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SPRING/
SUMMER
2020

ART WITH AN IMPACT

A creative partnership
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One man's fight for survival
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Putting an end to harsh
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HOPKINS MEDICINE

THE X FACTOR

Could advances
surrounding a
newly discovered
"X cell" hold the
clue to preventing
type 1 diabetes
from taking
hold in the first
place? / p. 30





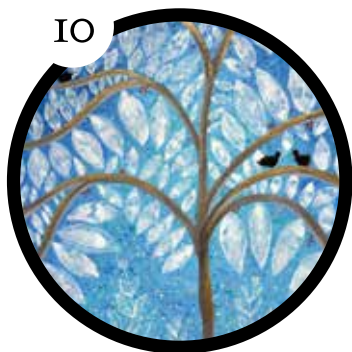
FLYOVER SALUTE

The iconic Johns Hopkins Dome served as a fitting backdrop for a May 2 flyover by the U.S. Air Force Thunderbirds and U.S. Navy Blue Angels — part of a Maryland-wide Healthcare Heroes Day tribute to front-line staff members in response to COVID-19. Read more about how Johns Hopkins faculty and staff members, researchers, and students have responded to the global pandemic in our special report, beginning on p. 3.

Photo by Loraine Imwold

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Student works bring a spirit of well-being to a local physician practice, thanks to a creative collaboration with the Maryland Institute College of Art.
By Linell Smith



- 18 Hanging Tough**
One night last fall, Pierre Gibbons ran into a burning building to help a neighbor — and emerged with severe burns and very slim odds for survival. To give Gibbons a fighting chance, specialists at the Johns Hopkins Burn Center tried a one-two punch they'd never used before.
By Jim Duffy



- 26 No Bullies Allowed**
In academic medicine, harsh treatment of medical students and trainees has too often gone ignored or excused. That culture is now changing, both at the national level and at Johns Hopkins, where new efforts are aimed at preventing — and addressing — mistreatment, harassment and discrimination. *By Karen Nitkin*



- 30 The X Factor**
Could advances surrounding a newly discovered “X cell” hold the clue to preventing type 1 diabetes from taking hold in the first place? That's the hope of a team of Johns Hopkins scientists whose arduous bench-side journey might be close to paying off. *By David Glenn*



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By Dean/CEO Paul Rothman

*Cover illustration
by Michael Glenwood*

THANK YOU, JOHNS HOPKINS HEALTH CARE HEROES

A staff appreciation gallery, created as part of the Extraordinary People, Extraordinary Moments campaign, includes portraits of front-line Johns Hopkins health care providers, a kudoboard with posts of appreciation and a video in which Johns Hopkins Medicine employees share their experiences during the COVID-19 crisis. View it at: [Bit.ly/JHMHeroes](https://bit.ly/JHMHeroes).

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Special Report

Courage in the Face of COVID-19

We were close to finalizing the feature stories in this issue of *Hopkins Medicine* magazine when our world — seemingly overnight — was turned upside down by COVID-19, the global pandemic that has shut down countries; caused untold anxiety, suffering and death; and put health care workers on the front lines of a grueling, life-and-death battle that could stretch on for months. In the special section that follows, a late-breaking supplement to the other content in this issue that had been completed pre-pandemic, you'll read about just some of the ways that people at Johns Hopkins Medicine are rising to the unprecedented challenges posed by COVID-19: in the lab, at the bedside and in the community.

Sue De Pasquale, *Editor*

‘A Beautiful Thing to Be Involved In’

In mid-March, Johns Hopkins launched a massive and ambitious initiative to repurpose research facilities and allocate new financial resources to projects that will advance understanding of COVID-19, prevent its spread and care for the sick.

“This is a university that lives and breathes research; optimizing and maximizing research is in the very fiber of our being,” says **DENIS WIRTZ**, vice provost for research at Johns Hopkins. “There are very few universities that can contribute on this scale to addressing the immediate needs of the global community. It’s a beautiful thing to be involved in.”

To date, \$6 million in university funding has been redirected to support roughly 260 scientists and researchers working on 25 projects grouped under five complementary interdisciplinary themes: understanding the virus, understanding and mitigating transmission, understanding the effects of COVID-19 on patients, helping patients recover, and developing new ways to protect health care workers and solve supply chain issues.

The COVID-19 Research Response Program is focused on supporting high-impact, foundational projects that provide the framework and resources — including data, assays and samples — necessary to enable further COVID-19 research at The Johns Hopkins University. The groups will share initial reports and relevant instructions for accessing shared resources in May.

“The focus of these projects is on immediate impact,” Wirtz says. “Are we thinking about long-term solutions? Of course. But our main concern is on immediately improving the health of patients, health care workers and our global community.”

SARALYN CRUICKSHANK, HOPKINS HUB

READ MORE about the COVID-19 Research Response Program: [Bit.ly/JHMCovid19Research](https://bit.ly/JHMCovid19Research)



KEITH WELLEN

Gearing Up for a Surge

ENGINEERS, CARPENTERS, PAINTERS AND OTHER FACILITIES workers throughout the Johns Hopkins Health System worked at a frenetic pace to prepare Johns Hopkins hospitals for COVID-19 patients throughout early spring.

They added ductwork and high-efficiency particulate air filters to convert regular patient rooms to ones with negative air pressure suitable for patients with the highly infectious coronavirus. They built anterooms where clinicians can safely don and doff their protective gear before treating patients diagnosed with COVID-19. They set up tents for COVID-19 testing and put up signs telling people which entrance doors are locked.

Because of such efforts, by late April, The Johns Hopkins Hospital was on track to add negative pressure capability to as many as 800 adult and pediatric patient beds, says **GREGORY BOVA**, senior engineering project manager for the health system. The other Maryland and Washington hospitals — Suburban Hospital, Sibley Memorial Hospital, Howard County General Hospital and Johns Hopkins Bayview Medical Center — added more than 200 COVID-19 rooms between them.

When the coronavirus crisis ebbs, the modifications will remain, allowing hospitals to switch room pressure as needed. The anterooms will stay as well, says Bova. But there will be a key difference: “We’ll open the doors so people can easily go in and out.” **KAREN NITKIN**



PROMISE IN PLASMA?

WITH A VACCINE FOR COVID-19 STILL A LONG WAY FROM BEING realized (see p. 9), Johns Hopkins immunologist **ARTURO CASADEVALL** is working to revive a century-old blood-derived treatment for use in the United States in hopes of slowing the spread of the disease.

The technique uses antibodies from the blood plasma or serum of people who have recovered from COVID-19 infection to boost the immunity of newly infected patients and those at risk of contracting the disease. These antibodies contained in the blood's serum have the ability to bind to and neutralize SARS-CoV-2, the virus that causes COVID-19.

"Deployment of this option requires no research or development. It could be deployed within a couple of weeks since it relies on standard blood-banking practices," says Casadevall, who published a paper on the proposal — "maybe the most important paper of my life," he says — on March 13 in *The Journal of Clinical Investigation*.

On March 24, the U.S. Food and Drug Administration (FDA) began allowing researchers to request emergency authorization for its use. Within three days, hospitals in Houston and New York City started treatments, and now under an FDA "expanded access program," soon "a very large number" of U.S. hospitals will follow suit, says pathologist **AARON TOBIAN**, director of the Division of Transfusion Medicine at The Johns Hopkins Hospital.

At Johns Hopkins, the FDA has paved the way for researchers to proceed with clinical trials to test convalescent plasma therapy in people who are at high risk of severe COVID-19 illness and have been exposed to people who have tested positive for the virus.

"We've received many inquiries from health care providers looking to ramp up their ability to deliver this therapy," says Johns Hopkins pathologist **EVAN BLOCH**. In response, on April 7, Bloch and colleagues published a clinical guidebook in *The Journal of Clinical Investigation* to help hospitals rapidly scale up their ability to deliver convalescent plasma therapy.

"This paper details the nuts and bolts of how to deploy convalescent plasma, and this information should be very helpful to colleagues worldwide who are preparing to use this therapy against COVID-19," says Casadevall.

The guidebook also outlines a range of clinical trials underway or planned at hospitals taking part in the Johns Hopkins-led network for convalescent plasma therapy.

**KATIE PIERCE, GEORGE SPENCER
AND VANESSA WASTA**

March 11

The first day that an in-house coronavirus screening test, developed by Johns Hopkins microbiologists **KAREN CARROLL** and **HEBA MOSTAFA**, was used at Johns Hopkins. Some 85 tests were performed in the first three days, and production ramped up rapidly, with tests quickly becoming available at the Johns Hopkins Health System's five Maryland and Washington hospitals. "This laboratory has a history of rising to the occasion," says Carroll, who directs the Division of Medical Microbiology at Johns Hopkins. "We did it for H1N1 influenza in 2009 and to support our Biocontainment Unit here in the hospital during the Ebola crisis."

Watch a video:
[Bit.ly/JHCOVIDtest](https://bit.ly/JHCOVIDtest)

A MESH of Support for Front-Line Staff

SEVERAL DAYS A week, at 2:45 p.m., **TY CROWE** leads a 15-minute meditation. He dims the lights and puts on soft music. Laptops click shut, phones are set aside.

“We focus on our breathing, on our bodies,” says Crowe, director of spiritual care for The Johns Hopkins Hospital. “The other thing I emphasize is to remember to be grateful, even for small things.”

The participants are the people in the Unified Incident Command Center who are leading Johns Hopkins Medicine’s response to the coronavirus outbreak. Their daily respite is part of a robust and connected effort to support all Johns Hopkins Health System employees as they cope with the COVID-19 pandemic, which can add stress to employees who may be learning new roles, worrying about their own health or struggling with the requirements of social isolation, says Johns Hopkins psychologist

GEORGE EVERLY.

Enter MESH (Mental, Emotional and Spiritual Help), an initiative led by Johns Hopkins Medicine’s Office of Well-Being that weaves together several Johns Hopkins services that support mental and emotional health for employees. The groups have teamed with the Department of Psychiatry and Behavioral Sciences, where more than 30 psychiatrists and psychologists have volunteered their time to provide timely mental health care to health system

employees at The Johns Hopkins Hospital and Johns Hopkins Bayview Medical Center.

