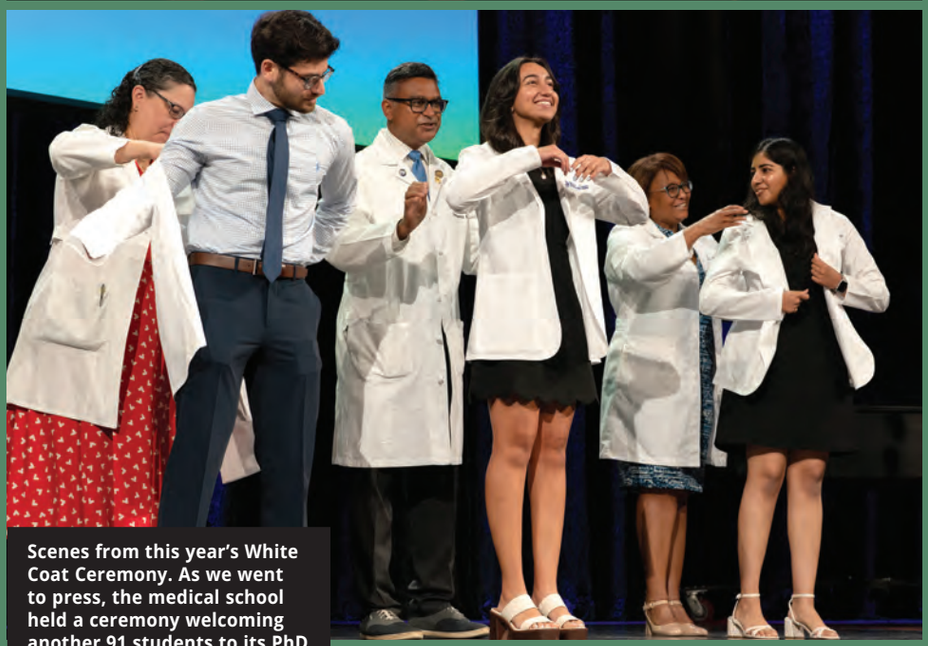
Conley expects the study will show that participating in Special Olympics is linked to an improvement in the health of the athletes.

"Once we've gone through a second iteration of testing, we'll have data that we can analyze to see where the differences exist and where improvements were made," says Conley. *—Shannon Turgeon*



Student volunteers work with the study's athlete volunteers.







Scenes from this year's White Coat Ceremony. As we went to press, the medical school held a ceremony welcoming another 91 students to its PhD graduate programs and the scientific community.

Photos these pages: Rayni Shiring/University of Pittsburgh



They join the family

"This is your adoption day," Anantha Shekhar told the 151 members of the School of Medicine's Class of 2029 during their White Coat ceremony on July 25. The event, the first step on their journey to becoming physicians, also represents new bonds, said Shekhar, senior vice chancellor for the health sciences and John and Gertrude Petersen Dean of the School of Medicine. "With this white coat, we welcome you as part of our family, and we will continue to cherish you and support you as part of our family."

The event, at Carnegie Music Hall in Oakland, was made possible with support from the Dr. Freddie and Hilda Pang Fu Endowment. Fu (MD '77, Res '82) was a Distinguished Service Professor of Orthopaedic Surgery, as well as David Silver Professor and Chair of the Department of Orthopaedic Surgery. The Fus believed the ceremony should also give students a taste of the cultural richness of Pittsburgh; so it included performances from members of the Pittsburgh Symphony Orchestra, Pittsburgh Ballet Theatre, MCG Jazz and Pittsburgh Opera.

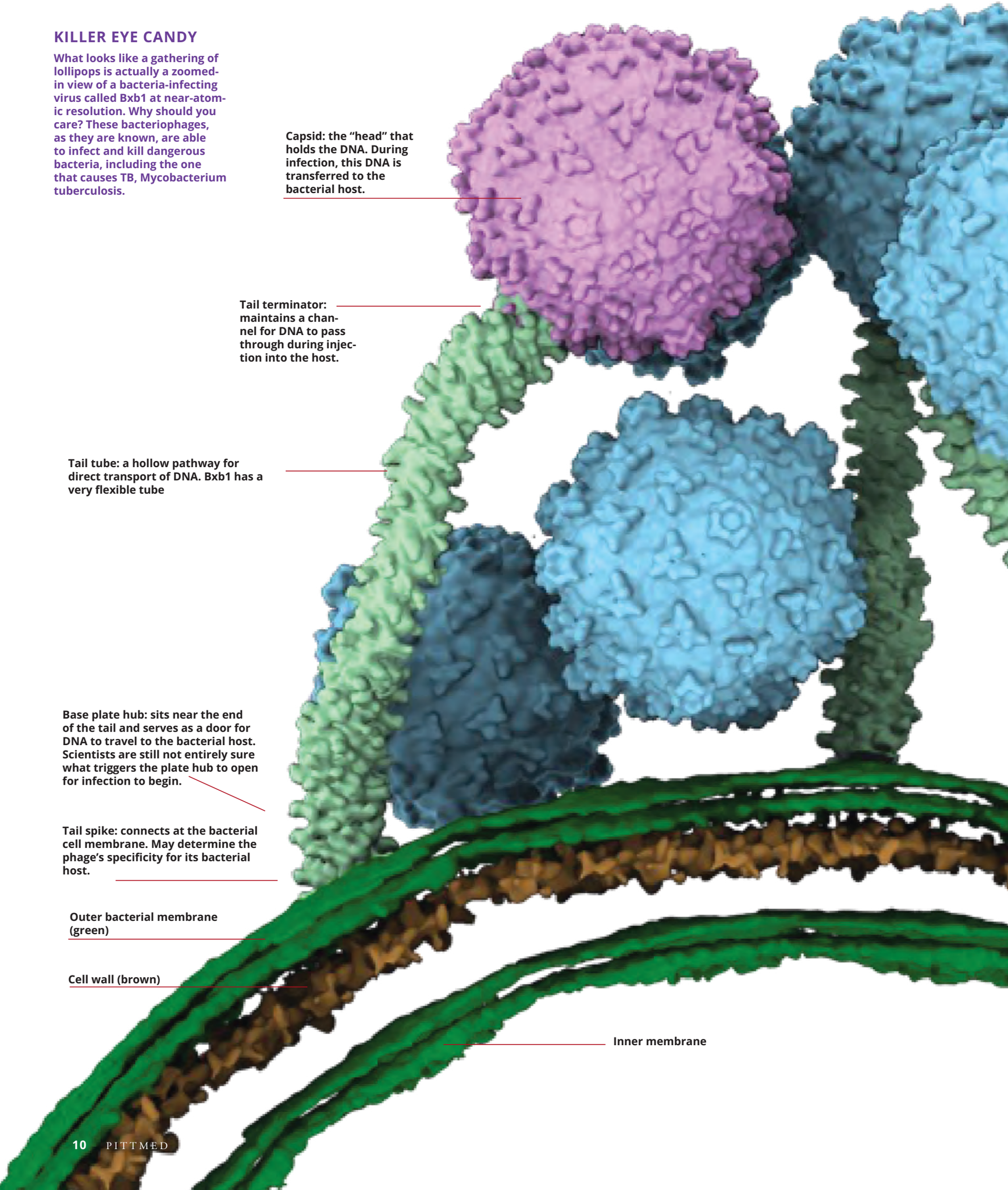
The school received nearly 12,000 applications for the entering class. Incoming students achieved a median MCAT score of 516 and a median GPA of 3.91. Twenty-two of the med students are entering scientifi training programs.

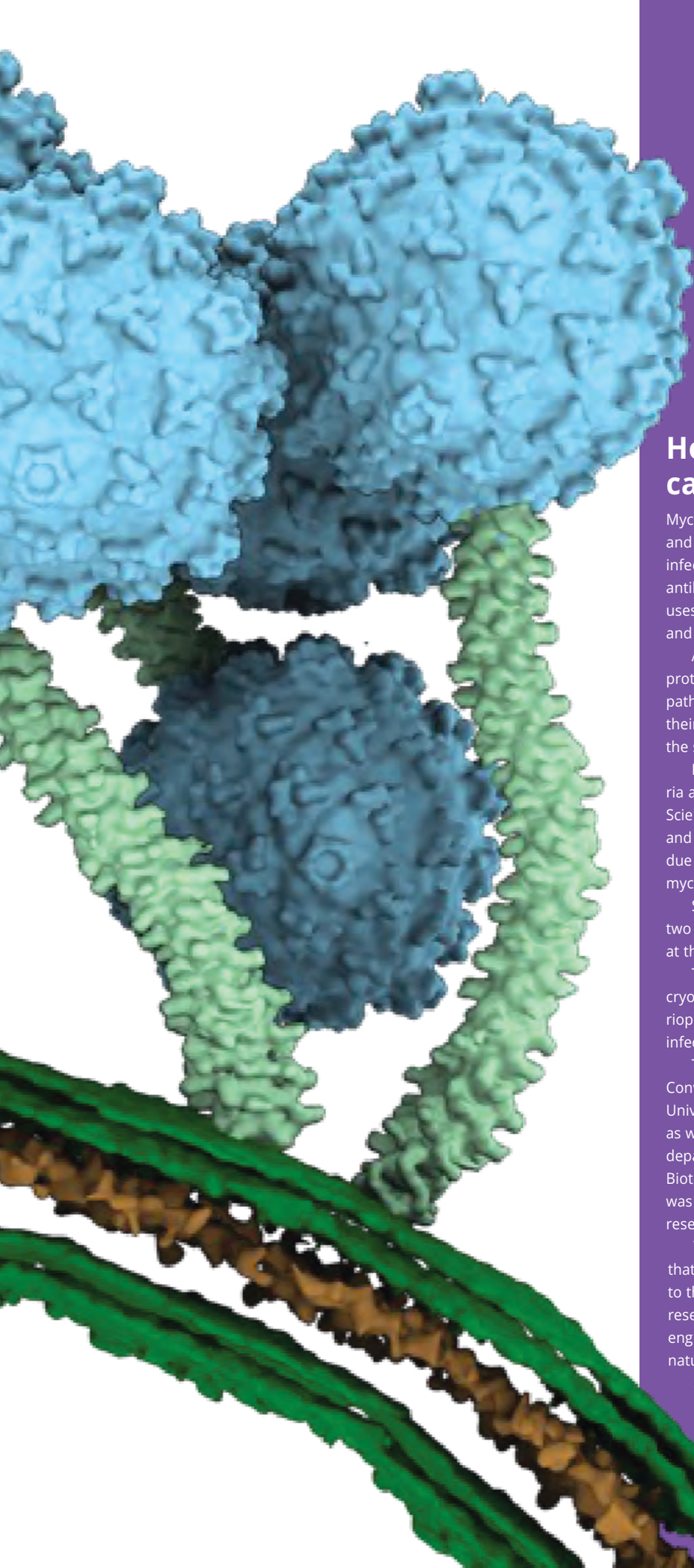
Alda Maria Gonzaga, professor of medicine and of pediatrics, associate dean for student affairs and former half-marathon runner, asked students to imagine medical school as a run through hills, valleys and bridges and to look to the sidelines where a cheering crowd will be holding signs of support.

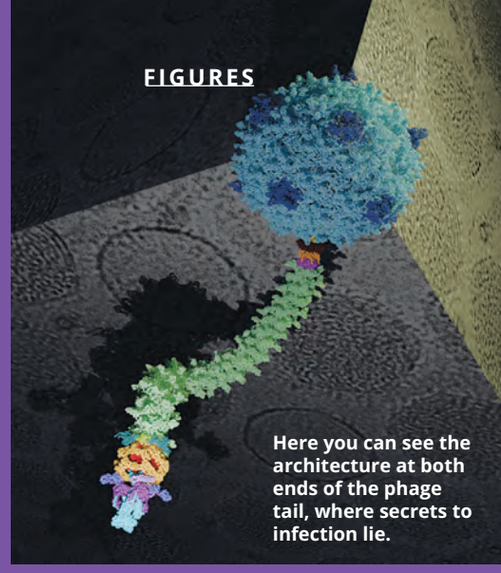
"That crowd is the entire Pitt Med community," Gonzaga said. "We all believe in you, and we have no doubt you will achieve great things." —*KP*

KILLER EYE CANDY

What looks like a gathering of lollipops is actually a zoomed-in view of a bacteria-infecting virus called Bxb1 at near-atomic resolution. Why should you care? These bacteriophages, as they are known, are able to infect and kill dangerous bacteria, including the one that causes TB, Mycobacterium tuberculosis.







Here you can see the architecture at both ends of the phage tail, where secrets to infection lie.

How a tiny virus can destroy tuberculosis

Mycobacteria are responsible for more than 1 million deaths each year—and they're getting stronger. These bacteria, which lead to a myriad of infectious diseases, including tuberculosis, are evolving to be resistant to antibiotics. In response, scientists are investigating phage therapy, which uses viruses known as phages, to combat multidrug-resistant mycobacteria and other "superbugs."

Antibiotics typically work by disrupting different cell processes like protein production. Bacteriophages, however, don't use the same chemical pathways as antibiotics. Instead, they attach to the bacterial surface, inject their DNA and hijack the bacterial machinery to make new phages, leaving the superbug ultimately defenseless.

Phages are also very specific in their work, so they'll leave good bacteria alone and target only the pathogen. Yet, this precision comes at a cost. Scientists are still unraveling how mycobacteriophages, phages that infect and kill mycobacteria, can recognize and infect mycobacteria, in large part due to mycobacteria's complex and almost impenetrable cell wall, called the mycomembrane.

Scientists from the University of Pittsburgh and Scripps Research used two imaging techniques to see a mycobacteriophage's biological structures at the near-atomic level.

The techniques, cryo-electron microscopy (cryo-EM, shown above) and cryo-electron tomography (cryo-ET, shown left), revealed how a mycobacteriophage, specifically Bxb1, attaches to bacteria, injects DNA and begins the infection process.

The images were published in the journal Cell in spring 2025. James Conway, a PhD professor and interim chair of structural biology in the University of Pittsburgh School of Medicine, was an author of the study, as was Alexis Huet, a PhD research assistant professor in the same department. Graham Hatfull, a PhD and the Eberly Family Professor of Biotechnology and HHMI Professor in the Department of Biological Sciences, was the senior author; Krista Freeman, a PhD and former postdoctoral researcher, was the first author.

The images not only demonstrate how Bxb1 attaches, but also reveal that the phage's tail tip can completely change its structure when it binds to the bacterial host. Understanding these tail structures will advance researchers' knowledge of phage-host interactions and pave the way for engineering phages with broad host ranges—potentially expanding their natural specificity to target a wider spectrum of bacterial pathogens.

On these pages we see Bxb1 very up close. *—Kat Procyk*



Team Chiron has developed a system that uses robotic dogs and drones to improve the ability of emergency responders to triage patients in the field. (Photo courtesy Carnegie Mellon University)



ROBO-RESCUE

WILL 911 OF THE FUTURE SEND A ROBOT TO YOUR DOOR?

BY ROBERTA ZEFF

People in cardiac arrest will most likely become brain-dead within six to 10 minutes. You can bleed out all of your blood in just as little time. In an emergency, it's crucial for emergency medicine providers to identify the people in greatest danger as quickly as possible, so they know which patients to help first

Leonard Weiss, an MD associate professor of emergency medicine at the University of Pittsburgh, is part of a team of researchers called Team Chiron that has developed a system using drones and robotic dogs to improve the ability of emergency responders to triage patients in the field. The team, including several researchers at Carnegie Mellon University, is in the second year of a three-year challenge through the Defense Advanced Research Projects Agency (DARPA).

"My specialty in emergency medicine is specifically for out-of-hospital care, and I work as the medical director of City of Pittsburgh Public Safety and an assistant medical director of the UPMC STAT MedEvac helicopter system," Weiss says. "So my passion and focus are how to take care of patients in the field "

Although this project originated with the military, it also has civilian applications. The team recently tested its capabilities in a simulated plane crash using mannequins and actors.

So far, the team has demonstrated a reliability above 85% in detecting life threats such as severe bleeding, respiratory distress and head trauma, says Weiss. He adds: "We have been working hard at enhancing what started as daylight evaluation and expanding to diffe ent environments with limited visual ability such as smoky or dark and nighttime environments. These are important next steps."

"It is our intention that this will be 100% autonomous, not just the ability to move, map and plan, but also the ability to gather all the physiological signatures, infer an injury pattern and send that back," Kimberly Elenberg, the principal scientist from Carnegie Mellon, told KDKA News.



Weiss

In any emergency, Weiss says, "we're limited by time. The faster we can get to the victim, the faster we can use our lifesaving care techniques. If we can reduce the time that we could get an intervention or help to the human victim while waiting for professionals to get them to the hospital, it will save lives."

Weiss notes that there are times in both combat and civilian emergencies when it is hazardous for paramedics to enter the scene. The Team Chiron system would help "use some reconnaissance and keep the paramedics and rescuers safe while they find the best ingress."

Pittsburgh has long been a hub of innovation for prehospital care.

"EMS was founded in Pittsburgh," Weiss says, referring to Freedom House Enterprises Ambulance Service, established in 1968 and primarily staffed by Black paramedics serving the Hill District. And in the years since, EMS programs have had long-running partnerships with the Center for Emergency Medicine of Western Pennsylvania and Pitt.

"We have [done] extensive research over these years together and [built] top-of-the line protocols, and we deploy our physicians into the field to work side by side with the paramedics," Weiss says.

"And that just doesn't happen everywhere across the country."

Someday soon, robots will be part of those teams. ■



Pitt research suggests that dietary interventions targeting the microbiome can improve fertility outcomes by supporting beneficia microbes.

GUT CHECK

SURPRISING INTERPLAY BETWEEN THE MICROBIOME AND FERTILITY

BY KAT PROCYK

GETTY IMAGES/NOPPARIT

When Eldin Jašarević, a PhD assistant professor of obstetrics, gynecology and reproductive sciences and of computational and systems biology at the University of Pittsburgh, came to the United States as a 10-year-old refugee from Bosnia, he couldn't quite grasp what it meant for him or his future.

As he reached his teenage years, he began to wonder how the traumatic experiences he faced in childhood could affect his health as he grew older. His concern for others like him developed into a research career focused on understanding how lifetime experiences could contribute to risk for chronic disease.

As a postdoctoral fellow, he pioneered work showing that the microbiome, the rich community of microorganisms in various parts of the body, can affect—and help predict—a baby's development before it's born.

"I'm really interested in how information is passed down from one generation to the next," Jašarević (pronounced yah-SHAR-eh-vich) says. "Could it be that our biological signals—shaped by our experiences—are somehow embedded and transmitted to future generations? We think that this transmission might influence everything from health and resilience to the risk of disease."

This question, born from his own experience with displacement and adversity, has guided Jašarević toward paths that could use science to help others overcome challenges.

In May, as part of the Senior Vice Chancellor's Research Seminar Series, Jašarević presented his lab's surprising finding that the microbiome's role as a conduit for intergenerational signals begins much earlier than previously thought. The team learned that the microbiome helps regulate female germ cells, or oocytes, which contain the mother's genetic material that's passed down to the next generation. (A paper on this finding was accepted by the journal Cell Host & Microbe and will publish in October.)

His research group found that metabolites produced by the microbiome nourish these oocytes, which suggests that dietary interventions targeting the microbiome, particularly increasing fiber intake, can improve fertility outcomes by supporting beneficial microbes.

"These findings gave us broader insight into how diet and microbiome interactions could help improve fertility outcomes, especially in individuals with metabolic disorders, a major contributor to infertility and subfertility," Jašarević says.

Exploring the interplay between the microbiome, diet and the immune system opens opportunities for earlier interventions and could inform new bedside practices, helping to personalize treatments and move away from a one-size-fits-all approach to women's health. Jašarević envisions developing empirical measures to determine the best timing and type of dietary interventions to improve reproductive health.



Jašarević

"Part of the challenge of supporting patients during prepartum is that the science is lagging," he says. "When someone goes to a clinic and asks, 'What kind of diet should I be on?' or what their nutrition plan should be, there isn't a definiti e answer from a health care provider.

"With a knowledge base, we can help people feel empowered and play a part in choosing their interventions."

For these new interventions, Jašarević emphasizes the importance of considering the microbiome alongside traditional factors.

"What's exciting about this work is the rare opportunity to witness how basic science can transform clinical practice," Jašarević says.

By understanding the underlying biological mechanisms, like how the microbiome influen - es oocyte development, he hopes he can design more targeted, personalized interventions that address the root causes of infertility.

Says Jašarević: "I believe this is how we make meaningful advances in women's health: connecting molecular discoveries at the bench to innovative solutions at the bedside that ultimately help more people build the families they hope for, regardless of the challenges they've faced." ■



GETTY IMAGES/STEIN PHOTO

You can think of cell signaling like a pinball game: seemingly chaotic, but following precise physics and rules.

SKILL SHOT

A CLOSER LOOK AT THE "GAMEPLAY" THAT DRIVES CELL SIGNALING | BY PHOEBE INGRAHAM RENDA

The way cells communicate, called cell signaling, seems chaotic, but it follows precise physics, rules and action sequences, like a pinball game.

For more than 30 years, Pitt's Andrew Hinck has been detailing the "gameplay" of a protein that's key to how cells grow, develop and behave; that protein is called transforming growth factor-beta (TGF-β). If you picture a pinball playfield, TGF-β would be the ball, while receptors and coreceptors on the cell surface act like bumpers and flippers guiding TGF-β through a series of events necessary for signal transmission and amplification.

Hinck, a PhD professor of structural biology, has used X-ray crystallography and cryo-EM (cryogenic electron microscopy) to identify the 3D shape of each protein involved in the process and molecular graphics technology to see how the protein atomic structures fold to fit into those 3D shapes.

In the TGF-β "game," the coreceptor betaglycan is essential for life—embryos cannot develop without it. However, the TGF-β signal also has immune-suppressing functions, which cancerous cells use to cloak themselves from immune system surveillance, making them impenetrable to immunotherapies.

Hinck's latest breakthrough, published in Nature Communications in February with Łukasz Wieteska as first author, reveals—in atomic-level detail—how betaglycan acts like flippers by catching TGF-β and helping to build the TGF-β signaling complex around it and boost the signal.

Hinck's structural insights have helped researchers design drugs that mimic these interactions or block unwanted signaling processes. Scientists have already used the known structures of TGF-β bound to its receptors to develop adjunct treatments to enhance the effecti eness of cancer immunotherapies. Those adjuncts are now in clinical trials for cancer.



Hinck

While structural insights into how betaglycan binds to TGF-β haven't been leveraged in the same way yet, understanding the rules of this molecular pinball game is helping to design smarter, more targeted treatments and provide biological context for clinical results.

"When facing a disease that is as complex, varied and challenging to treat as cancer, we need to think and approach the development of effecti e therapies not as a quick match, but as a tournament—maybe even a championship," says Hinck. ■







UNIVERSAL BENEFIT

GETTING DISCOVERIES TO MARKET IS CRUCIAL FOR PATIENTS, PITT, THE REGION AND BEYOND.

BY MICHAEL AUBELE

PHOTOGRAPHY: PITT PANORAMA BY TOM ALTANY, BLUE TEST TUBES BY IGABRIELA/GETTY IMAGES

HIV doesn't directly infect neurons but can lead to neurodegeneration and create severe cognitive problems. Smita Iyer, a PhD associate professor of pathology at the University of Pittsburgh, wants to offer patients relief and is approaching a potential therapy by asking a question most other researchers haven't. It has to do with the mechanisms underlying the condition, specifically, What role do certain lymphocytes play?

"Most of the work, so far, has largely focused on innate cells," she says of the immune cells we're born with and provide the first line of defense against infection. She's instead examining a subset of immune cells in the brain that develop over time to fight the infections that innate cells can't clear. Her preliminary look revealed that they could be targeted to reverse the neurodegenerative process.



Iyer

Iyer is designing a drug to rewire those cells to promote their regenerative function. "We believe," she says, "that these cells can enhance neuro-regeneration, which is quite different from the other therapeutics and drugs out there [that treat cognitive impairment], because most of them suppress the immune system [and don't play a regenerative role]."

Iyer's is one of hundreds of promising breakthroughs coming out of Pitt labs every year. Pitt Health Sciences has ramped up its efforts to make sure patients benefit from more of those discoveries and is streamlining and strengthening its ecosystem for getting new cures, therapies and other interventions to patients.

For instance, Iyer's quest to get her approach into the clinic has taken a step forward through Pitt Idea Navigation to Commercialization (Pitt.INC), a new program that helps innovators in the health sciences take the crucial first steps in that journey. It offers up to $50,000 in funding, as well as support through the University's commercialization ecosystem—support welcomed by Iyer, who points out that she was educated to be a scientist, not an entrepreneur.

"To publish, to get grants, we are good there," Iyer says. "But you're not really trained in generating pitch decks or business plans, so there's certainly a real gap when you're trying to move discoveries to the clinic. Even though you have a breakthrough in the lab, without guidance or resources, it can stall.

"So, Pitt.INC allows us to leverage existing resources by giving us a road map. It helps us think through IP [intellectual property] and value proposition, because that's not something we think about on a daily basis. We are not business people. But as scientists, we want to help people at the end of the day; commercializing your invention takes a different mindset and a different know-how about the resources needed."

Pitt.INC just awarded its first round of funding to five other projects that range from treating chronic traumatic encephalopathy to Meniere's, an inner ear disease, to chronic kidney disease. Four of the six awards have gone to School of Medicine projects.

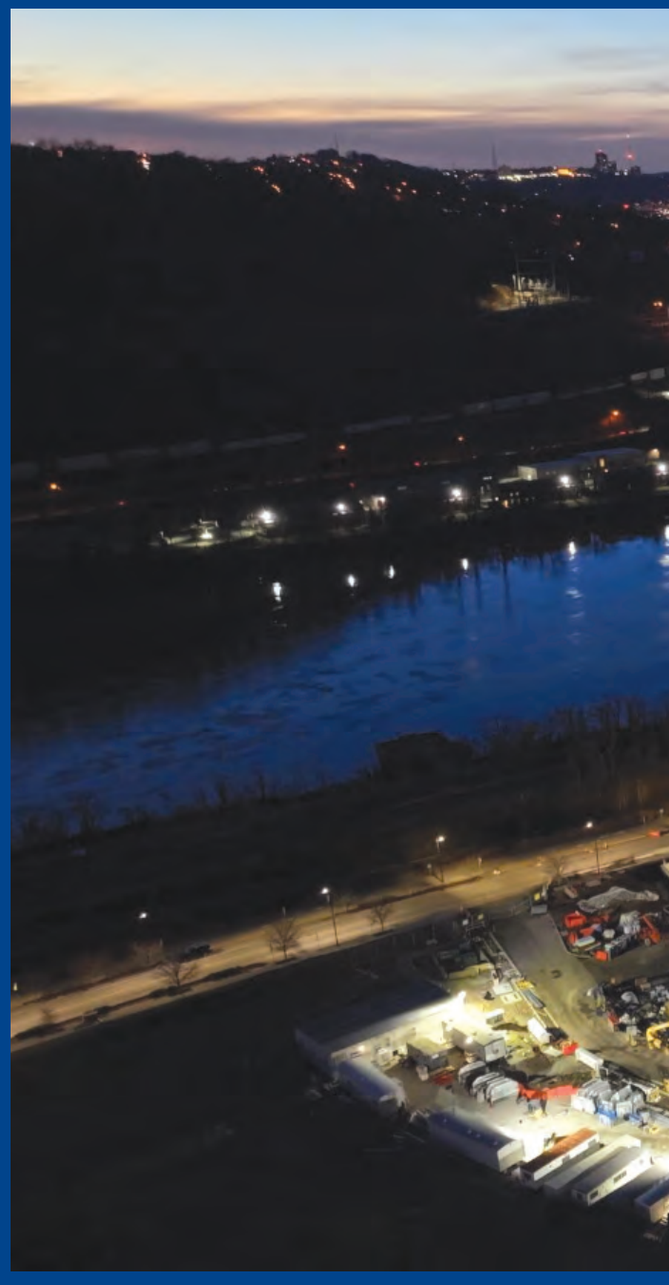
The University started to emphasize commercializing research about a decade ago. Its Office of Innovation and Entrepreneurship (OIE), which runs Pitt.INC and several other technology transfer, education, mentorship and support programs for innovators, plays a key role.