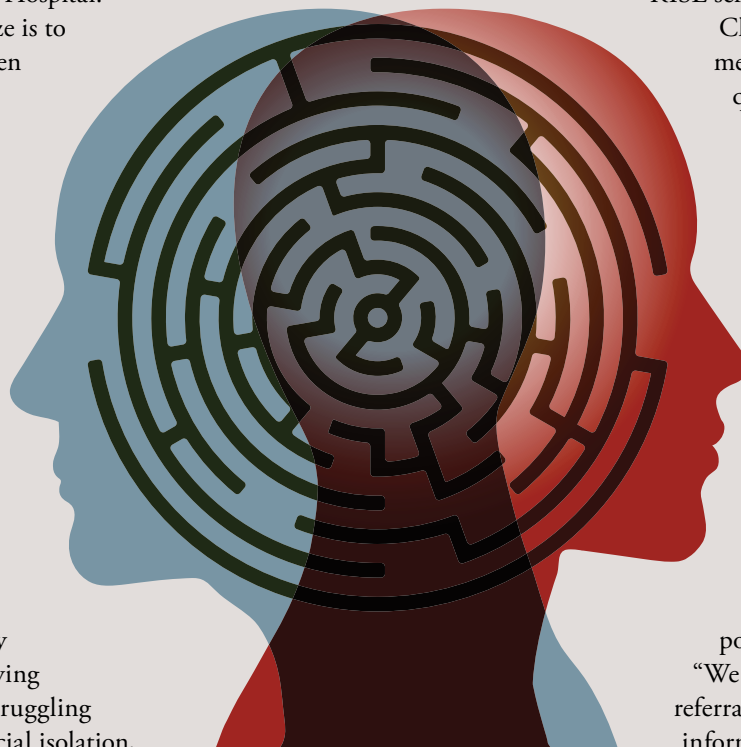
“People have stepped up to the plate in an extraordinary way,” says **CYNTHIA RAND**, the Office of Well-Being’s

WU, professor of medicine. Before COVID-19, RISE received that many calls in a month. “We’ve also started rounding proactively on the units, including some that are less visible, like laundry, food service and security,” Wu says. From mid-March to mid-April, RISE served more than 600 people.

Chaplain and spiritual care team members have also seen a quadrupling of staff encounters, particularly in units that have transitioned to caring for COVID-19 patients, says **PAULA TEAGUE**, senior director of spiritual care and chaplaincy. In one recent week, she says, her team met with more than 150 individuals and counseled more than 100 groups of three people or more across the health system.

Being part of MESH gives her office even more power to help them, Teague says. “We really are a first filter for referrals,” she says. “We have lots of informal opportunities to say to someone, ‘That was really hard, what you just did. How are you doing?’ Usually, you can see the relief in a person’s face, and you know they feel better. But when we see a person who is not recovering like that, we can refer them to mySupport [an employee assistance program] for counseling. For the first time, I feel like spiritual care has been integrated with other services. It’s very satisfying to be part of a true partnership.”

KAREN NITKIN



IMRSQUID / GETTY

KEITH WELLS

interim chief wellness officer. “Those who are not on the front lines caring for patients want to support their colleagues who are, and there are efforts all over the institution to do that.”

RISE (Resilience in Stressful Events), which delivers peer support to health care workers coping with stressful patient-related events, has 34 trained volunteers who provide peer support. They are getting five to 15 calls a day, says the group’s co-founder **ALBERT**



Michelle Azotea, on-site with volunteers

MEASURE TWICE, CUT ONCE

IN NORMAL TIMES, Johns Hopkins medical student **ISABEL LAKE** would be in class. Instead, on an afternoon in March, the second-year medical student sat in a large room in the Johns Hopkins Health System Consolidated Service Center measuring and cutting straps for face shields that will help protect Johns Hopkins health care workers from coronavirus infection.

“We were looking for something to do and ways to help out,” says Lake, who arrived at the storage facility with classmates **JOE BRODERICK** and **LYLA ATTA**. Like others in the warehouse, they sat at least six feet from each other as they worked.

The medical students were among dozens of Johns Hopkins volunteers who

either created the face shields or assembled personal protection packs that will help clinicians reuse their surgical masks and N95 filtering respirators.

“This is about preserving the supply of personal protective equipment,” says **MICHELLE AZOTEA**, director of project management and implementation for the health system.

About 250 volunteered in the first week, making between 2,000 and 6,000 face shields per four-hour shift. By March 24, more than 25,000 shields had been made, putting the volunteers well on their way to the goal of making 50,000 such kits for all Johns Hopkins clinicians in Maryland and Washington, D.C. **KAREN NITKIN**

An Unmatched Match Day

This year, the beloved rite of passage known as Match Day had a COVID-19 twist: Rather than gathering together at the Anne and Mike Armstrong Medical Education Building with friends and family to tear open their assignment envelopes at the stroke of noon on March 20, members of the Class of 2020 individually logged into a site to reveal their match results, then followed up with video chats and social media posts to celebrate the joyous moment. Some students hiked to the top of Federal Hill or Patterson Park in Baltimore to share the big reveal with friends — at a social distance, of course.

Of the 120 graduating medical students, 117 matched at institutions across the country, and 24 students matched at Johns Hopkins-affiliated programs. ■

**WEB
TRAFFIC:
BY THE
NUMBERS**

hopkinsmedicine.org
Covid-19 Traffic Snapshot
Jan. 27–May 22, 2020

TOTAL VISITS
TO ALL
CORONAVIRUS
CONTENT

25 Million

VISITS TO
“WHAT IS
CORONAVIRUS”
ARTICLE (THE
FIRST RESULT
ON GOOGLE
SEARCH)

8.2 Million

VISITS TO
COVID-19 SELF-
CHECKER

270,000

**For COVID-19 Survivors:
Rehab in the ICU**

PATIENTS WITH COVID-19 are staying for weeks in the ICU, putting them at great risk of developing post-intensive care syndrome (PICS): physical, cognitive and psychological changes that occur after surviving an illness or injury that requires ICU treatment.

The syndrome can affect a person’s ability to perform activities of daily living, driving and work, and impact family members who must adjust to their loved ones’ new normal, notes **DALE NEEDHAM**, a Johns Hopkins critical care physician who is renowned for advancing PICS research.

When a patient is in an unfamiliar environment, under sedation and working overtime to fight infection or recover from an injury, delirium can set in, says **JOE BIENVENU**, a Johns Hopkins psychiatrist who studies survivors of critical illnesses and intensive care. He describes delirium as a brain malfunction that makes it hard for patients to interpret what is going on around them. Their bodies seem to know that something is terribly wrong, but their brains can misinterpret what that is. Patients often describe frightening, nightmarelike experiences, sometimes with themes of betrayal by doctors and nurses, sometimes even loved ones.

The prevalence of delirium in patients with COVID-19 in the ICU is especially high, likely due to the amount of sedation needed to keep patients on ventilators for an extended period of time, says **MEGAN HOSEY**, a rehabilitation psychologist in the ICU at The Johns Hopkins Hospital.

Unfortunately, the effects of delirium can linger. “Even after it resolves,” Bienvenu says, “the memories can lead to mental health effects downstream: increased symptoms of anxiety, depression or post-traumatic stress disorder. Patients find themselves wanting to avoid hospitals and becoming very fearful that they will get sick again.”

Because delirium can also cause cognitive changes in attention, thinking and memory that last beyond hospitalization, Hosey talks to patients about getting in touch with a mental health provider who understands PICS.

In addition, in an effort to help patients with COVID-19 manage their health in the ICU as early as possible, many physical, speech and occupational therapists from Johns Hopkins rehabilitation facilities have been reassigned to The Johns Hopkins Hospital. “Very few ICUs in the country provide patients with the amount and intensity of early rehabilitation that we provide at Hopkins,” says Hosey.

Needham agrees. “We’ve got an extraordinary program that routinely provides psychological help and physical, occupational and speech therapy on top of medical care in the ICU. During the pandemic, this program continues.”

Soon, patients recovering from COVID-19 will have a convenient resource to report and monitor their health, including PICS. **ANN MARIE PARKER** is creating a virtual clinic for COVID-19 survivors. **LISA EDDY**

“Very few ICUs in the country provide patients with the amount and intensity of early rehabilitation that we provide at Hopkins.”

—MEGAN HOSEY,
REHABILITATION PSYCHOLOGIST,
THE JOHNS HOPKINS HOSPITAL

Q&A

Q: Is COVID-19 Lung Damage Reversible?

A: After a serious case of COVID-19, a patient's lungs can recover, but not overnight.

"Recovery from lung damage takes time," says **PANAGIS GALIATSATOS**, director of the Tobacco Treatment Clinic at Johns Hopkins. "There's the initial injury to the lungs, followed by scarring. Over time, the tissue heals, but it can take three months to a year or more for a person's lung function to return to pre-COVID-19 levels."

He notes that doctors and patients alike should be prepared for continuing treatment and therapy. "Once the pandemic is over, there will be a group of patients with new health needs: the survivors. Doctors, respiratory therapists and other health care providers will need to help these patients recover their lung function as much as possible."

GETTY IMAGES



'Go Team' Helps Nursing Homes

"NURSING HOMES ARE struggling right now. We're trying to be proactive in helping them manage their ill patients and make the hard decisions about when to send them to the hospital," says **CHRISTINA CATLETT**, director of the Johns Hopkins Go Team, a disaster response unit formed a decade ago to provide clinical and logistical support to communities that are reeling from hurricanes, earthquakes and other catastrophes.

In mid-April, the Go Team began offering assistance to nursing homes in Maryland, whose residents account for about half of the state's COVID-19 deaths. On April 29, Maryland Governor Larry Hogan mandated COVID-19 testing for all residents and staff members in Maryland nursing homes. As of early May, at least six nursing homes in the state had each reported 100 or more cases.