"The mission, from a macro perspective, is providing societal benefit," says Evan Facher, a PhD, MBA and Pitt's vice chancellor for innovation and entrepreneurship, who leads the OIE. His office carries out the section of the University's mission statement that reads, "cooperate with industrial and governmental institutions to transfer knowledge in science, technology and health care."

Commercialization also generates revenue that perpetuates more research, so it's not only crucial for patients, but, now more than ever, to Pitt as well—and you can extrapolate that out to Pittsburgh and the region.

In a handful of cases nationally, the windfall of spinoffs from university research has been tremendous. Northwestern University hit a home run in the late 1980s when Richard B. Silverman's lab discovered that specific synthetic chemicals could treat epilepsy. Silverman applied that discovery to create a new molecule that would become known as pregabalin. In stepped Northwestern's technology transfer office, which helped put the drug in the hands of Parke-Davis Pharmaceuticals.

In 2005, after an acquisition, Pfizer introduced the drug under the brand name Lyrica. Although initially designed to control seizures, it was found to also help control neuropathic pain and fibromyalgia, and that represents a much larger market. Lyrica generated $5 billion in revenue for Pfizer in 2016 alone and continues to earn the company income. Because Northwestern licensed the drug, it has benefitted as well—receiving hundreds of millions of dollars in licensing revenue.



Turn back the clock about a decade before Silverman introduced pregabalin, and Northwestern would not have realized the enormous return. The ability of universities to generate revenue from discoveries spawned from their labs began with the Bayh-Dole Act of 1980 that gave them the right to retain the title to inventions developed from federally funded research. Prior to that, many inventions never saw the light of day because commercialization was in the government's hands. Lacking the resources to market everything being developed, the government put that responsibility in the hands of the developers—universities and other organizations and companies that do research.

Of the Northwestern win, Facher says, "Now that's a grand slam," but not the norm. Pitt's tech-



The exterior construction of BioForge (foreground) at Hazelwood Green is complete. BioForge LLC plans to move in by 2028; its team is already working to accelerate breakthroughs in the development and manufacturing of new precision medicines. Anchor tenant ElevateBio expects to begin manufacturing cell and gene therapies there in 2027. (Photo: University of Pittsburgh/ Tom Altany.)

"Even though you have a breakthrough in the lab, without guidance or resources, it can stall."

nology commercialization activities generate from $12 million to $20 million annually, with a majority generated by the School of Medicine.

If you look at the last 30 years of all university deals in the nation, it's about half a percent that produce $1 million in total over the life of those licenses, Facher says.

A lot can boil down to timing, as the development of Pittsburgh Compound B (PiB) illustrates.

In the early 2000s, a Pitt team led by Chester Mathis, PhD, a Distinguished Professor of Radiology and the Radiology PET Research Professor, and William Klunk, an MD, PhD Distinguished Professor Emeritus of Psychiatry and professor of neurology, developed PiB, a radioactive compound that enables early diagnosis of Alzheimer's disease pathology by binding to beta-amyloid plaque deposits that can be located through positron emission tomography (PET). Before PiB, it was possible to confirm Alzheimer's disease only after a patient's death, during an autopsy.

Facher says PiB was licensed to GE HealthCare, yet—though it was welcomed by Alzheimer's researchers—didn't generate much in the way of uptake at the time because of a relative lack of drugs to treat the disease. "The question became, Why give money to something we can't figure out how to treat? But within the last year, we have approved drugs, and now there's a bona fide need to do imaging.

"We only have a couple years left on the patents though, because [PiB] was so far ahead of the curve."

Pitt has attracted more National Institutes of Health research dollars than most other research institutions in the nation. Of the University's more than $1 billion research budget, NIH funding accounted for $658 million in 2023, with about $568 million of that dedicated to Pitt Med research—placing it 6th in



Briem



Corby



Facer

the nation then.

Still, Facher says, Pitt had been slow to capitalize the way some other universities have when it comes to bringing its inventions to market. But using a lottery analogy, he notes Pitt is buying a lot more tickets. "The more you have," he says, "the better the odds of success when we talk about commercialization." (You might recall the Beastie Boys told us as much in their 1998 song, "Putting Shame in Your Game," when they rapped, "It's like lotto, you have to be in it to win it.")

There is room to grow, but Facher says the metrics show the University is in a good position to make that happen, and it's in good company.

This summer, Facher treated members of the Alavi Lab in the Swanson School of Engineering to a cake emblazoned with the number 444. Their work, on a new approach to spinal fusion, was behind the University's 444th invention disclosure of the year, surpassing previous records for disclosures at Pitt by 50.

In 2024, the most recent reporting data available, Pitt ranked 19th in the nation for invention disclosures; the University of Pennsylvania was at 18th. Those numbers, like other technology transfer metrics, are self-reported by research universities and compiled by AUTM (the Association for University Technology Managers). Facher says that in 2024, Pitt produced more invention disclosures than Duke University and Yale University.

In 2024, Pitt ranked 15th nationally in terms of number of patents issued, ahead of Cornell University and Mayo Clinic. It ranked the same for deals and transactions, wherein the University owns the intellectual property and licenses it to a for-profit company to create and sell a product or service.

"What I've learned is that large pharma keeps buying assets," says Yuan Liu, a PhD and associate professor of medicine. "A lot of the work happens at academic institutions, which are doing the riskiest parts."

Liu's lab at Pitt's Aging Institute focuses on developing small molecule therapies that target protein degradation in age-related diseases. Her research has been licensed to biopharmaceutical companies for commercial development.

Along with Aging Institute and Department of Medicine colleagues Toren Finkel, an MD, PhD, and Bill Chen, a PhD, Liu launched the startup Coloma to develop targeted protein degradation therapies for cancer treatment. In contrast to traditional targeted therapies that block cancer-related proteins, targeted protein degradation eliminates them.

Seasoned researchers aren't the only ones spinning out startups. Malleous, a collaboration among Pitt faculty, med students and undergrads, devised a surgical instrument that combines suction and retraction tools into one device that maintains malleable and bendable properties. The invention has the potential to reduce the duration of procedures and patient risk. It also could save hospitals money.

Malleous nabbed the top prize at the 2024 Big Idea Competition, sponsored by OIE's Big Idea Center, which is a hub for student innovation and entrepreneurship. The center runs the annual competition, which awards funding—$25,000 for first place—to projects with market potential.

Benjamin Leslie, Malleous CEO and second-year Pitt Med student, began developing the device while a bioengineering major and hockey captain at Pitt. He says the University has supplied $100,000 of the funding it has raised to date through several awards, getting the device to this point in its development.

"We're looking to create a production equivalent prototype and have been working with a manufacturer. It will be our first real look at what the device will look like in practice. As of right now what we have are some high-fidelity prototypes that we've done cadaver testing on."

After the prototype is squared away, they'd like to get the device into clinical testing quickly. Leslie is hoping an FDA Investigational Device Exemption isn't needed because the device is relatively low risk.

Pitt's renewed push to bring new solutions to patients goes beyond funding competitions and includes its Clinical Trials Office (CTO)—closely aligned with the OIE—that's focused on streamlining and accelerating the clinical research process. The office was established in January. Patricia Corby, a DDS, MS and associate vice chancellor for clinical trials development and operations, says, "The Clinical Trials Office's mission is to support, oversee and advance clinical research by ensuring trials are conducted ethically, efficiently and in compliance with regulatory standards to improve patient care and medical knowledge." She fully expects the CTO will shave time off the process, which right now takes about 7.5 years: "Even small efficiencies . . . can significantly accelerate study completion."

There's been no shortage of ingenuity coming out of this university. Pitt people built the first successful polio vaccine, MRI and the modern ambulance service and they revolutionized breast cancer care—we could, of course, go on. And beyond those 444 invention disclosures, Pitt last year spun out 15 startups. The rub? In recent times, Pitt has struggled to launch inventions and businesses that become household names—not only within the health sciences but in another major sector, tech.

Chris Briem, a regional economist at Pitt's University Center for Social and Urban Research, points to what has become the city's model for success as it continues to evolve from its steel industry heritage to a hub for innovation. Throughout the past few

"What I've learned is that large pharma keeps buying assets. A lot of the work happens at academic institutions, which are doing the riskiest parts."

decades, Pittsburgh has cultivated its "eds and meds" economy, where Pitt, Carnegie Mellon University, UPMC and Allegheny Health Network are significant economic engines, creating jobs and attracting investment. Yet Briem argues that rather than organically grow prominent tech businesses, which it does some of, the city has done more to attract already established ones.

"A lot of what we talk about in terms of technology in Pittsburgh is tremendous stuff," Briem says. "But it's that Google has an operation here and Apple and Amazon have research operations here, and these are all very important, palpable things because they're important to the economy and generate jobs, but they're not organically grown. "

Within the life sciences, the model is similar. The likes of Microsoft and Vizzhy, an AI and multi-omics company, are tapping into Pitt's knowledge enterprise. (Speaking of AI, at a Pennsylvania Energy and Innovation Summit at Carnegie Mellon in July, it was announced that $92 billion in development is headed to the state, supporting the construction of AI data centers and the energy infrastructure needed to sustain them.)

Liu sees potential in Pittsburgh to use its eds and meds economy to build a model similar to those in San Francisco and Boston.

"Definitely, Pittsburgh has that potential in its medical system," she says, not only because of the knowledge base at Pitt but also because of the clinical capabilities at UPMC.

UPMC's venture capital arm, UPMC Enterprises, right now is supporting more than 50 startups, of which about 20% are based in Pittsburgh. A number of those have come out of the labs and clinical advances made by Pitt professors. Novasenta, which spun out of Pitt and creates therapies to treat immune-mediated diseases and cancer, is one. Abridge, launched by Pitt Med alumnus and UPMC cardiologist Shiv Rao (MD '07, Fel '13), is another. Abridge's technology records and transcribes patient-doctor conversations and summarizes those to create clinical notes.

University leaders believe that Pitt is poised to lead revolutionary change in drug discovery and health care delivery.

"Over the next five years, we will transform the way medical research is done. We will transform the way drug discovery is done. And we definitely want to transform the way new products are done," Anantha Shekhar, senior vice chancellor for the health sciences and John and Gertrude Petersen Dean, School of Medicine, said in June at a private



Leslie



Liu

PATENT POTENTIAL: AN AI ASSIST ON DETECTING DANGEROUS LUNG CLOTS



Gokhale

Tanmay Gokhale, an MD, PhD cardiac electrophysiology fellow, is getting help from Pitt's Offic of Innovation and Entrepreneurship (OIE) to obtain a provisional patent for artificial intelligence technology that could have broad applications in health care.

Gokhale and fellow researchers developed a machine learning model that analyzes electrocardiogram (ECG) data to determine who is at highest risk for severe health complications from a pulmonary embolism, a blood clot in the lungs. When a patient has an embolism, the right side of the heart has to work harder to pump blood, which an ECG can identify.

Using ECG data from 1,376 patients who were diagnosed with pulmonary embolism over a nine-year period, Gokhale and team trained a model that correctly identified low risk versus high risk more than 80% of the time. The model's results were compared with results from clinical analyses of patients.

"I think one of the exciting things about the way we did this machine learning model is not just that we can make a prediction, but we actually get some mechanistic insight into what the model is looking at, to try to identify these patients. Sometimes machine learning models are really black boxes," Gokhale says. But in this case, he says, "We can look at what features of that ECG the model thought were most important."

Gokhale says the model picked up on ECG patterns that normally wouldn't appear significant. "We know that the goal of all this for the clinical team is, How do we identify the patients who are at the highest risk of bad outcomes?" Gokhale says. "And what we showed is that our model is actually able to better predict 30-day survival . . . than the clinical assessment."

Beyond picking up on subtle clues of pulmonary embolism, the model might be able to identify ECG features that point to other deadly conditions.

Gokhale and team are preparing to expand the model by examining ECG data from a group of patients seen in the UPMC Presbyterian emergency room in 2024 who were not at risk for pulmonary embolism and use those results as a control group.

OIE connected Gokhale with intellectual property lawyers who are working with him to get a provisional patent on that second phase of the project.

In addition, the team has obtained 9 million ECG results from patients seen by UPMC throughout the past 20 years. The team will use that information to identify more subtle patterns that predict high risk for pulmonary embolism.

He doesn't have a timeline for when the technology will be ready for clinical use, yet Gokhale says that his team now has "the ability to do large scale AI-ECG work with this really broad set of patients and look at a lot of really interesting questions."

—Michael Aubele

reception in Boston that coincided with the BIO International Convention, the world's largest annual biotechnology conference.

"We have an environment ripe for innovation. We are building the infrastructure and ecosystem that can take our research to the next level of product development, commercialization and manufacturing," Shekhar said. He added that biotech companies have begun establishing operations in Pittsburgh to take advantage of these new capabilities.

Foundation and industry partners are key to these efforts. A prime example: Pitt BioForge, the massive life sciences project at Hazelwood Green funded by a $100 million grant from the Richard King Mellon Foundation. And the Henry L. Hillman Foundation will also support bioanalytics at BioForge through a recent $6 million commitment.

ElevateBio, the anchor tenant at BioForge, is scheduled to open its second cell and gene therapy manufacturing operation in the first half of 2027, accelerating the rate at which new biologic precision medicines are produced. In a sense, BioForge's charge is to innovate innovation. Live-cell and genetic therapies, for instance, hold great promise for addressing diseases and conditions that pills can't. But these kinds of approaches are difficult to manufacture, hard to get to a large number of patients and expensive—some therapies can cost upward of $4 million for a single dose. The BioForge team plans to change that.

Research funding from NIH and other federal agencies has had a palpable impact on this region's economy, Briem notes. It's also allowed communities here to enjoy access to the latest therapies.