The Go Team team tests residents for COVID-19, assesses the health of those who have the disease, talks with staff members about infection-prevention strategies and provides moral support. "What [nursing home employees] really need and want is testing and also just support. So many are overworked and feeling alone. The strike teams give them a little morale boost, let them know we're looking out for them," says **MORGAN KATZ**, director of antimicrobial stewardship at Johns Hopkins Bayview Medical Center. **KAREN NITKIN**



Tzzy-Choou "T.-C." Wu and Chien-Fu Hung

18 Months

The amount of time it could take to develop a vaccine for the new coronavirus and move it into human trials, say two Johns Hopkins researchers, who began work on a vaccine in February. **TZYY-CHOOU "T.-C." WU** and **CHIEN-FU HUNG**, who run the Cervical Cancer Research Lab at Johns Hopkins, studied severe acute respiratory syndrome, or SARS, in 2002 and 2003 and are drawing on their experience to research this new coronavirus. They aim to do that, they say, either by making a DNA-based vaccine that contains genes that produce the virus' protein or by making a vaccine that includes a portion of the actual protein. Watch a video interview: [Bit.ly/JHMVaccineEffort](https://bit.ly/JHMVaccineEffort)

For ongoing updates about Johns Hopkins Medicine's response to COVID-19, visit: www.hopkinsmedicine.org/coronavirus/

ART WITH AN IMPACT

Student works bring a spirit of well-being to a local physician practice.

BY LINELL SMITH

ILLUSTRATION BY LAUREL STEWART

JOE RIGGS RECALLS the moment he stepped into a patient's distressed frame of mind. He was working in his office at Johns Hopkins Community Physicians (JHCP) when he heard a loud voice, sharp with anxiety, in the hall. An expectant mother was refusing to enter the sonography room for an ultrasound. When Riggs asked if he could help, she pointed to the photo emblem of a blackbird on the room panel.

"She told me, 'I'm not going in there. Look what bird you have on that door! It's bad luck!'"

After listening to her concerns, Riggs invited her into his office to search the internet for stories about the bird's symbolism. They found that blackbirds represent wisdom, power and beauty, as well as the hope expressed in the Beatles' classic song "Blackbird."

Reassured, the patient went ahead with her appointment. And Riggs, assistant director of operations at JHCP, gained a deeper appreciation of the need to consider multiple points of view when designing and decorating a health care environment.

The JHCP practice at Remington, which opened in 2016, stands as an innovative model of patient-centered design. There are no individual providers' offices. All care providers work together in a centralized area, to promote teamwork and trim patient wait times. To make the experience feel more patient-friendly, each examination room is named after a Baltimore landmark or a bird portrayed in a photo on the exterior door.

And thanks to a recent partnership with the Maryland Institute College of Art (MICA), the exam rooms in the practice now feature works by student artists. Patients entering the internal medicine examination rooms will find art depicting familiar Baltimore landmarks — such as the Domino Sugars sign, Patterson Park Pagoda, Fort McHenry and Camden Yards — while the 14 Gyn/Ob rooms display robins, flamingos, owls, cranes and other birds that suggest the beauty of nature.

The artwork was the result of a semesterlong class at

MICA created by faculty member Gina Gwen Palacios and associate dean Michael Weiss, which enabled students to imagine their work through the eyes of patients they would never meet.

Which is why Riggs told them the blackbird story. "It was important for students to understand the impact that art can really have on a unique audience," he says.

"The biggest thing for me was thinking about the viewer and the impact our artwork can have on someone," says MICA student Marisol Ruiz. "Take the rooms with the birds: Those birds are being seen by a lot of expectant mothers. My classmates and I talked about what kind of feelings we want to give to them while they're waiting for some news."

The blackbird/sonography room now features a "tree of life" painting rendered in soothing shades of blue and white, with clusters of red berries. Ten tiny blackbirds perch on its branches. MICA student Laurel Stewart has created a piece that is fanciful, welcoming and reassuring.

It's one of many paintings that elicit praise, according to Riggs. "Every day, patients comment on how wonderful the art is and how it makes them feel," he says. "We also get great feedback from our own team. Our staff members are providing care to patients in the exam rooms all day long, and their work environment and sense of well-being is really important. They say having artwork in their work environment has brought life to our practice."

"This is a win for everyone," Riggs adds. Plans now call for commissioning artwork from MICA students for additional Johns Hopkins Community Physicians practices. ■

WATCH A SLIDESHOW
of other artwork on display at
the JHCP practice in Remington:
[Bit.ly/JHMArt](https://bit.ly/JHMArt)



AT THE BENCH

Statins as Cancer Starvers

More than 35 million Americans take statin drugs daily to lower their blood cholesterol levels. Now, in experiments with human cells in the laboratory, Johns Hopkins researchers have added to growing evidence that the ubiquitous drug may kill cancer cells, and uncovered clues to how statins do it.

The findings enhance previous evidence that statins could be valuable in combating some forms of cancer, says cell biologist **PETER DEVREOTES**, whose team recently reported results of the new research in *Proceedings of the National Academy of Sciences*.

Devreotes and his team began the new study with an unbiased screen of about 2,500 drugs approved by the U.S. Food and Drug Administration to see which ones had the best kill rate of cells genetically engineered to have a mutation in a cancer gene called PTEN. The gene codes for an enzyme that suppresses tumor growth. Among the thousands of drugs, statins — and, in particular, pitavastatin — emerged as a top contender in cancer-killing ability. Most of the other drugs had no effect or killed normal and engineered cells at the same rate. Equal concentrations of pitavastatin caused cell death in nearly all of the engineered cells but very few normal cells.

The researchers then looked at the molecular pathways that statins were likely to affect. It's well-known,

for example, that statins block a liver enzyme that makes cholesterol, but the drug also blocks the creation of a small molecule called geranylgeranyl pyrophosphate, or GGPP, which is responsible for connecting cellular proteins to cellular membranes.

When the researchers added pitavastatin and GGPP to human cancer cells with PTEN mutations, they found that GGPP prevented the statin's killing effects and the cancer cells survived, suggesting that GGPP may be a key ingredient to cancer cell survival.

Next, looking under a microscope at cells engineered to lack the enzyme that makes GGPP, Devreotes and his team saw that as the cells began to die, they stopped moving. Under normal circumstances, cancer cells are a bundle of moving energy, consuming massive amounts of nutrients to maintain their unchecked growth. They maintain this break-neck pace by creating strawlike protrusions from their surface to drink up nutrients from the surrounding environment.

Suspecting that the unmoving cancer cells were literally “starving to death,” Devreotes says, the scientists then measured the statin-treated cells' intake by adding a fluorescent tag to proteins in the cells' environment.

Normal human cells glowed brightly with the fluorescent tag, suggesting that these cells ingested protein from their surroundings regardless of whether the scientists added statins to the mix of nutrients and cells. However, human cancer cells with PTEN mutations took in almost no glowing proteins after the scientists added statins. The inability of the statin-treated cancer cells to make the protrusions needed to take up proteins leads to their starvation.

Devreotes says his team plans further research on the effects of statins in people with cancer and compounds that block GGPP. **VANESSA WASTA**

“Our patients have no idea that e-cigarettes can cause refractory asthma or any pulmonary disease out there. **They are coming in to our clinic feeling like they have been duped.** And they have been!”

—**PANAGIS GALIATSATOS**, director of Johns Hopkins' Tobacco Treatment Clinic, who says he has growing concerns about the health risks of secondhand smoke from e-cigarettes. In a case study published in March in *BMJ*, he and his colleagues documented the first case of secondhand smoke from e-cigarettes causing pulmonary disease.

PEDIATRICS

Aquarium Escapes

With the help of telepresence robots, busy executives can tour a factory halfway across the country, and doctors can make virtual rounds at a clinic located hundreds of miles away. Now the same technology is helping critically ill and injured children at the Johns



Hopkins Children's Center escape for a day of fun at the National Aquarium without leaving their hospital beds.

Working with Johns Hopkins Telemedicine, second-year medical students **GALEN SHI** and **PAVAN SHAH** oversee these virtual outings from the Children's Center. For half an hour at a time, children ages 5 to 18 have the opportunity to learn about blacktip reef sharks, Atlantic stingrays, horseshoe crabs and many other underwater creatures. "The telepresence robots really break down the walls and help distract the kids," says Shi. "Through the robot, the [kids] can have fun outside of the hospital."

Shi started this program, entitled WeGo Foundation, in 2016 after he completed an internship with a company testing telepresence robots in health care. Patients at the Children's Center use a robot named RAE — short for Remote Aquarium Explorer — that is stationed at the National Aquarium. RAE's stick figure-like body is a sturdy, 3-foot-tall stand connected to a base with four wheels. Its head is a tablet-sized screen with a built-in camera, speaker and microphone.

Hospital patients use a laptop and special software to drive the robot, like a remote-controlled car, on a virtual trip through the aquarium. While they experience real-time sights and sounds, aquarium visitors can also see and hear them via the robot's screen and speakers.

"Time and time again, we see kids make friends with other kids," says Shah. "Sometimes, the kids aren't interested in the aquarium and spend all their

time chatting with the friends they make."

The WeGo Foundation targets patients who have been in the hospital for weeks, perhaps months, for a variety of reasons, such as waiting for a heart transplant or adapting to life in a wheelchair after severe injury. One mother said the aquarium trip was the most she had seen her child smile since he had been in the hospital, Shi says. Another parent said she and her daughter loved having a way to get out of the room.

Currently, the program has three robots — two were donated, and one is borrowed — and also operates in the University of Maryland Children's Hospital and Mt. Washington Pediatric Hospital. In addition to visiting the aquarium, the robots have already taken patients on virtual trips to the Maryland Science Center and to theater productions at Baltimore Center Stage.

LISA EDDY

OTOLARYNGOLOGY

A Scarless Solution for Benign Thyroid Nodules

Thyroid nodules are ubiquitous — an estimated 80 percent of Americans have these typically benign growths, says **JONATHON RUSSELL**, a Johns Hopkins otolaryngologist-head and neck surgeon. But in a fraction of individuals, thyroid nodules expand to

a size that becomes problematic, leading to troubles with swallowing or breathing, or changes in appearance that patients find unsightly.