Coincidentally, Pitt Health Sciences was redesigning and strengthening its commer-

START 'EM EARLY

The new Pitt.INC program is designed to get health sciences researchers thinking about commercialization at the very beginning of the idea stage—as soon as a hypothesis comes to be. It makes infrastructure, funding and a pathway to market readily available to inventive scientists.

STEP 1: **Define the scientific hypothesis and submit it through pittinc.pitt.edu.**

STEP 2: **Pitt.INC team reviews the idea and decides if it's ready to move forward.**

"Every step toward commercialization is a step closer to someone getting their life back."

PATENT POTENTIAL: HOPE FOR MAJOR DEPRESSION



Price

In 2022, Rebecca Price wrapped up a clinical trial on a major depression treatment she knew had potential to improve lives. Now, three years later, after filing an invention disclosure with the University of Pittsburgh, she has a licensing option with a company looking to market the therapy, while Pitt has filed patent applications for it in the United States and more than a dozen other countries.

Her treatment pairs computer-based exercises called Automated Self-Association Training (ASAT) with ketamine infusions. A National Institute of Mental Health grant supported the research.

Price, who is a PhD and Pitt associate professor of psychiatry, showed trial participants repeated groups of self-related words and images paired with positive cues such as a photo of themselves and then a photo of a stranger smiling. The goal was to harness the brain's neuroplasticity—its ability to form and reorganize synaptic connections—to support learning and recover from depression.

Patients sometimes require an external stimulus to boost neuroplasticity and unlock the benefits of ASAT, so study participants—before going through ASAT—received a low-dose ketamine infusion. Ketamine, an anesthetic known for its rapid antidepressant effects, can enhance neuroplasticity.

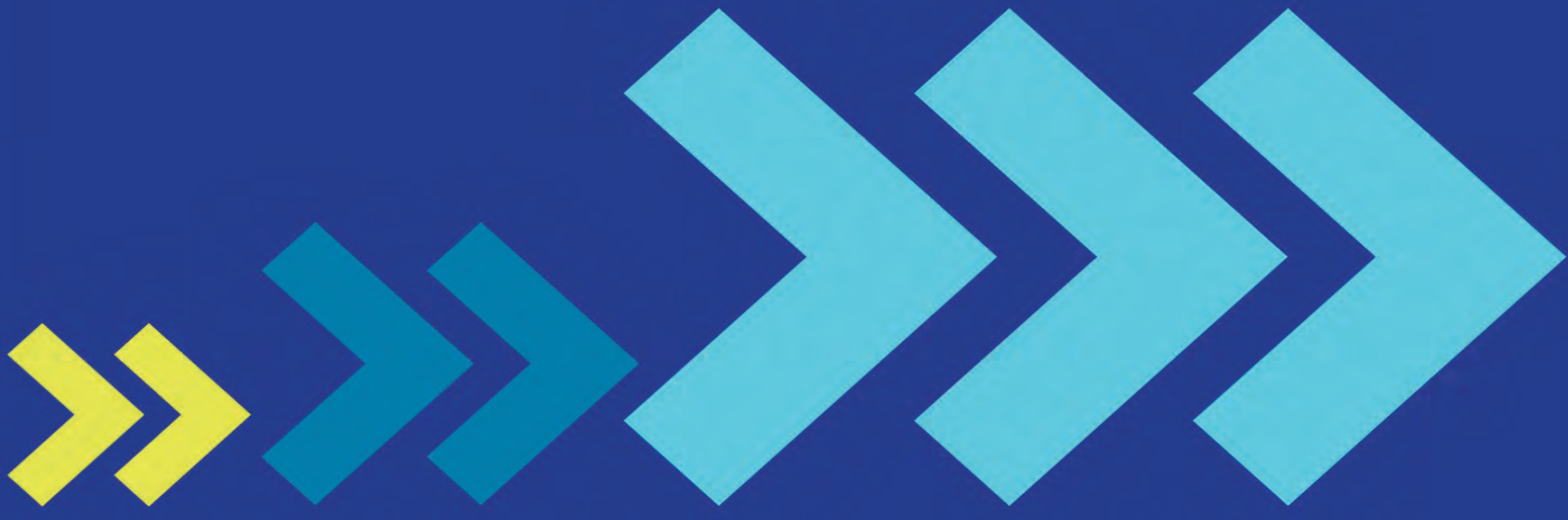
The system worked. Patients reported an immediate reduction in depression symptoms that continued for about 90 days.

"I had a sense that this could be something that would be helpful," Price says. "I was getting emails from people who are treating depression in the real world, and people who are suffering with it or have a family member suffering with it, and they heard about our findings, and they wanted it. They wanted access to it. And so that was an important encouragement to me that there is a market for this."

Price is also partnering with Syndeio Biosciences, a clinical-stage biotechnology company for which Dean Anantha Shekhar is a scientific advisor, on an investigator-initiated study to test a new depression-drug candidate as a substitute for ketamine. There's potential for Price to license the software she developed to Syndeio.

Price says her goal for everything she develops is to get it into the public's hands. "I've always been interested in making sure whatever I'm working on in research gets to people," she says.

"Bringing this therapy to market isn't just about innovation—it's about impact," says Price, also a Pitt associate professor of psychology and of clinical and translational science. "Every step toward commercialization is a step closer to someone getting their life back." ***—Michael Aubele with Kat Procyk***



STEP 3: Design the study. Researchers work with Pitt.INC to plan the project and finalize a budget.

STEP 4: Pitt.INC makes a final decision on whether to fund the project.

STEP 5: Conduct the study and assess the results.

STEP 6: Submit a disclosure to Pitt's tech transfer office which will independently validate the work and plan for filing a patent.

At this point, Pitt.INC steps away and Pitt tech transfer experts step in.

STEP 7: The tech transfer offic files for a provisional patent.

STEP 8: The idea goes through tech validation—making sure the approach can materialize. The bridge process of getting the innovation to market happens here, including producing a prototype, conducting a market analysis and developing marketing and sales plans.

STEP 9: The researcher develops the product or idea by launching a startup.

Source: Offic of Innovation and Entrepreneurship

cialization and clinical trials infrastructure before threats to NIH funding began. Facher says that, regardless of the federal funding climate, Pitt will continue to invest in bringing ideas to market.

"If anything, I'd say it's put a spotlight on the need to have a diversified funding portfolio."

Hooman Rashidi, MD, MS, Pitt's associate dean for AI in medicine and executive director of the Computational Pathology and AI Center of Excellence, points to a partnership with the technology company Leidos as an example of how important industry alliances are.

Leidos and Pitt have forged a $10 million agreement that will advance work at the center. A focus of the five-year collaboration will be developing AI-powered tools for quicker detection of heart disease, cancer and other conditions, enabling earlier, more effective care management. These advancements are expected to benefit groups facing barriers to high-level care such as rural patients who don't have easy access to large medical centers and those in other underserved populations, including veterans.

"For the longest time, NIH funding has been the number one most important thing for any major research university," Rashidi says. "We certainly still value that. But this has been a wake-up call—we see our industry relationships as being as valuable as our government grants."

Liron Pantanowitz, an MD, PhD, MHA who is the Dr. Maud L. Menten Professor and Chair of Pathology, says a key upside to industry partnerships is the ability to take revenue from IP the University has licensed and "reinvest it in what we're doing—to have it come back to our center and sustain what we're doing now."

Blackrock Neurotech, which recently gave a $740,000 grant to further the vision research of Xing Chen, a PhD assistant professor of ophthalmology, says the expertise and translational capabilities at Pitt are key reasons why the company invests here.

"These partnerships build the kind of ecosystem science needs to thrive," says Florian Solzbacher, company cofounder and chair. "They bridge the gap between federally funded discovery and industry's ability to manufacture, scale and sustain devices without locking the science away. They also strengthen public trust by combining transparency, strong governance and genuine patient involvement into every stage of development.

"At a higher level, we are aligned with academic partners like Pitt in a shared mission: to restore lost functions and improve lives. That only happens when basic science is paired with the rare ability to carry it through to translation and clinical readiness.

"Pitt has built that bridge." ■

"We see our industry relationships as being as valuable as our government grants."



The Tranis had few options as they sought help for their daughter, Kelsey, who has a rare disorder called PACS1 syndrome. Then they met Gary Thomas, who discovered the PACS1 gene. (Photo by Dustin Lewis)



RARE OPTIMISM

NEW HOPE FOR A TODDLER WITH A LITTLE-KNOWN GENETIC DISORDER—AND, PERHAPS, OTHERS LIKE HER | BY ANDREW DOERFLER

When Marisa Pacifico Trani emailed a cell biologist at the University of Pittsburgh in October 2024, she had modest expectations for what he could offer her baby girl, Kelsey.

Then 7 months old, Kelsey had spent her life dealing with heart trouble, difficulty eating and swallowing, low muscle mass, weak retinas, developmental delays and other challenges. A difficult series of emergency room stays and an avalanche of questions eventually led to her diagnosis: an ultra-rare, genetic neurodevelopmental disorder called PACS1 syndrome, which was first identified in 2012. The number of people affected isn't totally clear; most estimates now stand at a couple hundred.

A doctor advised Marisa and her husband, Shane Trani, that effective treatment could be years away, likely arriving too late to make a major difference for Kelsey.

But if the family wanted to learn more about ongoing research and future therapies, the physician suggested they contact someone who would have the most information about Kelsey's condition. Gary Thomas, a PhD professor of microbiology and molecular genetics at Pitt, had led the discovery of the PACS1 gene in 1998 when he was at the Oregon Health Sciences University (now Oregon Health and Science University). In people like Kelsey, the gene is mutated, which dysregulates the trafficking of proteins that are important to the development of nerve cells. Years later, after other researchers located the mutation, Thomas led a study that supported a way to correct many of the resulting neural deficits in mouse models.

Marisa and Shane Trani were eager to talk to him. Beyond getting answers for themselves, they thought they could help further his research by sharing Kelsey's experiences.

"She's incredibly well documented going back to her third trimester with all these records, all these appointments," Shane Trani says.

"We know it's too late for Kelsey, but what can we do to help?" Marisa Trani says, describing their thinking at the time. "We didn't think that we would ever be able to get the treatment. We just didn't want anyone to have to go through all the stuff we have."

The message that landed in Thomas' inbox came as a surprise. He was moved by the family's story, and especially by their eagerness to help others. What's more, he thought he knew a way to get a new treatment to Kelsey—and possibly other PACS1 patients—in Pittsburgh.

"Marisa certainly is very interested in seeing her daughter get treated for PACS1 syndrome," Thomas says. "But she's also interested in seeing other PACS1 patients be treated. And I really wanted to help her."

A basic scientist and not a clinician, Thomas was motivated by an opportunity to see his life's work make a real difference in people's lives. But he couldn't do it on his own, and getting access to the treatment wasn't certain.

In the United States, conditions that affect fewer than 200,000 people are considered rare diseases, 80% of which are genetic. In many cases, like PACS1 syndrome, the number of patients stands in the hundreds or fewer. Some of these are considered "orphan diseases," where the patient population is so small that pharmaceutical companies have little profit potential in developing and delivering treatment.

Even though each of these is rare on its own, taken together they affect about 30 million Americans, according to the National Institutes of Health—about 1 in 10 people has one.

Yet of the 7,000 rare diseases with a known molecular cause, only 500 have an approved treatment. Funding for research in the rare disease world is hard to come by, even in more ordinary times than today, when all medical research funding is at risk.

When promising studies do point to potentially life-changing therapies, determining the safety and effectiveness in humans is especially challenging for rare diseases. Classic clinical trials are hardly ever an option because the small number of patients make it difficult to gather a large enough cohort to conduct double-blind studies (where who is in the control group is not known by even the study staff until the trial is over), considered the gold standard.

Researchers and clinicians often need to explore other options, like the Food and Drug Administration's expanded access (also called "compassionate use") exceptions and "n-of-one" studies focused on just one patient, both of which face numerous additional regulatory hurdles from government agencies and medical institutions themselves. Many patients are left managing symptoms rather than receiving therapies that could target the disorder directly.

Their rarity also leaves these diseases off the radar of doctors, even when patients show severe symptoms that are characteristic of the conditions. Often these health issues are shared with more common diseases, which doctors, with good reason, consider first. The average time for an accurate diagnosis of a rare disease is four and a half years.

When a timely diagnosis is made, funding a treatment is still a challenge for providers and patients alike. Families often end up strained by the financial burdens.

Despite those obstacles and more, Thomas is convinced that Pitt, working with clinical partners at UPMC Children's Hospital of Pittsburgh, is an ideal place to treat potentially dozens of PACS1 patients. The collaborative spirit here, he says, allows him to seamlessly combine his lab's expertise with that of clinicians well versed in treating rare diseases in children. Children's doctors treat thousands of rare disease patients each year.

"When we synergize the basic science and clinical sides, I think we can accelerate patient care quite quickly," he says.

Perhaps, he thought, Kelsey could be the first PACS1 syndrome patient at Pitt, setting the University on the road toward helping more children like her.

After the journey they'd been on, Kelsey's family was willing to take the chance.

In rare disease work, Vockley says, you have to "get comfortable being uncomfortable."

Kelsey is a giggly 19-month-old who loves watching singing competition shows like "American Idol," eating peanut butter puff snacks and bothering her older brother, Jameson. On a recent Zoom call, she sat on her mother's lap, cooed and clicked away happily on the keyboard before grabbing a smartphone on the desk and managing to call someone in France.

As she awaits treatment that would address the root cause of her condition, Kelsey has seen gradual but encouraging progress in eating, vocalizing and motor skills through a comprehensive series of therapies.

She has one to four appointments a day and sometimes takes part in weekslong intensive sessions of dynamic movement intervention, a neuromuscular therapy meant to compensate for her difficulty controlling her limbs. Some of Kelsey's therapies have the family traveling two hours from their home in Chesapeake, Virginia, to Richmond, trips that Shane and



Kelsey with her dad

Marisa Trani both balance with their full-time jobs. A three-week stretch of daily sessions in Richmond in June helped her learn to sit up on her own and start to crawl, skills she hadn't mastered before.

She has malacia of the airways, which leaves them weak and makes it difficult for her to clear mucus on her own—she relies on a saline nebulizer to soften the mucus and a vest that oscillates her chest to shake it loose. So far, Kelsey has had one seizure, a frequent symptom of PACS1 syndrome, and now takes a drug to prevent future ones. The Tranis are grateful for their in-home nurses, who take care of her much of the time on weekdays.

Her parents have been amazed at Kelsey's resilience amid the demanding regimen of treatments. "Kelsey will be crying and struggling, and she just keeps doing it," Shane Trani says. "It doesn't matter how hard it is. She'll push through it."

For all the difficulty, the steady improvements are a relief after early months of crushing uncertainty. Kelsey was about 10 weeks old when she started resisting her bottle.

Her refusal to eat worsened, her weight dropped, and, when she did eat, she would vomit. The family ended up in the ER the Friday before Memorial Day weekend in 2024 after a speech language pathologist told them, "This girl can't wait." The ER doctors diagnosed Kelsey with reflux and a rhinovirus and sent the family home, telling them that the problem would resolve on its own.

For the next 26 days, Kelsey was never out of the hospital for more than a day. Her refusal to eat and vomiting kept bringing her back, even after the doctors gave her a feeding tube. "I can remember, candidly, just crying in the car,'" Marisa Trani says.

To Kelsey's parents' frustration, the doctors at first seemed satisfied to monitor and try to address her eating and weight, but not to look closely for underlying issues. After little improvement and with insistence from the Tranis, one physician agreed to a whole genome test for Kelsey. Because of Kelsey's facial structure and weak muscle tone, the physician suspected Kelsey might have Noonan syndrome, a genetic condition that hampers physical development in many ways but usually results in few cognitive impairments.

When the results came in two weeks later, the genetic counselor told the family she wanted to share them in person.

"When the geneticist came into the room," Marisa Trani remembers, tearing up, "the first words out of her mouth were, 'We never would've found this. Nobody here has even heard of this.' The doctor had to Google it."

Unlike Noonan syndrome, PACS1 syndrome meant Kelsey would likely face steep neurological and cognitive challenges. Patients that had been documented so far had autism, ADHD, seizures and mild to severe intellectual disabilities. Their speech was impaired or never



Thomas



Vockley

developed at all; the same was true of their walking ability.

Patients with PACS1 syndrome have what's known as a recurrent de novo mutation. They share the same nucleotide mutation in their genomes, causing the same amino acid substitution that leads to similar symptoms.

"It's hard to find out your child may never walk, may never speak, may never eat solids," Marisa Trani says bluntly. They couldn't help thinking ahead far into the future, too. "When you first get the diagnosis, you're obviously very worried about your child [with a rare disease], but other things go through your head: 'What happens when I'm not around? What's the impact on my other kids?'" Their son might feel obligated to be her primary caregiver someday. (The family is expecting a third child.)

Upon receiving the diagnosis, some immediate interventions were in order. The Tranis traveled to Boston Children's Hospital for procedures on Kelsey's larynx and stomach to improve her breathing and eating. They began plotting the intensive physical and occupational therapies Kelsey would soon undergo.

From doctors, PACS1 family communities and their own searches, though, they also began to learn about an experimental treatment for PACS1 syndrome that used antisense oligonucleotide (ASO) therapy. A form of the therapy developed by the biotechnology company Ionis was already FDA approved for patients with another genetic disorder, spinal muscular atrophy. More recently, a different ASO had been delivered to some PACS1 patients through a nonprofit called n-Lorem started by the founder of Ionis.

What they read was heartening—instead of addressing symptoms, it targeted the expression of the very gene that was throwing Kelsey's system into disarray. But publicly available information was scant. The chance Kelsey could receive ASO therapy herself seemed remote, until they connected with Gary Thomas.

When Marisa Trani reached out, Thomas was already well acquainted with ASO therapy for PACS1. His lab in Oregon had first identified the PACS1 gene through studying a protease called furin, which is capable of cutting certain proteins that activate viruses, including Ebola and SARS-CoV-2. The protein produced by the PACS1 gene, they found in 1998, was essential to furin's trafficking within cells. Years later, around the time Thomas came to Pitt, the mutation in the gene that caused PACS1 syndrome was discovered by other researchers.

In October 2023, with collaborators at Ionis, Thomas was the senior author on a paper in Nature Communications that showed, in part, what the PACS1 syndrome mutation does in mouse brains and neurons derived from patients. The dysregulated proteins lead to an overpopulation of dendrites, extensions of nerve cells that are covered with spines that receive input from synapses. In the PACS1 patients, the spines of the overpopulated dendrites lack their usual density and have fewer functional synapses, which is characteristic of neurodevelopmental disorders.

"Our lab is probably the preeminent lab on the PACS1 gene. It's something we dedicated our career to. And that was fortuitous, right? Because we didn't know the mutations until just a few years ago," Thomas says. "When the mutations came out, we were well positioned to be able to accelerate an understanding of mechanism."

The paper also showed that ASOs developed by Ionis could restore neuronal structure and synaptic transmission in mice, suggesting they would be an effective therapy. They do this by using small bits of chemically modified genetic material to bind with and degrade messenger RNA sequences at play, effectively silencing the dysfunctional expression of the mutated gene.

"If the messenger RNA for PACS1 is degraded and eliminated, then the cell no longer can make the diseased protein," Thomas says. "The cell systems go back to normal."

While this hasn't been proven yet, Thomas thinks a sister gene with similar functions, called PACS2, helps to compensate for the silenced PACS1. "You're better off with no PACS1 than you are with the diseased PACS1," Thomas says. (A mutation of the PACS2 gene leads to a similar—and similarly rare—neurogenetic disorder.)

To help Kelsey, though, he would need the help of clinicians to provide the treatment and Pitt administrators to coordinate with n-Lorem, the nonprofit that now provides a human version of the ASO therapy for PACS1 to patients on a case-by-case basis. Joe Losee, an MD, MBA and associate dean for faculty at the School of Medicine, helped connect him with people who might be able to help.

Eventually, Thomas met with Pitt's Jerry Vockley, an MD, PhD professor of pediatrics, a medical geneticist and director of the Center for Rare Disease Therapy at Children's Hospital. While the focus of his research is genetic disorders of energy metabolism, he was well versed in treating children with rare genetic diseases with experimental therapies. He had even been in contact with n-Lorem about another ASO project once before.

After talking to the Tranis and Thomas, he was willing to do what he could to treat Kelsey.

"I said, 'Look, I can't guarantee anything, but I'm willing to give it a try,'" Vockley says. "It really was an opportunity to do something that could be life changing."

In rare disease work, Vockley says, you have to "get comfortable being uncomfortable." The researchers repeatedly find themselves working with brand new treatments for the first time. And with such small patient populations, each family is taking on risk when they agree to try an experimental therapy. They may not see the benefits they expected, but their participation nonetheless helps future patients. "Whatever [you find out], you go on to the next patient with that knowledge in hand," Vockley says.

Kelsey's family was more than willing to play their part in that process, and Pitt seemed like the right place to do it. Even though they

live in Virginia, they deeply value Thomas' expertise about PACS1 and his zeal for helping not only them but also other patients the Tranis have sent his way.

They've also bonded with him and his wife on a personal level. When they talk to Kelsey about Thomas, they call him "Grandpa Gary."

"When we first brought Kelsey to see Gary in Pittsburgh, she went into his arms like she had always known him," Marisa Trani says. Kelsey also quickly took to his wife, Laurel Thomas, who works in the same department and was instrumental in discovering furin, as well as the PACS1 and PACS2 proteins. She also helped lead the ASO study. "They're two of the kindest people I've ever met."

At Pitt, Shane Trani says, they felt like the doctors they met with really cared. Along with Vockley and Thomas, they spoke with pediatric neurologist Deepa Rajan (Res '13), an MD associate professor of pediatrics. Others were working behind the scenes to apply for Kelsey's treatment from n-Lorem.

Funded by a combination of philanthropic foundations, individual donors and corporate partnerships, n-Lorem provides the treatment to patients free of cost. (The Pitt team will be responsible for its own costs for the research trial component.)

Stanley Crooke, founder and former CEO of Ionis, started the nonprofit after realizing that many of the diseases their technology could treat were too rare to tenably help patients with a commercial model.

"I realized that, given the technology we invented was efficient enough, I could make a drug and give it to them for free," Crooke said in a recent interview on CNBC. The nonprofit says it costs them $1 million to treat a patient with ASO therapy for life, though they hope to bring that down to $800,000.

On top of n-Lorem's own process for getting Kelsey started, the care team at Pitt will also have to go through FDA approval for an n-of-one treatment, because the ASO for PACS1 is not yet approved by the agency.

Thomas plans to set up a fund at UPMC Children's Hospital Foundation that individuals and organizations can donate to in support of the effort. In December 2024, Pitt was awarded a patent for an aspect of the ASO therapy for PACS1; Thomas says any revenue he receives from the patent would go straight into the fund.

Doctors are optimistic about Kelsey's potential. She was diagnosed relatively early in her life and has seen significant progress with her therapies so far. With the new ASO therapy, the family and their doctors are hopeful Kelsey will have "the best chance possible at an independent life," Marisa Trani says.

But she can't help thinking about all the other children out there who haven't been as fortunate. "While I am excited for my own daughter, I'm fearful that older children will be left behind," she says. The benefits of ASO therapy for older patients aren't as well understood.

Not yet. Thomas is determined to help as many patients as possible, and he has begun studies on older mice to learn more about the efficacy of ASOs on older brains.

While the cost to treat someone with a rare disease remains a hurdle for scaling the therapy more broadly, he urges people to consider the alternative.

"When you think about it from the bigger, the macroeconomic picture, having a kid less ill, more healthy, is definitely going to be a lot less costly to society in general," he says. "And their life is improved enormously."

What they read was heartening—instead of addressing symptoms, it targeted the expression of the very gene that was throwing Kelsey's system into disarray.

The joint effort was typical of the University, Vockley says. "The thing about Pitt is that there really are no barriers here. I can work with anybody in any department, on any campus. I've got collaborations with at least a half a dozen departments, both in and outside the medical school. So it's really a very special university in that regard."

The Tranis got the news on July 30: The Access to Treatment Committee at n-Lorem had recommended Kelsey for ASO therapy.

"Shane immediately cried and had to step out of the office. I was in the middle of a client service call, so I had to maintain professionalism, but it was certainly hard to keep my cool," Marisa Trani says. "We're incredibly excited but know that there are more steps to continue to push forward on."

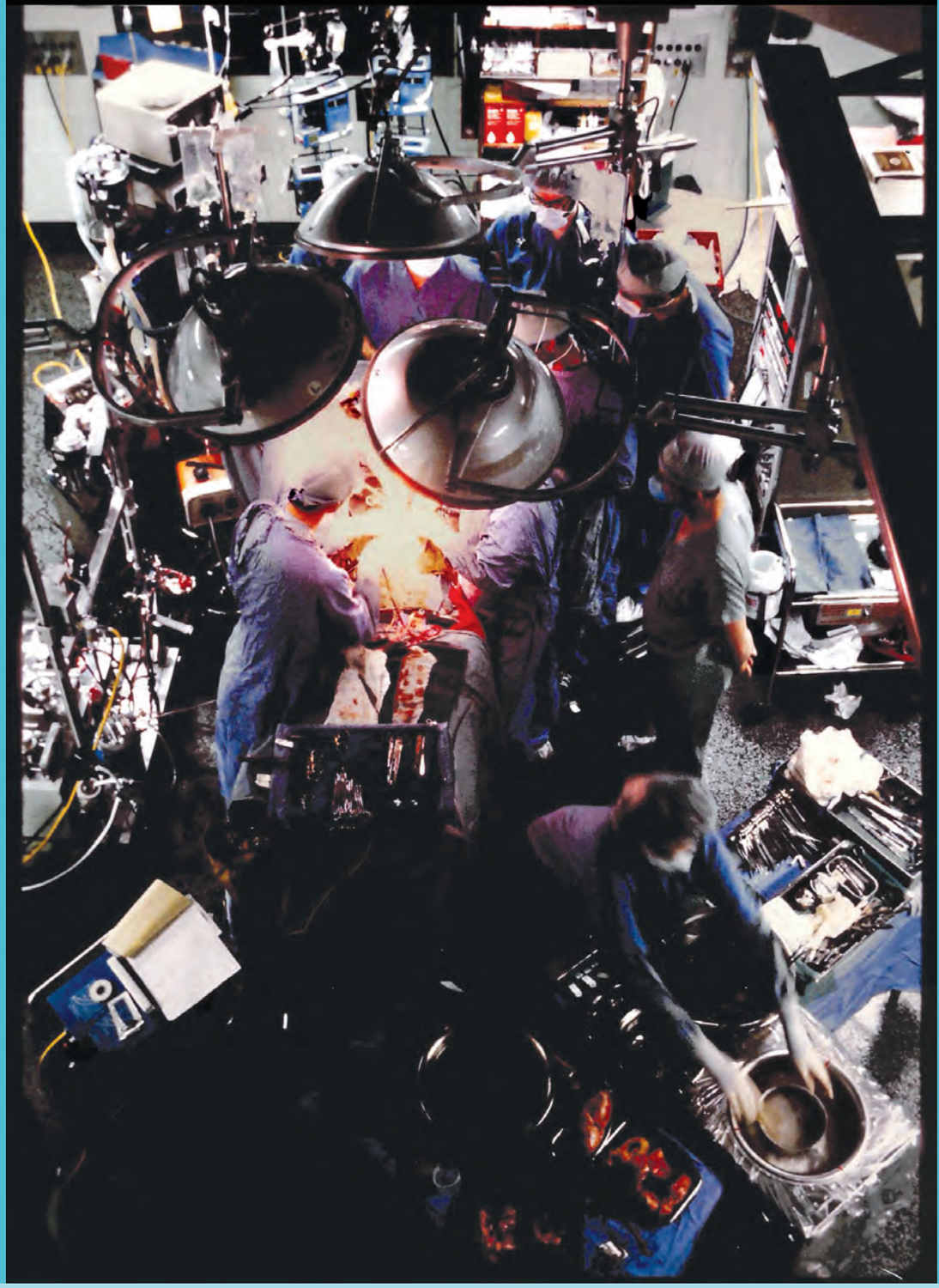
The little girl has a long road ahead. When the treatment begins, it's expected that Kelsey will receive the ASOs through monthly spinal taps for two months. That will then reduce to every three months. Meanwhile, she'll continue with her intensive physical and occupational therapies to make sure she sustains her ongoing progress.