“Several years ago, the choice on how to respond to benign thyroid nodules was binary: either perform surgery or not,” Russell says. “Because these growths typically aren’t life-threatening, many patients chose to live with them rather than deal with the recovery and scars of surgery.”

But recently, says Russell and his colleague thyroid surgeon **RALPH TUFANO**, Johns Hopkins began offering a third option: radiofrequency ablation (RFA), a technique that destroys unwanted tissue using heat generated from medium-frequency alternating current.

RFA has been used for decades to treat conditions affecting the heart, liver and other areas. But its use in the neck has been limited due to the close proximity of vul-

nerable anatomic structures, such as nerves critical for swallowing and speaking, explains Tufano. With better technology and more refined techniques, he adds, RFA has become a popular way to treat benign thyroid nodules elsewhere in the world. Johns Hopkins’ leadership in “scarless” techniques to treat thyroid and parathyroid nodules and cancers made it a fit to be a pioneer for RFA in the United States.

Russell, Tufano and their colleagues use ultrasound guidance to insert the RFA probe into a nodule, creating a pattern of damage that’s visible under imaging. Depending on the size of the nodule, this procedure takes as little as 30 minutes to complete, Russell says. Over the next several weeks and months, the damaged tissue shrinks and disappears, leaving patients with markedly reduced nodule size and related symptoms.

Because RFA is minimally invasive and extremely targeted, says Tufano, there are no scars, and patients can avoid the long-term consequences of surgery, such as the need to take thyroid hormones for life.

Right now, he adds, the procedure is limited to benign nodules, in which patients have at least two confirmed biopsies showing no malignancy. But eventually, RFA may be an option for patients with small cancerous tumors. In time, Russell says, he and Tufano plan to also offer this procedure under local anesthesia, performing it right in the clinic.

CHRISTEN BROWNLEE

40

The number of Johns Hopkins faculty members who have been named primary appointees in the newly established Department of Genetic Medicine — a designation announced in late January in recognition of the rapidly growing importance of genetics in medicine.

The new department, which evolved from the McKusick-Nathans Institute of Genetic Medicine, joins 31 other departments in the school of medicine that focus on excellence in clinical care and the biomedical sciences. “This new department designation underscores our continuing commitment to excellence in genetic medicine,” says Paul Rothman, dean of the school of medicine and CEO of Johns Hopkins Medicine. “The new structure will help our researchers and clinical staff do their jobs even more effectively.”

TECHNOLOGY

A Window on Blood Flow to Tumors

Johns Hopkins Medicine researchers have created a computer program for scientists at no charge that lets users readily quantify the structural and functional changes in the blood flow networks feeding tumors. The team recently published a link to download the new program, called HemoSYS, and an accompanying manual with instructions on how to use it in *Nature Scientific Reports*.

“Compared to blood flow in healthy tissues, tumor blood flow is abnormal,” creating a huge hurdle to effective delivery of therapeutics, says radiologist and biomedical engineer **ARVIND PATHAK**. “HemoSYS enables scientists to quantify these abnormalities from imaging data acquired from tumors in live animals.”

Studying the architecture of blood vessels and their flow dynamics in tumors could provide insights into cancer pro-

gression and metastasis, says **JANAKA SENARATHNA**, a research fellow in Pathak's lab and lead author of the paper. This approach could accelerate development of new therapies that target a tumor's blood vessels in order to limit its supply of nutrients and oxygen. HemoSYS could also lead to more effective delivery of already available drugs by mapping blood flow fluctuations in the vessels feeding the tumor, the researchers say.

The scientists caution that the research tool is not directly applicable to human tumors yet. But, says Pathak, "as our ability to obtain high-resolution images in the clinic improves, we hope that this tool can be adapted to provide a noninvasive way to analyze the blood flow fluctuations in an individual patient's cancer and help to customize their therapy."

PULMONARY

Improved Outlook for Serious Lung Conditions

By the time many patients find their way to Johns Hopkins pulmonologist **KEIRA COHEN**, they have seen doctor after doctor to treat their lung ailment, but they only seem to get sicker. "Many of our patients have been misdiagnosed and mismanaged," she says. "They have bounced from specialist to specialist and have almost gotten whiplash from the different messages and treatments they have received."

The outlook for these patients has improved dramatically with the launch of a multidisciplinary center at Johns Hopkins — co-created by Cohen, fellow pulmonologist **MARK JENNINGS** and infectious diseases specialist **JONATHAN ZENILMAN** — that is specifically aimed at managing and studying two lung conditions that doctors are seeing with more frequency: bronchiectasis and nontuberculous mycobacterial infections.

Nontuberculous mycobacteria (NTM) are a category of organisms occurring in the environment, such as in water and soil. In most people, these bacteria do not cause health problems, but in some cases these bacteria can infect the airways and lung tissue or organs outside the lungs. It can take years and multiple antibiotics to clear the infection. While related to tuberculosis, these infections are not thought to pass from person to person.

"We hear a lot about TB, but we have more than 10 times as many cases of NTM disease than TB cases in the United States these days," says Cohen.

Bronchiectasis, a scarring of the airways, can develop from multiple causes. If not managed well, bronchiectasis can lead to worsening lung function, repeated lung infections and increased hospitalizations. While patients with bronchiectasis are at risk for all

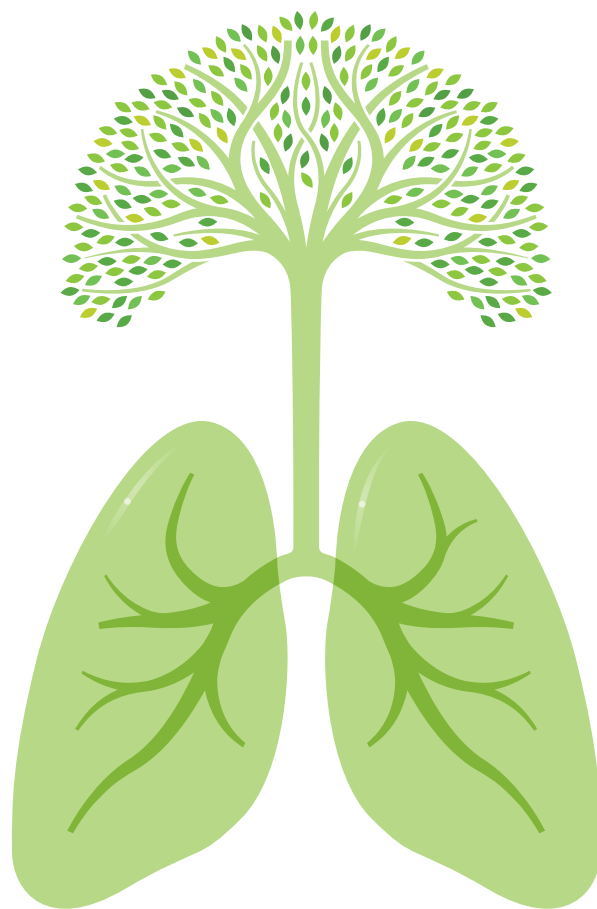
sorts of infections, one that occurs frequently is NTM, which is why the new center focuses on both conditions.

Crucially, says Cohen, "when patients come to our multidisciplinary center, it's a one-stop affair." At the Friday morning clinic in Johns Hopkins Bayview Medical Center's Asthma and Allergy Center, they'll see a pulmonologist, an infectious disease specialist and a physical therapist knowledgeable about airway clearance techniques. The center's nurse practitioner, **MEGHAN RAMSAY**, sees patients in clinic, acts as a bridge between these different specialists and communicates with patients between visits. The center also works with a chest radiologist and has relationships with specialists in rheumatology, allergy and immunology, gastroenterology, and otolaryngology. The in-house Clinical Mycobacteriology Laboratory at Johns Hopkins allows physicians to quickly and accurately assess test results.

"As a multidisciplinary team, we meet to come up with a unified treatment plan that is individualized according to the needs of each patient," says Cohen, who notes that the center has been designated a Johns Hopkins Precision Medicine Center of Excellence.

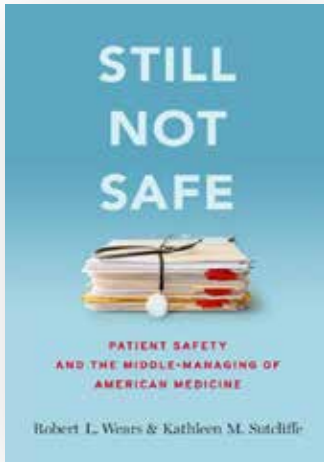
Research is a crucial element of the multidisciplinary center. Patients who come to the clinic have the option to donate biospecimens (blood and mucus) to the team's biobank and to have data from their medical chart added to an ever-growing database. One goal, she says: "to see if we can determine blood-based predictors of who might respond better to a particular medication or treatment plan."

SUE DE PASQUALE



JOHN WOODCOCK / GETTY

Catch and Correct



STILL NOT SAFE: PATIENT SAFETY AND THE MIDDLE-MANAGING OF AMERICAN MEDICINE

Kathleen M. Sutcliffe and Robert L. Wears.
Oxford University Press

“WE NEED TO UNDERSTAND OUR FAILURES BECAUSE IT GIVES US A SENSE ABOUT THE HEALTH OF OUR SYSTEMS, RIGHT?”

—KATHLEEN M. SUTCLIFFE

PATIENT SAFETY EXPLODED INTO public consciousness on Nov. 29, 1999, when two popular evening TV newscasts made their top story a leaked report from the National Academy of Sciences’ Institute of Medicine. The study — *To Err Is Human* — argued that medical errors were a significant factor in American mortality.

News of the report reached more than 100 million people within a week, and the uproar spurred a frenzy of proposals for patient safety reform, including calls for a 50 percent reduction in medical error. Yet two decades later, **KATHLEEN M. SUTCLIFFE** says, those reforms are now “becalmed,” and medical errors remain a leading cause of death in the United States.

How reform stalled is the subject of her new book, *Still Not Safe: Patient Safety and the Middle-Managing of American Medicine*, which was co-authored with **ROBERT L. WEARS**. An alumnus of both The Johns Hopkins University and its school of medicine, Wears died in 2017, shortly after the manuscript was finished.

Still Not Safe is a comprehensive history of patient safety. Yet it also offers a call for substantive improvements through collaborations that draw deeply from the expertise of both physicians and researchers.

The book itself models such collaboration. Sutcliffe is a Bloomberg Distinguished Professor of Medicine and Business at Johns Hopkins, and her research focuses on organizational theory, while Wears was a physician and a professor at the University of Florida College of Medicine — Jacksonville, specializing in emergency medicine.

The authors note that over the past 20 years, the health care industry’s obsession with costs and desire for control has slowed reform efforts, yet “dramatic and poignant accounts of medical harm” in popular media keep the issue in the spotlight. Sutcliffe and Wears identify competing narratives about patient safety from physicians and researchers as the heart of the problem.

“There hasn’t been enough effort to be more systematic,” observes Sutcliffe, “and to develop interdisciplinary expertise and sustained partnerships. Interdisciplinarity is really tough to do. People speak different languages.” The authors note that fundamental reform will require “substantive and equal co-partnerships with safety scientists.”

As an example of how safety science can make a difference, Sutcliffe points to how advances in surgical procedures have not always registered across institutions.

“Surgical mortality rates vary widely,” she observes. “Most people would say, ‘Well, it’s complication rates.’ But high- and low-mortality hospitals have the same rates of complications. What’s different in low-mortality hospitals is something called ‘the ability to rescue.’ High-mortality hospitals are ‘failing to rescue.’”

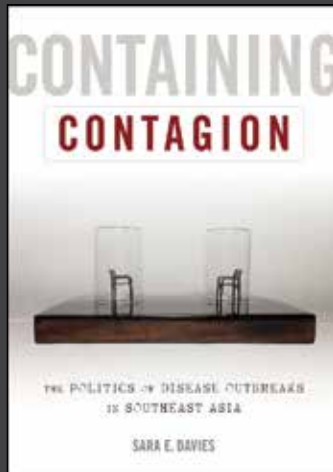
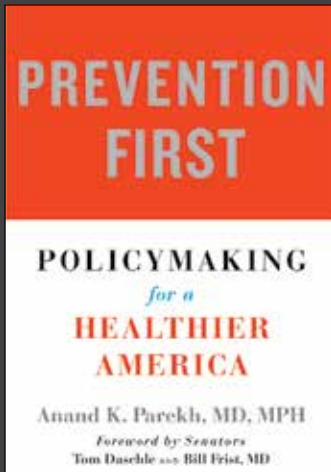
Organizational studies can identify best practices in such rescues. “What kinds of daily habits do people engage in?” asks Sutcliffe. “What do they do in order to be more alert and aware about what’s happening in the context in which they’re working?”

Sutcliffe — who also holds an appointment at Johns Hopkins’ Armstrong Institute for Patient Safety and Quality — says better collaborations between physicians and safety researchers aim to identify not only failure but also ways to bounce back from it, with evidence-based strategies that can be promulgated and widely adopted across the industry.

“We need to understand our failures,” she observes, “because it gives us a sense about the health of our systems, right? So that’s critical. But we also need to acknowledge the fact that in the course of doing work, people are constantly making mistakes. And they’re catching them and correcting them.

“Basically,” concludes Sutcliffe, “we need to understand what we can do to help people be more resilient in the moment. To be able to adapt and catch and correct better. We need to understand both how things are going right — and how they go wrong.” ■

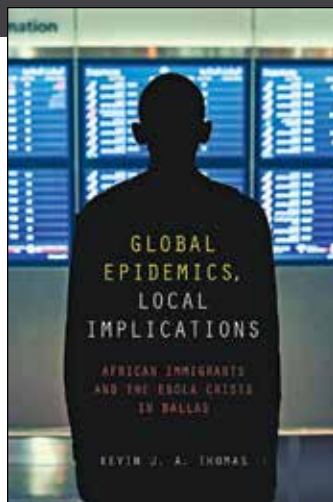
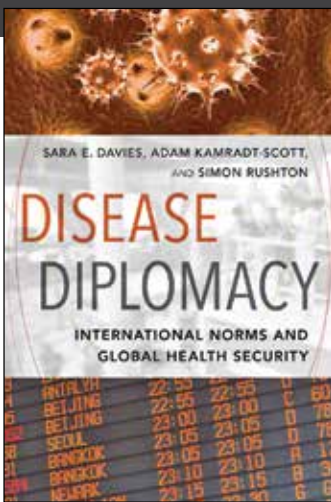
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HANGING

One night last fall,
Pierre Gibbons
ran into a burning building
to help a neighbor —
and emerged with severe burns
and very slim odds
for survival.
In their efforts
to give Gibbons
a fighting chance,
specialists at the
Johns Hopkins Burn Center
tried a one-two punch
they'd never used before.

BY **JIM DUFFY**

ILLUSTRATION BY **MICHAEL WOLOSCHINOW**

TOUGH

The Gibbons family enjoyed an idyllic day together before their trial by fire began. Like most families, they don't gather as often as they'd like. When they do, things don't always go smoothly. But that Sunday afternoon in September was different, which is one reason siblings Jeremiah and Taylor Gibbons remember it so vividly.

"It was kind of surreal," says Jeremiah, the birthday-boy center of attention that day. "For whatever weird reason, every little interaction seemed totally heartfelt."

A second reason that memory looms so large is that the family's life turned upside down the following day. When Taylor's phone rang at 10:30 p.m. that Monday, Sept. 22, 2019, she did a double-take: *Why in the world would one of her father's friends be calling?*

"Taylor, your Dad's been burned. He's at Johns Hopkins Bayview. You should go there."

She lives an hour away. She alerted Jeremiah, who is much closer. He and his wife, Rachel, had missed calls from that friend while taking advantage of a brief sleeping window that opened when their newborn son dozed off. Jeremiah raced over with no idea what was going on, but as a Baltimore City firefighter, he grasped the gravity of the situation when he saw how the brotherhood had gathered. A fleet of ambulances and fire trucks were outside the Emergency Department of Johns Hopkins Bayview Medical Center. He spotted two deputy chiefs, one from fire, another from emergency medical services.

"I got out, didn't even think about where I was parking," Jeremiah recalls. "Everyone was like, 'Oh my God, oh my God.' They were all crying."

Jeremiah started crying too. When he found his father — burned body wrapped in blankets, eyes glazed but open — he put a gentle hand on his forehead and said the only words that came to mind. "Hey, Dad, I'm here for you, man." Later, a paramedic would tell Jeremiah how his dad had shouted, "Jeremiah Gibbons! Engine Six!" over and over during the ambulance ride to Johns Hopkins Bayview.

The patient was wheeled away to the ICU in the Johns Hopkins Burn Center. Taylor arrived. The siblings were directed up to the Burn Center to await word on their dad's condition. Talking with first responders that night, Taylor and Jeremiah started to piece together what had happened.

Pierre Gibbons, 57, had been watching Monday Night Football with his friend. Hearing a ruckus outside about flames in a nearby house, both went to investigate. While his friend checked out back, Gibbons headed out front where, through an open front door

in the rowhouse on fire, he saw his 77-year-old neighbor, Mary Sterling, waving for help.

In a scene captured in a grainy cellphone video that soon went viral online, Gibbons marched inside the burning rowhouse. He almost made it back out with that elderly neighbor in his arms, collapsing just short of the front-door finish line. Both were alive when firefighters reached them, but barely. Sterling would die several weeks later.

Johns Hopkins Burn Center surgeon **JULIE CAFFREY** didn't sugarcoat things when she talked with Jeremiah and Taylor that night. After some basic triage work — intubating the patient, cleaning wounds and surveying damage — she reported that burns covered 65 to 70 percent of their father's body. In such cases, burn specialists run an algorithm that tallies historical survival numbers for patients with similar ages, burns and lung damage. The mortality rate for Gibbons approached 90 percent.

Listening, the siblings tried to get their heads around two big things: Their dad had played the role of hero, and he was probably going to die because of it.

"Go home and get some sleep," Caffrey said. "You've got some long days ahead."

DISMAL ODDS

STRANGE AS IT MAY SOUND, GIBBONS GOT lucky that night. Located seven minutes from his home in the Patterson Park neighborhood of Baltimore City, Johns Hopkins Bayview houses an elite academic burn center where three surgeons and a small army of specialists across many disciplines — nursing, psychology, intensive care, chaplaincy, social work, nutrition and physical therapy among them — take on the most daunting cases the specialty has to offer. The center treats about 800 burn patients a year, half of whom are admitted to the hospital. Its physicians also provide outpatient treatments and surgeries for scarring and skin infections related to other wounds besides severe burns.

"The charge here, and really all across an institution like Johns Hopkins, is to define new standards of care,



After sharing the long odds their father faced, surgeon Julie Caffrey gently advised his adult children: "Go home and get some sleep. You've got some long days ahead."

not just follow the existing ones,” says **SCOTT HULTMAN**, the center’s director. “What that means in practice is that we’re always pushing the boundaries, looking for new and better strategies.”

Gibbons put that mission to a stiff test. Burn Center surgeon **MOHAMMED ASIF** ticks off a fast-and-furious run of complications that arose in the days that followed Gibbons’ arrival, including kidney failure, multiple strokes, skin graft rejection, drug-resistant pneumonia and pancreatitis. By the time of that last mishap, the dial on his mortality algorithm was up around 98 percent, Asif says.

“The thing is, algorithms like that are informative for populations of patients, but individuals are all different,” Hultman says. “We can’t really predict who’s going to live and who’s going to die at that individual level, which is why we can’t ever let those numbers get in the way of going all out for patients like Pierre.”

‘OUR FATHER IS A FIGHTER’

THE GIBBONS FAMILY GRABBED HOLD OF this distinction like a lifeline. When Taylor and Jeremiah had met with Caffrey the morning after their dad arrived at the Burn Center, the surgeon had warned that the ordeal ahead would be arduous, perhaps six months in intensive care followed by two to five years of rehabilitation, much of it spent as a full-time inpatient. Pierre might regain a reasonably full measure of physical and mental functioning, but that best-case outcome was far from a sure thing.