Thomas and his collaborators at Pitt already have their sights set on expanding Pitt's ability to help more PACS1 syndrome patients. He has had conversations with Kathrin Gassei in Pitt's Office of Industry and Economic Partnerships about what it would take to expand the treatment at Pitt to dozens of patients.

"To scale the treatment beyond the first patient, regulatory trials would be needed," Gassei says. "This would require substantial financial support from other nonprofit or for-profit entities."

Approximately 30 million Americans suffer from a rare disease. This is the first of a two-part series on how Pitt researchers and clinicians are helping such patients.

To make a donation in support of PACS1 treatment: Visit givetochildrens.org and mention PACS1 in reference to the gift or email RareCare@chp.edu to learn more.



LEFT: Remembering the early days of transplantation at Pitt and UPMC. The overwhelming need for donor organs led some surgeons and engineers to chart new paths in artificial organ development and cross-species transplants.

Bartley Griffith (Res '81) was the University of Pittsburgh's chief of cardiac surgery and HT Bahnson Professor as well as the founding director in 1992 of what was then called the McGowan Center for Artificial Organ Development; it's now known as the McGowan Institute for Regenerative Medicine. In 2022, at the University of Maryland, he performed the first pig-to-human heart transplant.

Lee Gutkind is a professor emeritus at Pitt, founder of Creative Nonfiction literary magazine and author of numerous books, including "Many Sleepless Nights," which documents the early days of transplantation in Pittsburgh.

BREATHLESS TIMES

A DEARTH OF DONOR ORGANS COMPELLED US TO FIND NEW SOLUTIONS.

BY BARTLEY GRIFFITH WITH LEE GUTKIND

The years I spent at the University of Pittsburgh and UPMC, from 1974 to 2001, were truly remarkable. For much of my career, I've been in pursuit of treatments for disabling breathlessness—through improved heart and lung transplantation, as well as mechanical alternatives—and those early days also happened to be breathless times.

So much of who I am as a surgeon was shaped by my mentors and patients at Pitt. So when I heard recently that the School of Medicine wanted to honor me by naming a Griffith Professorship for the director of the McGowan Institute—a position held today by Chandan Sen, a PhD whose regenerative medicine work is world renowned—it was like being called home. The lessons I learned at Pitt prepared me, many years later, to sit with a dying patient and propose he accept a heart from a pig.

After Cape Town's Christiaan Barnard performed the first human-to-human transplant in 1967, Hank Bahnson, Pitt's chair of surgery, performed one nine months later—on Ben Anolik from Squirrel Hill. My future mentor-in-the-trenches, Bob Hardesty (MD '66, Res '72), then a trainee, was charged with concocting a serum that would knock out Anolik's lymphocytes.

To do so, Hardesty collected thymus gland tissue from Bahnson's pediatric cases. He then drove 13 miles to Bahnson's farm home. Bunkie, Bahnson's white-faced mare that faculty children rode at the yearly departmental picnic, provided the antibodies after Hardesty injected a thymic slurry into its jugular.

This OR-to-barn-to-lab brew was injected into Anolik. He survived 14 months after his heart transplant—longer than most in that overconfident era.

Bahnson was a natural surgeon. As an intern, I watched the master through viewing domes from above his ORs, No. 5 and No. 6. His hands were too large, and his knuckles were knobbed, but they belonged to a magician. I observed bits of his surgeries and struggled to decode their dots and dashes. Only his hands moved. And no one in the room traveled without purpose.

One early case with him remains indelible. Bahnson had operated on a woman with a horribly disfigured heart and a valve that was tangled and obstructing blood flow. Try as he may to repair the heart and separate it from the life-sustaining support of the attached heart-lung machine, he could not. Lacking an alternative, he told the perfusionist manning the machine and anesthesiologist to simply stop.

He exited the magician's stage.

I followed him to the waiting room.

The patient's husband stood up immediately. Bahnson was stone faced, and despite the 10 hours of surgery, he held himself rigidly upright. His long white coat was so starched it seemed it would stand by itself, a hardened impregnable cloak shielding the boss from his failure.

He told the husband flat out, "Your wife has died."

That was it.

No explanation. No apology.

The husband reached up to grab the tall surgeon around the shoulders, instinctively looking for an embrace in this horrible moment. Bahnson stood, hands at his side. The husband slid down his front. Bahnson helped him up and walked him back to his corner of the waiting room. We walked out together, furthering the silence that screamed at us.

I often think of Bahnson's ability to quit in the OR and bury his feelings in the waiting room. Someone told me that surgeons had selective memories. I don't believe that is true. I have learned the daring ones bury the bad memories a little deeper and, while not celebrating, use successes to shake the hands of the next desperate patient. When I completed training, I chose more vulnerable relationships with patients and families. My natural empathy grew as I cared for sufferers of heart and lung failure. Those who could not breathe demanded treatment. The treatments were often experimental, and sometimes they were seat-of-the-pants, why-not trials. There was justice in the attempts because patients were suffering, and my training with surgical pioneers made me inclined to try.

Thomas Starzl's tenacity and stunning surgical and scientific acumen made Pitt the place to come for transplants. By the '80s, the ridiculousness of the ever-increasing numbers of transplant candidates arriving at Presbyterian to fill ICUs in wait for a donor sparked Pittsburgh Post-Gazette cartoonist Rob Rogers to draw patients in hospital beds lined head to foot on the Parkway East.

There weren't enough donor organs, and patients were dying. We thought that artificial hearts, new to humans, could be best used only until donors were found. After a team at the University Medical Center in Tucson in 1985, we were the second to use the Jarvik total artificial heart (TAH) as a temporary bridge until a donor organ was designated. Our group, led by Pitt's Harvey Borovetz, a PhD bioengineer, implanted and managed the air-driven TAH in a cow that we named Hank. (The second one was Mark, for Dr. Ravitch, surgeon in chief at Montefiore.) The animals greeted us by munching hay the following morning.

When Tom Gaidosh arrived at our CCU, the 47-year-old steelworker's heart was failing. Its muscle inexplicably just would not squeeze. Gaidosh was an excellent candidate for a heart transplant except that he was 6'4" and 230 pounds. He needed an SUV-scale, not a compact, donor heart, and the race was on to find one. His condition reached a point at which his kidneys and liver were beginning to fail. I was in Akron when I received a page from the Presbyterian CCU. Gaidosh was terminal. His large size made it likely the Jarvik artificial heart we'd been testing would fit, as it was sized for a cow.

I called Hardesty from Ohio, where I was giving a talk: "Bob, it seems like a go for Gaidosh. Problem is I'm in Akron til morning."

"I'll see what I can do to get you back tonight."

The owner of a corporate jet company personally flew a Lear to collect me that same evening. Gaidosh agreed to have his heart removed and replaced with a plastic and metal one until a donor could be found. I had little evidence it



would be successful as only two other surgeons had used the Jarvik heart.

When asked if he was willing to undergo the experimental procedure, Gaidosh smiled. "Yes, I want to get back to my polka with Dee." Dee was Dolores, his wife. Off we went without extended conversation.

The TAH fit Gaidosh nicely. When the Jarvik heart was sutured into connections, the synthetic substitute looked unworldly.

And when the heart was actuated by the 90-psi pulses of air timed by Borovetz's team of engineers, the mechanical valves sounded like a trotting horse: pluckily, pluckily, pluck . . . repeat. This moment was spellbinding. I had mostly gotten used to the thrill of exchanging a worn heart with a donor. But to do it with one made of plastic was like an Armstrong "giant leap" for me. I wondered if we had an answer for the scarcity of donor hearts. We found a heart for him in four days and escaped lasting complications that had plagued earlier recipients. After his TAH was replaced by a donor heart, Gaidosh left the hospital with a big smile and a T-shirt that said, "the beat goes on."

Gaidosh danced to Bobby Vinton's "Hoop-Dee-Doo Polka" for eight more years before dying from stomach cancer, no doubt related to his immunosuppressive medications. His new human heart never faltered. Ironically, this sweet large man always greeted me as "The Big Guy."

Yet problems mounted with the Jarvik TAH. Blood clots formed on the seals' gaps and connections, causing strokes. The rubbery deep maroon clots would dislodge and flow out with the blood. Infection was not uncommon. Patients generally were stuck in the hospital waiting for a donor with their device's 400-pound control console.

Many of us thought that if the early heart pumps could become smaller and less prone to those issues, that they very well could be an answer for heart failure patients without an option of a donor organ.

Bill McGowan was a patient who taught us less about the care of his heart than of the power of philanthropy when driven by a natural entrepreneur. In 1987, he quietly came to us from his MCI chair offi in D.C. with hopes of receiving an urgent heart transplant.

It was important for McGowan not to reveal his illness. His telephone company was exploding because of a favorable outcome from its lawsuit against Ma Bell that broke the monopoly on long-distance calling.

The air transport delivered him concealed in bedding. He was rolled into our most private room with a heart monitor. Unwrapped, he looked the part of a CEO busted by lifestyle, a chain of smoke and a ticker that had driven him hard but had worn out. His eyes still had a boyish twinkle that relayed a love of life. He was cool to the touch, and grayness had overtaken his skin; but his path ahead was made clear. He would either receive a donor heart in the next few days or Jarvik's artificial one. He wasn't going to survive much longer.

He thanked us. "I'm here because Pitt is the busiest and the best based on my review of your publications. I'm sick and need to get better."

An out-of-town donor organ was offered two days later, and Hardesty took off after it. I watched McGowan get his new heart, but I didn't understand why Hardesty asked us to keep him on an antibiotic for two weeks, well beyond the usual 48 hours. After the VIP was discharged, I asked why.

Hardesty blushed and laughed hard, "During removal of the donor heart, I tripped on a suction tube. As I stumbled, I squeezed it, and the heart flew out of my hands, hit the floor and bounced twice. I picked it up and washed it in iodine prep solution."

"Bob, you dribbled the chairman of MCI's new heart like Meadowlark Lemon, and he chose us as the best?"

Now we were both gut laughing.

McGowan loved hearing the story. He wondered what he could do to help.

I said, "You wanted a telephone system to compete with Bell. Our team wants to build a new turbine-powered heart pump."

We had a growing group of bioengineers under Borovetz's mentorship and a need to formally initiate an artificial organ development effort at Pitt, one that prioritized new startups to promote commercialization. The McGowan Center for Artificial Organ Development was dedicated on May 6, 1992. Bill McGowan and local organizations gave a combined $12 million for a freestanding research and startup hub in a new building for the School of Medicine. The center was also the beneficiary of an annual $1 million commonwealth appropriation.

Research spawned in the center was directly responsible for the development of a new class of heart pumps. The pump was the size of a small avocado; its magnetic motor rotated a turbine at up to 5,000 rotations per minute to propel blood from the heart into the body. The continuously turning impeller did its work, and the patient lacked a pulse. The trick was to design the turbine so it would not turn

LEFT: In 1985, Tom Gaidosh was the second patient ever to receive a Jarvik total artificia heart, which gave him time until a donor heart became available. (Photo: © Pittsburgh Post-Gazette, 2025, all rights reserved. Reprinted with permission.)



Bartley Griffit with Muhammad Mohiuddin; they've developed a cross-species transplantation program at the University of Maryland.

the blood into a useless milkshake. The high point came after years of design and benchwork plus in vivo calf testing. We implanted the device for the first time on July 27, 2000, in a patient at Sheba Hospital in Tel Aviv, Israel.

Since then, these devices have been implanted in more than 15,000 patients, with many reports of more than a decade of survival. All heart pumps today rely on fast-spinning turbines. Patients with pumps survive about three years, as do those with transplants (84% versus 87%). It makes me hopeful for what science from McGowan might continue to do.

On Dec. 3, 1987, I joined Christiaan Barnard and Rob Jarvik on ABC's "Good Morning America."

Host Joan Lunden began by welcoming us, noting we were celebrating Barnard's "world-stopping first heart transplant 20 years ago."

Lunden: "The tremendous recent success of the transplant operation fueled by new medicines has caused another problem. What should be done about insufficient donor hearts?"

Barnard: "I think we will have to move on to even better methods of combating rejection so that we can move on to the use of animal hearts.

". . . Animal hearts will be used initially as bridging devices, and eventually as a permanent replacement."

There it was. I did not consider cross-species transplantation prospects very favorable because human-to-human outcomes were still modest. But I thought, "Here is the surgeon that first tried human hearts thinking animal organs will be the answer." I filed the opinion, preferring the immediacy of promising mechanical hearts.

Between 1992 and 1993, Starzl reawakened the possibility of animal organs for transplant by performing baboon xeno-liver transplants in two patients with hepatitis. Both patients died—one at 26 days, the other at 70. He continued to see the potential for animal organs that could be available on demand. The cloned Dolly the sheep convinced him animals could be bred so their organs would be safe in humans, and he recruited investors, including UPMC, to fund Revivicor, a startup founded by Dolly's team, to engineer pigs for transplanted organs.

I would not have guessed that 30 years after Starzl's baboon attempts at Presbyterian I would be the first to test an engineered pig organ in a dying man.

Good fortune followed me in 2001 to the University of Maryland in Baltimore, where I was lucky to attract Jon Wu, a PhD bioengineer from the McGowan team. We picked up where we left off. As the turbine heart became our Pitt signature, our development of and sale of an artificial lung remains the highlight of the artificial organ lab at Maryland.

In the last eight years, we've focused on gene-altered pig-heart transplantation. Transplant surgeon Muhammad Mohiuddin joined us from the National Institutes of Health with his research group that had logged 20 years in cross-species transplantation studies. We qualified the work with the FDA for a first experimental pig heart to a patient in 2022 and another in 2023.