The talk culminated in a stark question: Did Pierre’s children want doctors and nurses to go all out to save him?

The middle child of five, Pierre Gibbons had grown up outside of Washington, D.C. The family moved to Santa Fe, New Mexico, during Pierre’s high school years. His father, Dave Gibbons, describes that as a challenging period — the kids weren’t exactly on board with the move. But he was proud of the way Pierre moved forward in the face of that disappointment.

“It was quite something to see, how this Anglo kid from the East Coast who didn’t want to move found a way to fit in so quickly with all the Indian and Hispanic kids,” he says. “Pierre has always had a remarkable ability to meld with other people.”

Pierre spent four years in the Navy after high school. In the years that followed, he would marry, divorce and eventually move back to the Washington, D.C., area and establish himself as a facilities manager for commercial properties. Career opportunity brought him to Baltimore, where he most recently worked at MedStar



“The charge here is to define new standards of care ... we’re always pushing the boundaries, looking for new and better strategies.”

SCOTT HULTMAN

Good Samaritan Hospital.

As a father, Pierre could be demanding. His children say they never doubted his love, but they also never doubted that he would expect them to meet the challenges and disappointments of life head-on.

“He is the toughest person I know, the scrappiest, hard-headed-est, old-school-est guy you’ll ever meet,” says Jeremiah, 34. “Everybody else is like, ‘I can’t believe he ran into a burning building.’ I’m like, ‘Oh, I can totally believe it.’”

Looking back, Jeremiah and Taylor, 25, feel like those childhood lessons in toughness had been delivered in preparation for the moment when they had to summon up their courage, look their father in the eye and ask him a life-or-death question. First things first, however: They told him they loved him. He mouthed their words back at them around his intubation tube.

Then Jeremiah put the question on the table: “Dad, do you really want to do this?”

Pierre’s eyes were clear. He understood. He nodded his head. Soundlessly, he uttered a single word, “Yeah.”

The Gibbons children told Burn Center physicians to go all out. Caffrey was struck during that exchange by the family’s confidence: “They were saying, ‘You don’t know this guy. Our father is a fighter.’”

On top of that run of strokes and organ failures, Pierre would undergo 24 surgeries over five and a half months in intensive care at the Burn Center. Every time the human body gets invaded by a scalpel, Caffrey notes, it goes into an inflammatory overdrive that sends waves of high-alert stress out in every biological direction.

“Here’s a guy in his late 50s, and basically what’s happening with his injuries and those surgeries is his organs are running a marathon nonstop for five or six months,” she says. “It takes a special person, with a special will to live, to survive that. There’s an element inside of Pierre that’s a big part of his success.”

One week into their family’s ordeal, Taylor and Jeremiah rushed to the Burn Center in response to an emergency summons. Their father had slipped into a coma. Organ transplant teams were on standby. Technicians were scanning for brain activity to see if the fight was already over.

The wait to see if Pierre would emerge from the coma stretched past two weeks and into a third. By this point, the relatives who had driven or flown in from distant locales to offer support to Taylor and Jeremiah had returned to their lives.

“We came to a point,” Jeremiah says, “where we’re thinking, ‘Should we have done this? Would it be better to just let dad be in peace?’” He invited a fire department chaplain to come pray with the family. ➔



Journey to Recovery

Photos from the Gibbons family album capture Pierre and family members before the fateful fire, and at key times throughout his monthslong recovery at the Johns Hopkins Burn Center.

PHOTOS COURTESY GIBBONS FAMILY

1. Pierre Gibbons and daughter, Taylor.
2. Pierre, Jeremiah and grandson Spencer Gibbons.
3. Early weeks of recovery.
4. December: Pierre flanked by (l to r) father Dave Gibbons, Jeremiah, Taylor.
5. February: A welcome moment outside.
6. A visit from Taylor and Jeremiah.
7. March: Gibbons gets back on his feet in physical therapy.
8. Sharing a happy moment with Burn Center staff, in Gibbons' special "tilt-table" bed.
9. Released from the Burn Center ICU on March 5, Gibbons rang the celebratory bell.



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Story continues on next page.



One night, wracked by doubts, he sent Caffrey a late-night text: “Are we pushing it too far? Should we throw in the towel?” Caffrey replied, “What? No, of course not!”

As the third week of coma came to a close, the call came. “Get down here. Your dad’s awake.” Jeremiah got there first. His father’s eyes were open. He couldn’t talk, and he looked confused, but so what?

“Oh, my God,” he shouted. “Dad! You’re there!”

‘LIKE A MIRACLE’

THE MEDICAL INTERVENTIONS THAT HELPED bring that day to pass are all over the map. Early on, kidney function is key for burn victims. Swelling caused by burn wounds leads to leakage of internal fluids at levels that can interfere with the supply of oxygen to vital organs. Unable to discharge enough liquids, Gibbons landed on continuous venous dialysis.

Another key is providing protective coverage to open wounds on bodies that have little or no skin. The standard-of-care treatment here is skin grafts using living tissue harvested from cadavers, which usually provide protection through a three-week-long healing window. Not so with Gibbons: Over and over again, his grafts failed within a couple of days, infected by the multi-drug-resistant pneumonia and blood-related infections (bacteremia) in his body.

“To be honest,” Asif says, “we weren’t sure what to do at that point.”

Pushed beyond standard of care, Burn Center physicians tried a one-two punch they’d never thrown before. They used a pair of new products, a synthetic skin substitute called BTM (for biodegradable temporizing matrix) and ReCell, a device that grows new skin cells from a patient’s own tissue.

BTM is made with an inner layer of biodegradable polyurethane foam and an outer layer of impervious sealing material. It provides temporary wound coverage that won’t get infected with disease or come under attack by the immune system. As patients grow new skin during the BTM healing window, that skin grafts seamlessly to the inner layer. Once that happens, surgeons can peel off the outer layer like a bandage.

By coincidence, Burn Center physicians had sat through their first training session with ReCell just days before Gibbons arrived. Recently approved by the U.S. Food and Drug Administration, the device gives physicians a high-speed tool to expand the number of skin cells in a biopsied sample. This process used to involve sending samples to a lab and waiting three weeks, while ReCell accomplishes the feat on-site in an oper-

ating room in less than an hour. The cost savings are as impressive as the time savings.

“For a little less than \$20,000,” Hultman says, “we were able to deliver treatments that would have cost \$300,000 if we did it the old way.”

The soupy mixture that comes out of the ReCell machine doesn’t look anything like human skin, but it’s full of specialized skin cell types chosen for their robust immunologic qualities. The mixture is sprayed on or poured into wounds. In the case of Gibbons, those wounds were then covered with BTM.

“Almost overnight, his physiology changed,” Asif says. “We were hopeful about this strategy, but what happened was almost like a miracle, the way he started getting over his infections and regaining function in his kidneys.”

Burn Center physicians have high hopes that these two treatments will prove beneficial for future patients as well. They are now participating in a multisite randomized trial comparing BTM outcomes with standard-of-care treatments in a population of more than 200 patients. Here, too, the potential cost savings are significant: Caffrey says BTM is perhaps one-third less expensive than standard of care.

Later, Gibbons became the first Burn Center patient to use an advanced “tilt-table” hospital bed designed to prevent bedsores by giving caregivers a constant color-coded map showing a patient’s weight distribution across the mattress. That bed also rotates up a full 90 degrees, making it easier for bedridden patients to re-acclimate themselves to the vertical position and begin getting their legs ready to bear weight again. The device was donated to the Burn Center by a small nonprofit, Sons of the Flag; Hultman hopes that arrangement will lead to the purchase of additional tilt-table beds soon.

After emerging from his coma in October, Gibbons endured frequent episodes of delirium that seemed linked to intense dreams. Concerned about his sleeping patterns, Burn Center physicians sought advice from a team at The Johns Hopkins Hospital studying how ICUs can become more sleep-friendly operations. Those discussions led to a change to a quieter room location and alterations to Gibbons’ medication schedule.

“What makes this such an exciting place to work is that you’re in this environment of constant innovation, of trying new things, of pushing the edges,” Hultman says. “When that work comes together for a patient like Pierre, gosh, it’s a great feeling for everyone.”

In this case, those feelings extend far beyond the patient’s caregivers and family. Shortly after news broke about his heroic actions on the night of the fire, Gibbons became the focus of a remarkable grassroots campaign of public support. A Facebook page, Keep Fighting



“Almost overnight, his physiology changed. What happened next was almost like a miracle.”

MOHAMMED ASIF

Burn Critical Care

Surgeons **Mohammed Asif** and **Julie Caffrey** both came to their positions by way of fellowship training at the Johns Hopkins Burn Center. With three fellows on board at any given time, that program ranks as the largest in the country. Starting later this year, the focus will broaden to include intensive care training for select fellows.

Currently, the Burn Center employs what Director **Scott Hultman** describes as a “two-sets-of-eyes approach” in which ICU patients are seen on separate sets of rounds by burn medicine and intensive care specialists. The fellowship program is in the midst of a transition to an approach that will deliver training on a joint track known as burn critical care.

It will be the second or third such program in the country — and the first set within a Department of Plastic and Reconstructive Surgery. “This is a great project that is going to really help us forge a new educational trail for this field,” says Hultman. **JD**

Pierre, surpassed 1,500 followers. A GoFundMe campaign to defray the medical expenses raised more than \$50,000. Family and friends organized several fundraising events. At the Burn Center, cards and letters arrived for Gibbons from all over the country.

‘I COULDN’T STAND THERE AND WATCH HER BURN’

BY THE TIME I VISITED GIBBONS IN MID-FEBRUARY, he’d made remarkable progress. Though still bedridden in the ICU, he was tackling an hourslong daily regimen of physical therapy. Even though he was still unable to use his left shoulder and arm, there were no signs of stroke aftereffects in his voice.

I told Pierre how his father, Dave, had shared a theory with me about the night of the fire. When he was in the Navy, Pierre did duty as a firefighter. Though nearly 40 years have passed, Dave suspects that military training kicked in for Pierre at some unconscious level.

“He’s probably correct about that,” Pierre says. “You know, I didn’t discuss with myself whether to go in or not. I just did it.” In a conversation with his son and daughter, he’d described this turn of events in blunter fashion: “I couldn’t stand there and watch her burn.”

He brushes aside the hero talk that has surrounded him since the night of the fire. Whenever it comes

up, he tries to deflect attention onto the “real” heroes — firefighters and paramedics, physicians and nurses at the Burn Center. Thinking about the long rehab road ahead, he remembers a lesson he used to try and teach his kids: “There are consequences when you take actions.”

He laughs heartily: “I’m paying some consequences now, that’s for sure.”

Gibbons hopes that one mystery about his trial by fire becomes clear someday. Why did God let him live? What special plan or purpose does He have in mind for the rest of his days? In the meantime, he is trying to focus on lessons he’s already learned through this ordeal. Slow down. Stop being in such a rush to get to the next stoplight. Just be nice to people.

There have been days since their father came out of his coma when Jeremiah and Taylor found themselves wondering what happened to the grumpy part of their father’s personality.

“It’s almost like that grouchy guy is missing now,” Taylor says. “He’s been really cool and really kind since he woke up, which is pretty amazing when you think about what he’s going through.”

“He doesn’t even want to talk about the fire,” Jeremiah adds. “He wants to laugh. He wants to tell jokes. He wants to spend time with his grandkids.”

A CELEBRATORY RING

ON MARCH 5, GIBBONS WAS DISCHARGED from intensive care at the Burn Center after nearly six months. Still unable to walk (he would take his first tentative steps while in the supportive grip of physical therapists the following week), he emerged from the unit atop a bed being pushed by nurses. A crowd of several dozen friends and family erupted in cheers. Television news crews were on hand as well.

The trip he took that day wasn’t long — he was headed to an inpatient rehab unit in the same building — but it was full of emotional import for family members who had been there or heard about the night that last rites were administered to Pierre Gibbons. By long-standing tradition at the Burn Center, intensive care patients get to ring a celebratory bell upon their release. As Gibbons tackled that task with relish, applause and shouts rang out as well.

Pausing to take questions from reporters, Gibbons deflected their questions about being a hero, telling everyone yet again how that word applies not to him, but to his doctors and caregivers at the Burn Center.

“I’m not a hero,” he said. “I’m a Gibbons.” ■



In academic medicine, harsh treatment of medical students and trainees has too often gone ignored or excused. That culture is now changing, both at the national level and at Johns Hopkins, where new efforts are aimed at preventing — and addressing — mistreatment, harassment and discrimination.

BY **KAREN NITKIN**

ILLUSTRATION BY **NATE KITCH**

N O

B U L L I E S

A L L O W E D

The professor pulled the medical student aside, loudly berated him and threw him against a wall.

The student, **ROY ZIEGELSTEIN**, was rattled. But he didn't report the incident.

In fact, he forgot all about it for 30 years, until he was reminded by his work. He was addressing learner mistreatment in his role as vice dean for education at the Johns Hopkins University School of Medicine.

"When I began speaking to different groups about this issue, they would often ask if I experienced mistreatment when I was a student," says Ziegelstein. "I would tell them I couldn't recall.

"Then one day, I thought more about it and realized that for some reason, I had forgotten the times I was publicly humiliated or berated, even the time I was literally thrown against the wall by a faculty member who didn't like what I had written in a patient's chart. I guess it just seemed like a part of the medical student culture."

That culture is finally changing, both nationally and at Johns Hopkins.

Learners are recognizing and reporting mistreatment, harassment and discrimination more frequently. And institutions such as Johns Hopkins are working hard to prevent it, and to address it seriously when it occurs.

In July 2019, for example, a professor of molecular biology and genetics in the school of medicine resigned after the university's Office of Institutional Equity found he had violated the school's sexual misconduct policy. The medical faculty advisory board, the dean of the school of medicine and the university's provost had recommended his termination.

The faculty member was accused of "sexual harassment of a student, abusive and bullying behavior toward trainees, and other inappropriate behaviors," according to an internal email sent at the time from Johns Hopkins leadership.

KYLE CAVAGNINI, then president of the school of medicine's 800-member Graduate Student Association (GSA), praises the university's response. "The complaint was taken seriously, it was investigated, consequences occurred and the consequences were made public," he says. "That shows me that the school of medicine is committed to holding individuals accountable for unacceptable behaviors."

THE SCOPE OF THE PROBLEM

THE CONCEPT OF medical school mistreatment first appeared in a 1982 *JAMA* article by Colorado pediatrician Henry Silver, who decried the transformation of too many medical students from bright and eager to cynical and depressed. "Is it possible that medical school is a place where medical students are actually abused?" he wrote. The answer, of course, was yes.

Yet for decades, harsh treatment of medical students was routinely ignored or excused, physicians, trainees and academics agree. Ziegelstein notes that some faculty members in academic medicine believe that teachers have to be tough and demanding in order to teach. Ziegelstein says teachers who yell at students and demand perfection typically don't recognize that aspects of their behavior and teaching style constitute mistreatment.

A survey by the Association of American Medical Colleges' Medical School Graduation Questionnaire showed that 40.4% of medical students in the country experienced some form of mistreatment in 2019, a number that has scarcely budged since 2015.

In 2016, the GSA at Johns Hopkins added questions about mistreatment to the annual surveys it began in 2012. Each year, dozens of master's and doctoral students in the school of medicine anonymously document mistreatment they experience and observe, including public humiliation, abusive comments, unwanted sexual advances and threats of physical harm. The numbers have risen slightly over the years, probably because awareness of mistreatment has grown, says Cavagnini.

Yet the GSA surveys also show that most graduate students still don't report the mistreatment they experience or observe. "I am scared of how reporting will affect my reputation as a student among faculty," one student wrote in 2019.

The university forbids retaliation for reporting mistreatment, but repercussions can be difficult to prevent.

"Let's say you've spent a year and a half in a lab," says **KAITLIN WOOD**, a doctoral candidate in the Department of Cell Biology. "Problematic behaviors escalate over time, so things that didn't seem bad at the start have now crossed a line. You have a year and a half of data but no rights to that data. If you report misconduct, you're most likely not going to stay in the lab. You're throwing away that work."

Guidance on Personal Relationships

Students and trainees at the school of medicine also have a new resource offered through The Johns Hopkins University's first-ever personal relationships policy, which provides guidance on sexual and other relationships for all members of the university community.

"Romantic and/or sexual relationships are viewed as incompatible with a teaching/training relationship," the policy states. "This view applies regardless of whether the context involves, for example, an undergraduate student and an instructor, a graduate student and a professor in the same program, or a clinical resident and the attending physician."

And an updated sexual misconduct policy and procedures, effective Aug. 1, 2019, allows people who report sexual misconduct to have two supporters, one of whom may be a lawyer or trained advocate, during the investigation. In the past, just one supporter was permitted. **KN**

TAKING ACTION

IN RECENT MONTHS, Johns Hopkins has taken several steps to address learner mistreatment, working closely with Cavagnini and other students and trainees on anti-mistreatment policies for several years.

"Students going through these issues may feel frustrated, partly because the reporting and investigation process can feel slow," says Wood, GSA president for the 2019–20 academic year. "But the school is working to make it better."

Notably, a new discrimination and harassment policy and new procedures went into effect June 1, 2019, replacing the general anti-harassment policy and providing "a more robust statement of prohibited conduct" and "rights and options for addressing issues of protected status based discrimination and harassment," says **JOY GASLEVIC**, the university's interim vice provost for institutional equity. In addition to many other rights, parties to a matter under the new policy may have a supporter accompany them to any meeting or hearing.

The school of medicine also created the Resources for Reporting Mistreatment portal in 2019, which provides easy-to-navigate information about how to report mistreatment and where to find counseling or emotional support.

Another improvement has been the addition of a second location for the Office of Institutional Equity (OIE), which investigates reports of discrimination and sexual harassment for all Johns Hopkins University schools. The office also ensures the university is complying with affirmative action and equal opportunity laws, and it is a resource for people requiring accommodations for religion or a disability. While its main office is on the Homewood campus, an OIE satellite office, newly located in Reed Hall on the East Baltimore medical campus, is now open during business hours every other Tuesday.

"The new office hours create a more regular presence for us, especially for walk-ins," Gaslevic says.

"Graduate students told me that having to travel to the Homewood campus to the OIE added a barrier to reporting discrimination and harassment," says Ziegelstein. "I'm absolutely delighted ... that we found an appropriate space that is off the beaten path so those who wish to report issues can feel comfortable that they won't be seen walking in."

BETTER TRAINING FOR FACULTY

CAVAGNINI, A DOCTORAL candidate in biological chemistry, says that some of the mistreatment comes from the fact that many faculty members have not been trained to teach or mentor. "Their training may be solely as researchers," he says.

JENNIFER HAYTHORNTHWAITE, professor in the Department of Psychiatry and Behavioral Sciences, is working with Cavagnini and others on a series of workshops to help faculty members develop mentoring strategies through role-playing scenarios, such as a mentor being rude to a student.