I approached the first patient hoping he would not ask me what kind of animal's heart we intended to use. Dave Bennett was, in ICU parlance, beyond due for his death. Heart failure left him scarecrow thin, bed bound and connected to extracorporeal membrane oxygenation for more than a month. During the short walk from the lab to his side in the ICU, I practiced what I would tell him. His room was a spiderweb connecting him to machines and tubing. I pulled up a small stool near him. Though I was below his level when I sat, I felt like a judge about to deliver a death sentence from on high.

I forgot my measured lines.

I just let the bad news out. "Dave, the transplant group denies your candidacy for the heart transplant you need." His eyes turned and locked on mine. They penetrated my last hope to remain hopeful for him. I saw their early yellowing that suggested blood backup in his liver. His bearing dropped with a shoulder sag and head bob.

Neither of us could escape the moment. "There is no chance you will leave this unit."

His head bobbed again.

"Unless—there is the chance you can receive the heart from an animal. Our team has been working on this for years, and we have reached enough success in the lab that we propose the experimental transplant for you."

The bobbing ceased, "Doc, are you sure I cannot receive a human heart?"

"Sorry Dave, I'm sure."

He immediately recomposed himself. Out came, "What kind of animal?"

"A pig."

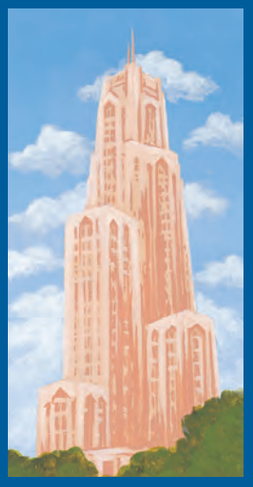
"Will I oink?"

I view all organ donors' wish to give their organs "upon their brain's death to another person" as a remarkable act. Our pig heart recipients doubled down on such altruism. Both loved life, yet they gifted their bodies before death. And they died hoping we could learn from them.

They, like the patients we treated at Presbyterian, made the impossible possible.

Altogether they survived for 100 days. Much of that time, the gene-edited pig hearts pumped beautifully. The extra days were meaningful for recipients and their families. We have learned a great deal, which we hope will be used to extend the lives of other brave patients soon. They, like the patients we treated at Presbyterian, made the impossible possible. ■

To read more about Griffith' breathless times as a trainee and surgeon at Pitt, see pi.tt/breathless.





Katz



Ragni



Griffin



Lim

CLASS NOTES

'60s

David Katz (MD '61, Obstetrics and Gynecology Resident '65) trained and spent much of his career at UPMC Magee-Womens Hospital during a time of major advancements in the field. For instance, he and his fellow residents would wheel patients into Magee's auditorium to use one of the first ultrasound machines. In 1969, Katz, in collaboration with Saul Berg (Obstetrics and Gynecology Resident '70), initiated the first laparoscopic surgical program in Pittsburgh. Katz later taught as a clinical professor of ob/gyn and reproductive sciences at Pitt.

Even after officiall retiring, Katz, whose father also was a Pitt Med alumnus and ob/gyn, continued providing primary gynecological care at Alma Illery Medical Center, a charitable community health center in Homewood. He later worked in pharmaceutical research before retiring for good. He currently resides in an independent living senior community where he enjoys local Pittsburgh trips, bridge and other activities with friends.

'70s

When **Margaret Ragni** (MD '75) was a girl, several of her family members died young from blood clots. "I distinctly remember thinking, 'What caused this, and how can we prevent this problem?'" she told a writer for the Pitt Vitals newsletter recently. Those life experiences and her interest in science and medicine led her to apply to the School of Medicine in the early 1970s. "I was interested in research, but specifically how it related to patients. But clinical research wasn't even considered a science then," she added.

Ragni has since conducted numerous trials of novel drugs and gene therapies for people with bleeding and clotting disorders. And she has served many roles at the University, including director of the Hemophilia Center of Western Pennsylvania, director of the Medicine, Ethics and Society course, professor of medicine and clinical and translational research and now professor emeritus.

She looks forward to seeing classmates at their 50th reunion this fall: "It is important to recognize how important this time was in our lives and what we were able to do for others because of our training here."

'10s

The first time **Marilyn Gri** (Triple Board Resident: Pediatrics, Psychiatry and Child Psychiatry '11) was featured in the Chicago Defender, she was in high school. This March, the same paper honored her as one of the 2025 Chicago Defender Women of Excellence. The awards celebrate African American women in Chicago who inspire others through their accomplishments and influence. Today, Griffin an MD and native Chicagoan, is the chief psychiatrist and senior behavioral health medical director for Aetna Better Health of Illinois. She was also recently honored at the annual gala of Educating Our Community, a nonprofit that supports young adults in areas that include mental health, financial literacy and vocational support.

On July 1, **Grace Lim**, an MD (MS '16), became president of the Society for Obstetric Anesthesia and Perinatology, a position she will hold for three years and use to set the strategic direction for the society to advance maternal and infant safety. A Pitt professor of anesthesiology and perioperative medicine, who is an obstetric anesthesiologist and physician-scientist, Lim focuses much of her research on maternal and neonatal health by creating strategies for, among other things, using opioid alternatives for pain management.

As of fall 2024, **Ruchika Vij** (MD '15) is one of Pittsburgh Magazine's 40 Under 40, recognizing her as one of the city's young leaders. Vij is an attending obstetrician and gynecologist for Allegheny Health Network and a physician at Planned Parenthood of Western Pennsylvania. Her motivation for her work—divided between resident education, inpatient deliveries and procedures and outpatient clinic hours—draws from her conviction that "knowledge is life-changing." "Ensuring that women have the knowledge to make the decisions that are right for them inspires me on a daily basis."



Vij

'20s

While the percentage of cardiothoracic surgeons who are women is relatively small overall—about 10% in the United States—**Kyla Joubert**, an MD (Cardiothoracic Surgery Resident '23), MPH, finds herself working with three other female cardiothoracic surgeons at IU Health University Hospital. "I've managed to land in a really positive position," she says. Yet Joubert says she never felt like an outlier in the field, especially during her training in Pittsburgh, where she estimates half of those in her residency class were women.



Joubert

Joubert trained extensively at Pitt Med in robotic surgery. "When I was hired at [IU], I came in primarily as a robotic thoracic surgeon," she says.

Joubert also earned her MPH here. And Pitt Med is where she met her husband, neurosurgeon Matthew Peace (Neurological Surgery Resident '22). *—Keightley Amen, Michael Aubele, Livia Daggett, Rachel Mennies*

SPOTLIGHT

SANSOSTI RESPONDS TO MIGRANT NEEDS IN ITALY





LEFT: Sansosti (center) enjoys downtime with colleagues. BOTTOM: Migrants arrive in Lampedusa after a harrowing journey.

PHOTOS COURTESY A. SANSOSTI

March 13, 2020: Then-med student **Alexandra Sansosti** (MD '20) returns to Pittsburgh from a clinical rotation at the Mediterranean Institute for Transplantation and Highly Specialized Therapies (ISMETT) in Palermo, Italy.

March 15, 2020: The United States begins shutting down in response to the COVID-19 pandemic.

March 20, 2020: The University of Pittsburgh School of Medicine, like many other schools across the nation, holds Match Day virtually.

April 26, 2020: Pitt holds Diploma Day virtually.

And with that, Sansosti says goodbye to Pitt Med and moves to New York City to start her residency, "really without any fanfare," she says. She's now a fourth-year general surgery resident at NewYork-Presbyterian/Columbia University Irving Medical Center.

With few opportunities to socialize, Sansosti had time on her hands to reflect on her experience in Italy—the people she met and the stories they told.

One of her Palermo friends would recount watching migrant boats from Africa come ashore in southern Sicily when he was a kid. The boats arrived carrying people who endured the harrowing trip of more than 110 nautical miles across the Mediterranean Sea.

The migrant crisis is even worse on Lampedusa, an Italian island between Sicily and Tunisia, and Sansosti says the stories she heard about circumstances there tugged at her heartstrings: "Lampedusa is a tourist destination for Sicilians. And yet there's this massive humanitarian crisis that they live with day in and day out. I kept going back to this idea of, What is this place like, and how do they manage this from a medical standpoint?"

When it came time for her research year, Sansosti received a Fulbright scholarship to establish a project on Lampedusa. She set down roots in Florence first, landing in October 2023 and ultimately arrived in Lampedusa in March 2024.

Sansosti reviewed the triage and emergency care of obstetric patients on the island, including the number of helicopter flight needed to take women with pregnancy emergencies to the mainland. She also tracked statistics of patients of all types who needed emergency care.

About 10% of the migrants who arrive at Lampedusa are women, and about 10% of those arrive pregnant, Sansosti says.

For years, there was no dedicated obstetric unit on the island. So, in a case in which the mother feared the baby wasn't moving, an emergency helicopter would be dispatched to get her to Palermo.

"What [the Italian government did] was say, 'OK, this is a massive waste of resources. We're going to staff the island with either an obstetrician or a gynecologist. We're also going to buy a camper van, and we're going to turn it into a little obstetric exam room, and we're going to get an ultrasound, and we're going to get a speculum, and we're going to get all the necessary materials that we need,'" Sansosti says.

After establishing the clinic, two babies were delivered on the island, which hadn't happened in years because of the risk, Sansosti says.

"What my project looked at was, OK, we instituted protocols—are they working? We looked at the number of helicopter flights that were used to take pregnant women off the island . . . and now we have some actual data points that show us, OK, providing more access, providing more resources on the island has made a huge difference.

She has a paper under review on the project.

"Now we have an ongoing data collection—we have a mechanism that is being updated by the obstetricians every month, and so hopefully we'll be able to publish an update that has more long-term data that shows this effect is sustained over time." *—Michael Aubele*



GETTY IMAGES/CAMPWILLOWLAKE

Can you answer these without going online?

(We encourage you to call doctors-in-the-know for consults.)

1. A stretch of Lothrop Street was named Thomas E. Starzl Way in 2007 after the famed Pitt Med liver transplant pioneer. But who is Lothrop Street as a whole named after?

A. Daniel Lothrop, a prominent American publisher

B. Sylvanus Lothrop, an engineer who constructed many Pittsburgh bridges

C. It's unclear who the street is named after.

2. True or false: The UPMC Presbyterian tower, construction of which began in 2022, is 17 stories and 900,000 square feet.

3. What is the average number of papers that Pitt Med graduate students author while earning their PhD?

A. Five, with two of those being first author publications

B. Three, with one of those being a first author publication

C. Eight, with two of those being first author publications

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.

LEGACY OF PROVIDERS WHO RESEARCH

Thomas Radomski, an MD (Res '13, Fel '16, MS '16), was an attending physician beginning a master's degree in clinical research at Pitt Med when he plunged into a qualitative research project on opioid prescription policies for military veterans.

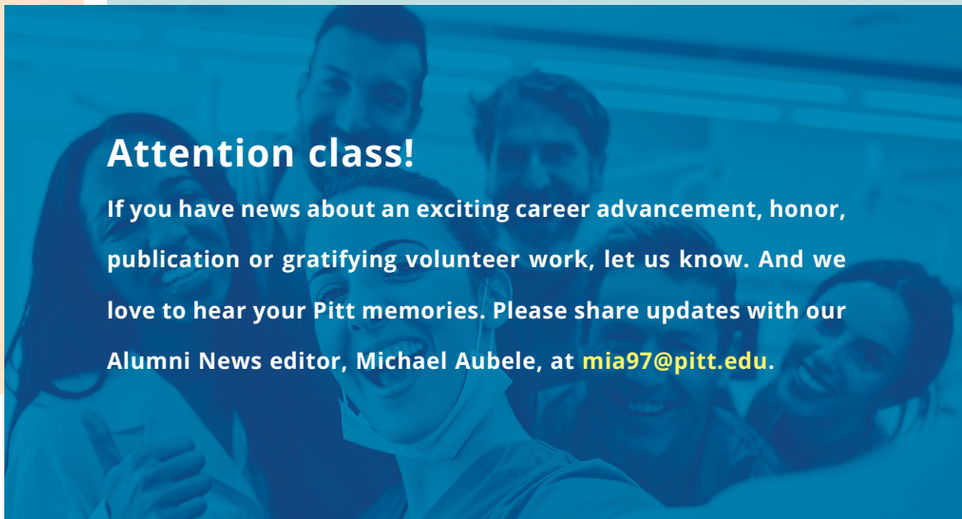
His mentor, Walid Gellad, an MD, MPH professor of medicine, didn't typically conduct qualitative research. But Radomski wanted a richer, more descriptive interpretation of prescription practices and policies than what the numerical data could provide. Radomski felt he could handle the qualitative portion of Gellad's grant if he enrolled in a qualitative research course with Pitt's Institute for Clinical Research Education (ICRE), where students are invited to bring projects from their clinical practices.

"Every week, I learned something that made my actual research better," Radomski says. "I was able to get feedback from other experts that even enhanced what we had in the grant."

The research, which involved interviews with VA physicians in three states, led to increased transparency on whether veterans were receiving opioid prescriptions from both VA and non-VA facilities. Radomski built on that research when he later took ICRE's flagship course in advanced grant writing and wrote a proposal that was awarded, laying the foundation for his own clinical research career centering on reducing health service overuse with patient-centered strategies.

Now a Pitt associate professor of medicine and of clinical and translational science as well as associate director of ICRE, Radomski oversees the programs that have made the institute a national standout. It's been a destination for multidisciplinary training in clinical research and teaching since it was seeded 25 years ago with a small training grant awarded to founder Wishwa Kapoor, an MD, MPH and vice chair of the Department of Medicine.

"In the beginning we were unique," says Doris Rubio, a PhD, the ICRE director and professor of medicine who has served the institute since 2002. "No other place in the country had anything like this. Still today, the size and scope of what



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.



Rubio (right) and Radomski have worked with prominent ICRE alumni.

NATALIE VAZQUEZ/UNIVERSITY OF PITTSBURGH

we do are unmatched by any institution." As they celebrate the institute's 25th year, they note that 1,715 people have graduated from the center's degree and other programs (with many repeat customers).

Rubio and Radomski say the institute has built a well-regarded body of scholarship on the teaching of clinical research, and it soon will offer a PhD in health professions education as well as an undergraduate certificate in clinical research in partnership with Pitt's School of Public Health and the Community College of Allegheny County.

Radomski, who received the 2023 Distinguished Alumnus Award in Clinical Research, says the ICRE has elevated dozens of fellow ICRE alumni to leadership roles in academic medicine and clinical research nationwide. Among them:

Esa Davis, an MD, MPH—the senior associate dean for population and community medicine at the University of Maryland and vice chair of the U.S. Preventive Services Task Force was an ICRE K scholar. (K scholars get funding, mentorship and training to help them become independent researchers and attract future funding.)

Julie Donohue, a PhD—a K scholar who is now the chair of health policy and management in Pitt's School of Public Health and deputy editor of JAMA Health Forum.

Jason Sperry, an MD, MPH—a K scholar who is Pitt's Andrew B. Peitzman Professor of Surgery and principal investigator of several Department of Defense studies.

"We've had many success stories of trainees who have really advanced in their careers both at Pitt and beyond," Rubio says. *—Cara Masset*



Davis



Donohue



Sperry

MENTORS NEEDED!

The Help Our Students Thrive (HOST) program connects alumni with students who are looking for guidance and support as they plan the next chapter of their lives. You can support the students through virtual or in-person mentoring sessions, cover letter and resume reviews and travel accommodations for residency interviews. Our students are as passionate and motivated as ever. Your support can give them a leg up to realize their full potential.

WILLIAM HOWARD MARKLE

APRIL 11, 1947 – MAY 13, 2025

When an explosive construction mishap damaged the 9th Street Clinic in McKeesport, Pennsylvania, during off hours in 2022, Bill Markle was on the front line, working with first responders to save valuable medical equipment. Markle, an MD and former Pitt Med clinical associate professor of family medicine, stepped up not only because he cofounded the free clinic, but because it was in his nature to serve anytime help was needed.



Markle

He died in May at 78 of pancreatic cancer.

"Whenever there was a crisis, Bill was at the helm," says Tracey Conti, an MD and former chair of the Department of Family Medicine at the University of Pittsburgh, who recalls Markle's humanitarian trips to Haiti and other countries in the aftermath of earthquakes and other disasters. "He was the epitome of the servant leader, both domestically and abroad."

Markle earned his MD from Penn State University and a degree in tropical medicine and hygiene from Mahidol University in Thailand Early in his career, he served in the National Health Service Corps and helped found the Mannboro Medical Center, a rural family medicine practice in Virginia. He also held a post as a medical coordinator in Indonesia.

Markle landed in Pittsburgh in the 1990s. In 2001, he helped establish the Shoulder to Shoulder Pittsburgh chapter, an ongoing medical and civic mission linking Pittsburgh and San Jose, Honduras. Cofounder Mark Meyer, an MD and Pitt assistant professor of family medicine, says Markle was extraordinarily bright with a remarkable memory. "He was the guy who read the tropical medical text once and could tell you the four lifeforms of a subform of a parasite," Meyer says. He also coedited the textbook "Understanding Global Health."

Markle was also humble and unassuming with an adventurous spirit, Meyer says, recalling how easily he hopped bareback onto a horse during their first trip to Honduras.

Markle was the program director of the family medicine residency at UPMC McKeesport until he transitioned the role to Conti. "He's been a role model for me since my first day at the University," she says. She credits him with infusing a culture of compassion into the McKeesport program, where she saw medicine practiced how she had always envisioned it.

In the clinic or at monthly team dinners, Markle always genuinely inquired about everyone's families, Conti says, and he was proud of his own. He and his wife, Mary Markle, a Pitt BSN alum, raised four children. They regularly volunteered on medical missions during their 55 years of marriage. Together, they received the 2014 Physician Volunteer Award from the Allegheny County Medical Society Foundation.

The Markles will support globally minded health care providers for generations. A fund they established at the School of Medicine sponsors international students visiting Pittsburgh for clinical rotations, as well as Pitt Med students studying and serving abroad.

—Cara Masset

IN MEMORIAM

'50s

MORTON GOLDSTEIN, MD '57
JUNE 14, 2025

'60s

WILLIAM TIEGEL, MD '65
AUG. 4, 2025

RONALD L. ZIMMERMAN, MD '62
JUNE 16, 2025

'70s

CARL L. STANITSKI, MD, RES '74
JULY 6, 2025

'80s

LARRY DOBKIN, MD '80
AUG. 18, 2025

PATRICK KANE III, MD '86, RES '92
JUNE 27, 2025

'20s

ERICA HAMPTON, MD '22
APRIL 9, 2025

FACULTY

WILLIAM MARKLE, MD
MAY 13, 2025

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

BETH PIRAINO EMOTIONAL GOODBYES

BY MICHAEL AUBELE



TOM ALTANY/UNIVERSITY OF PITTSBURGH

Piraino, esteemed nephrologist and former associate dean for admissions, shares poignant stories in retirement.

Beth Piraino, a nephrologist who practiced for 40 years and served as Pitt Med's associate dean for admissions and financia aid for 20, reflects on her career through memoir writing.

Much of the free time she acquired in her retirement—she retired from her role as associate dean in summer 2025 and from clinical practice in 2022—she spends chronicling her years as a physician to patients with kidney disease and as caregiver to a son with serious health issues that shortened his life.

"Oh gosh," Piraino, an MD (Res '80, Fel '82), says of her career as a physician, "it was my love." She describes nephrology as "an intense form of internal medicine" she gravitated to because kidney disease often affects other organs and requires "detective-like" skills to diagnose and treat.

She conducted extensive clinical research, establishing herself as an international expert in peritoneal dialysis, which collects waste from the blood by washing empty space in the abdomen. She's widely sought as a speaker at conferences across the globe.

She also formed extremely close relationships with her patients. Heather Halper, a former nurse and a transplant recipient, is one of those. Piraino helped return her to good kidney function after Halper first went to see her in 1989 for treatment for vesicoureteral reflux, a condition where urine fl ws backward through the urethra.

"I grew to really like her," says Halper, who was 17 and transitioning out of care at UPMC Children's Hospital of Pittsburgh at the time. "I had this profound trust . . . this feeling she really had my back. I knew that as long as she was around that I'd be OK."

After her kidney transplant in 2002, Halper decided she wanted to have a baby and sought Piraino's advice. Piraino told her it was safe, which was as much confidence as Halper needed. In 2004, she delivered her daughter Rayna Beth Halper—her middle name honors Piraino.

But because kidney disease is an awful illness—it's among the top 10 deadliest diseases in the United States—Piraino treated many patients who suffe ed greatly; those experiences had a profound impact. She tells the story about a young woman who became extremely sick—among her most enduring memories from her years in practice.

It happened more than 15 years ago, but Piraino relays the circumstances as if they played out recently, telling the story with a level of sobriety you might expect from someone who watched a close friend struggle. Th young woman endured renal failure. Piraino recalls, "She had a wonderful mother, but I was almost like a mentor to her. She was very successful and had so much going for her, but her life was cut short.

"It was heartbreaking."

These were times of profound heartache for Piraino. Her son, Matthew, died in 2009 at 28 years old after a lifelong struggle with common variable immunodeficiency and congenital heart disease.

"I had this very unusual perspective," she says, "of being a physician who saw a lot of very ill people and then having my son."

She describes the process of writing the book about her experience as cathartic but says she has no immediate plans to publish it. It might be a story she shows family and friends and ultimately leaves with her daughter, Lisa Solinsky, who can decide if she wants to publish it after her mother and father are gone.

In honor of Matthew, Piraino established an endowment to fund an infectious disease award, which is given to two or three graduating students each year.

Most graduates from this century would know Piraino from when they applied to Pitt Med. She joined the admissions team in 2003 as assistant dean, advancing to associate dean in 2005, helping to bring in thousands of students who are now physicians.

Piraino's work in admissions has evolved over the past two decades along with the goals of the School of Medicine, building on its traditional mission of training excellent physicians to building the medical school into a research powerhouse, while finding students motivated to pursue bench-to-bedside work to get new treatments to patients.

Despite the evolution, one thing has remained constant, says Piraino, and that's the quality of the students she's had a hand in admitting and mentoring. "The type of student that has applied and that we have interviewed and accepted really has changed over the years," she says. "But they were strong before and are still strong."

Among them is Alexandra Bursic (MD '18), assistant professor of medicine in the Division of Renal-Electrolyte, who describes Piraino as "such a tremendous mentor who is incredibly humble and down to earth."

Bursic, also a nephrologist, says she got to know Piraino during her first year at Pitt Med while Piraino served as the preceptor for her clinical experiences course.

Bursic has long admired Piraino's contributions to nephrology: "She has a tremendous international reputation and is so deserving of all the recognition she's received." More than that, Bursic says she admires her dedication: "She's been following some of her patients for 30 years, walking with them through their journey. Just knowing she treated those patients across the course of their lifespan has been inspiring."



GETTY IMAGES

Why can't we remember being babies?

FOR REAL! TWEEN SCIENCE



Try to picture your first birthday party. Maybe you've seen photos—cake o your face, pointy hats, people smiling all around you. But can you actually remember being there? Probably not. And you're not alone. Most people can't recall anything from their very first years. Scientists call this strang brain blank spot "infantile amnesia."

But why does it happen?

One part of your brain that helps prepare memories—the hippocampus—wasn't fully developed yet. Your brain didn't have the tools to process your experiences clearly and get them ready for long-term storage. You can think of it like a new library, where the librarian isn't trained yet, and the system for cataloging hasn't been set up. The library might have some books, but without a system in place to sort and send them to the right shelves, they're easy to misplace.

Language plays a big role, too. Words give your brain the labels it needs to make sense of experiences and decide where to store them in another part of the brain called the cortex. Without words like "puppy" or "slide," it's harder for your brain to tag your memories of your childhood dog or a day at the park and figure out where they go. It's like you'v filed a book away in the library without knowing the title—it might be on a shelf, but di - ficult to find late

Most people's first solid memories don't stick until around age 3 or 4, when the libra - ian is trained, the shelves are ready, and new books are correctly labeled. As you age out of babyhood, a big reorganization called "synaptic pruning" makes the "library" work faster and more efficiently, though some early unlabeled books may get lost along the wa

So if you flip through baby pictures and wonder, "Why don't I remember this?"—jus know: You didn't forget. Your brain was still figuring out how to organize its growin catalog. —*Samri Samuel*

Special thanks to Peter Strick, a PhD and the Dr. Thomas Detre Professor and Chair of Neurobiology, for his help with this trip down lack-of-memory lane.

CALENDAR

ASCENDING STAR AWARD LECTURE SERIES
OCT. 3—ALISON KOHAN, PHD
OCT. 23—ZACHARY FREYBERG, MD, PHD
NOV. 7—WILLIAM EVANS, PHD
pi.tt/2025-ascending

SENIOR VICE CHANCELLOR'S RESEARCH SEMINAR
OCT. 17—TERA LEVIN, PHD
NOV. 14—HATICE ULKU OSMANBEYOGLU, PHD
NOV. 21—PAULA POWE, MD
DEC. 12—LU TANG, PHD
pi.tt/2025-SVC-Lectures

VANSCOY WINTER ACADEMY
FEB. 6, 2026
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 36)*

Answers:

1. B—Sylvanus Lothrop, an engineer who constructed many Pittsburgh bridges
2. True
3. A—Five, with two of those being firs author publications

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From left: Max Quinlin, Ann (Quinlin) Davis, Robert Quinlin, Elizabeth Sagan Quinlin, Kate (Quinlin) Brown and Molly (Quinlin) O'Brien. (Photo courtesy Kate Brown)

Purposeful. Powerful.

A first-of-its-ki d endowed professorship at the University of Pittsburgh has been named after a first-of- er-kind urologist—Elizabeth Sagan Quinlin (MD '79, Res '84).

"I'm really just starting to understand just how remarkable she truly was, and not just to me, but to so many others. And that alone makes me feel like she should be honored," Max Quinlin says about his mother, a pioneering urologist and Pitt Med alum who died Jan. 31, 2025. Quinlin and his three siblings, all adults, decided one way to honor their mother's legacy was to establish the Elizabeth R. Sagan, MD, Chair of Female Urology—the first of its kind in western Pennsylvania and one of the few in the world dedicated to female urology.

In the early 1980s, Sagan became the first woman urologist in the region. (As recently as 2023, just 11.8% of U.S. urologists were women.) She was the first to specialize in female urology here and in 1990 opened a urology practice that treated women exclusively, another first in the region. She taught Pitt Med obstetrics and gynecology residents, as well as urology residents, and did it so well that she twice won the ob/gyn teaching award, even though she was a urologist.

"When talking with my mom's close colleagues and friends who worked at [UPMC Magee-Womens Hospital] they emphasized to us what a huge loss there was once my mom did retire," says Sagan's daughter Kate Brown.

"And even when my mom wasn't working, she still would meet with differe t doctors, and she still kept up a lot of these relationships so that her presence was still felt in the halls of Magee to some degree.

"But after her passing, we really learned even more about this huge void in female health care, in female urology, specifically in the greater Pittsburgh area."

The endowed chair, which hasn't been awarded yet, will transform the field by building a comprehensive program in women's health. It will shape future generations of urologists who can advance diagnosis and treatment of urological conditions in women, such as urinary tract and bladder infections, overactive bladder, vaginal and pelvic prolapse and interstitial cystitis, a long-term infla - mation of the bladder wall.

Urological conditions in women are significa tly underdiagnosed and undertreated. Reasons include women's reluctance to talk about sensitive issues and a shortage of urologists, particularly those who specialize in conditions affecting women. More than 60% of U.S. counties lack a practicing urologist.

"This endowed chair . . . will continue Dr. Sagan's legacy by addressing the unique urological needs of women and the critical shortage of specialists in this area," says Quoc-Dien Trinh, chair of Pitt's Department of Urology, who holds the Dr. Frederic N. Schwentker Fund Chair in Urological Surgery.

To donate: giveto.pitt.edu/femaleurology
Or call Deidre Lesesne: +1-412-482-4334