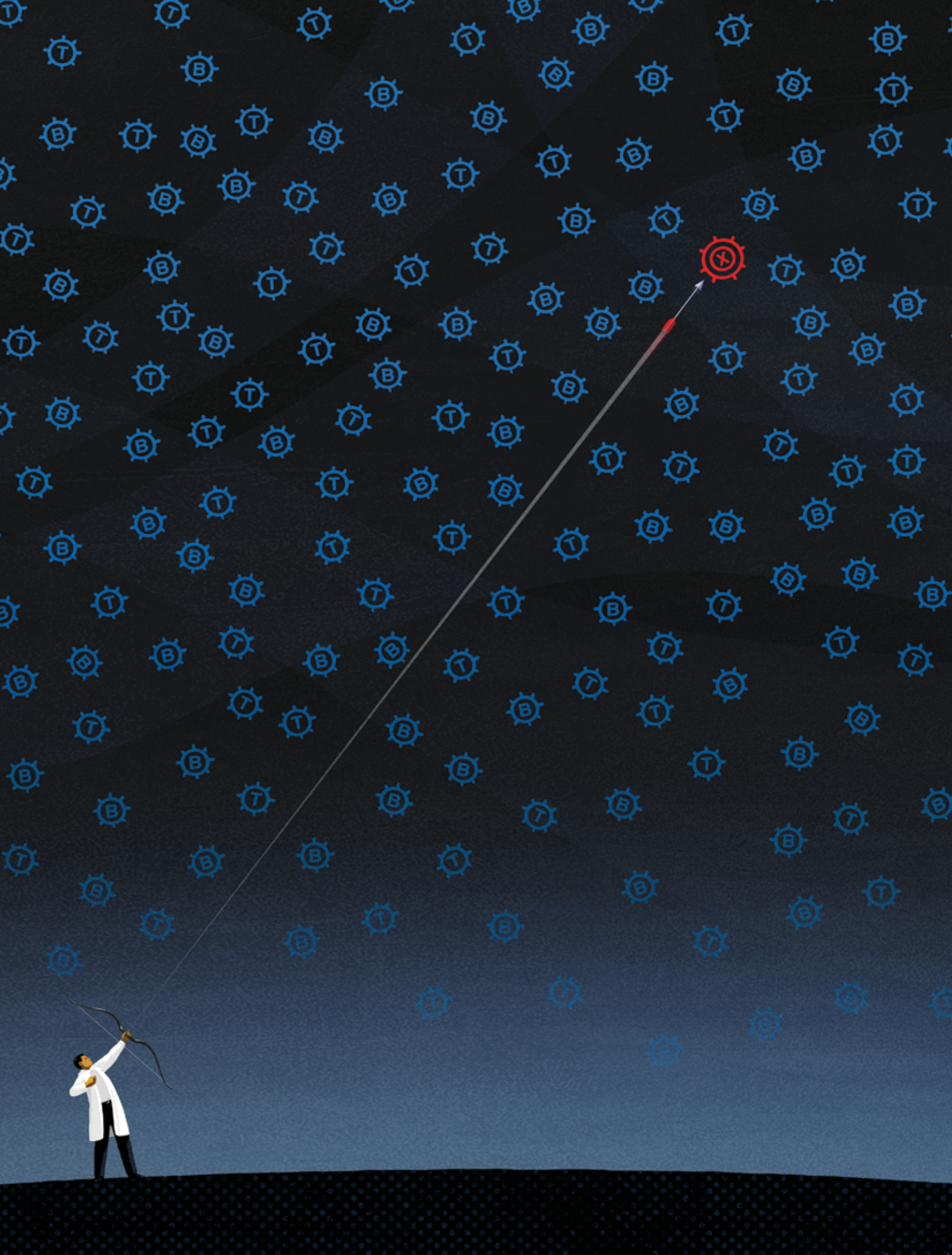
The program is not specifically designed to address learner mistreatment. But "we are going to have cases that bring up topics like bullying and social disparagements," Haythornthwaite says.

Ziegelstein promotes the idea of "microaffirmations," — "relatively small acts, which generally don't take much time, and affirm another person's humanity. It could be a quick email that says, 'Great job today with your presentation.' How long does that take? Thirty seconds?"

These positive comments can help students learn better, and eventually make them more compassionate as physicians and more innovative and creative as scientists, he says.

"What I tell people who practice microaffirmations is they're not only uplifting their students, but the more they practice this behavior, the less likely they are to engage in bad behavior," Ziegelstein says.

"We have the best and brightest learners in the world. If we can't allow them to learn and be productive without the stress of experiencing negative behaviors, we've not just failed them and failed Johns Hopkins, we've really failed the world." ■



THE X FACTOR

Could advances surrounding a newly discovered “X cell” hold the clue to preventing type 1 diabetes from taking hold in the first place? That’s the hope of a team of Johns Hopkins scientists whose arduous bench-side journey might be close to paying off.

BY DAVID GLENN
ILLUSTRATION BY MICHAEL GLENWOOD

The conversation never gets easy,

Thomas Donner says, no matter how many times you've done it: It's always painful to tell a patient that they've developed type 1 diabetes, an incurable autoimmune disease that will require lifelong insulin therapy and a constant awareness of their glucose levels. For these patients, who are typically 10 to 13 years old but can be any age at the time of diagnosis, no decision about what to eat, what to drink or how to exercise will ever be simple again.



“These patients basically need to be thinking about their diabetes all day long,” says Donner, an associate professor of medicine who directs the Johns Hopkins Diabetes Center. “It’s a very demanding disease.” If they allow their glucose levels to run chronically high, they risk irreversible damage to their eyes, kidneys and cardiovascular system; if glucose drops too low, they can suffer seizures or coma.

But now, thanks to a remarkable series of studies at Johns Hopkins, Donner sees reason to hope that there will be fewer of those conversations in the future. Within a decade, Donner says, there may be a treatment that would prevent type 1 diabetes from developing in the first place.

Ten years ago, Donner was approached by **ABDEL-RAHIM HAMAD**, who directs an immunology laboratory at Johns Hopkins. Hamad had begun his career by hunting for immune cells that might be useful in treating cancer. Along the way, he’d spotted an interesting pattern in the lab: Certain genetically modified mice in his cancer studies seemed somehow to be protected against autoimmune diseases. He asked Donner if he’d be

interested in exploring the implications for type 1 diabetes.

Last year, their collaboration paid off dramatically. In a paper in the journal *Cell*, Hamad, Donner and their colleagues reported extraordinary discoveries about the machinery that drives type 1 diabetes — and possibly other autoimmune disorders. Hamad’s lab has identified a previously unknown type of lymphocyte that combines features of both B cells and T cells. In people with type 1 diabetes, this hybrid lymphocyte — which Hamad has dubbed the X cell — carries a peptide that primes the immune system to attack insulin-producing cells.

This discovery has shed new light on the long-standing mystery at the heart of type 1 diabetes: Why and how exactly does the immune system decide to attack and destroy the insulin-producing islet cells in the pancreas?

And with that new understanding, Donner says, the discovery of the X cell has opened up new possibilities for preventing and treating type 1 diabetes. Before long, he hopes, he and colleagues will manufacture an antibody that targets and inactivates or destroys the X cell. If all goes well,



Clockwise from center, front: Rizwan Ahmed, Adebola Giwa, Abdel-Rahim Hamad, Mohan Sadasivam, Zahra Omidian (center).

this new therapy might protect at-risk people before symptoms ever emerge.

“When I first started med school in the 1980s, there was a perception that people with type 1 diabetes would have significantly shortened life spans,” says Donner. “That perception has changed dramatically, but it’s still a very difficult disease to manage. What we’d really like to do is stop it from developing in the first place.”

“I’m very lucky,” says Laurie Hart, a diabetes advocate who has been a patient of Donner’s for three years and who has donated funds to support his research. “I’ve had type 1 diabetes for 41 years with relatively few complications. But I hear every day from people who are struggling with complications and struggling to afford insulin. If Dr. Hamad and Dr. Donner’s research helps us identify children at risk of type 1 diabetes and prevent the disease from developing, that would be life-changing for so many people.”

‘EXTRAORDINARY EVIDENCE’

THE SEEDS OF this research were planted in the late 1990s, when Hamad arrived from his native Sudan to take a postdoctoral position at Johns Hopkins. He was assigned to the laboratory of **DREW PARDOLL**, a pioneering researcher in immunotherapies for cancer. In Pardoll’s lab, Hamad studied a variety of rare and unconventional immune cells, in an effort to see if they might be weaponized against cancer. As he worked with genetically modified mice in Pardoll’s lab, Hamad occasionally came across cells that seemed to express both B cell receptors and T cell receptors. Those cells had been previously noticed by other researchers, but they’d generally been shrugged off as “doublets” — that is, pairs of T cells and B cells that happened to cling together, not true hybrid immune cells with single nuclei.

“People just ignored them,” Hamad says. “They called them abnormal lymphocytes. But I never bought that. I always thought that they must have a real function. I put the problem on the back burner for many years, but I never forgot about it.”

In 2015, in the course of his collaboration





“WE COULD POTENTIALLY KNOCK THIS CELL OUT EVEN BEFORE THERE’S BEEN ANY DESTRUCTION OF THE PANCREAS.”

THOMAS DONNER

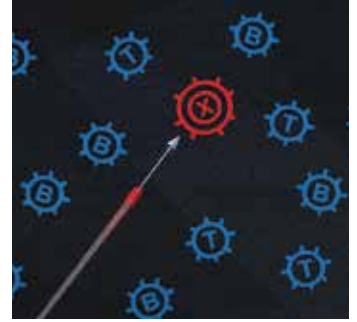
with Donner, Hamad finally got his chance to focus on the problem. With the help of a \$50,000 grant from the Johns Hopkins Discovery Award program, Hamad and his postdocs started to search seriously for these hybrid cells.

“In the early phase of this research,” Hamad says, “some people were so skeptical. The nicest people would just sort of look at you and change the subject. But I understand. To tell people that there is a cell that is a hybrid between a B cell and a T cell is a tall order. For an extraordinary discovery, you need extraordinary evidence.”

The first challenge that Hamad’s team faced was that the X cells comprise only a tiny fraction of a person’s immune cells. “If I started with a pool of 60 million to 80 million lymphocytes, I might eventually find 1,000 of these X cells,” says **RIZWAN AHMED**, a postdoctoral researcher in Hamad’s lab. “It’s very discouraging work. It would take me hours and hours to use flow cytometry to separate those cells.”

That laborious census of the X cells soon paid off: In collaboration with **HAO ZHANG**, a research associate in the lab, Ahmed confirmed Hamad’s hunch that the population of X cells would be elevated — still tiny, but elevated — in people with type 1 diabetes.

“If these cells were just doublets,” Ahmed says,



“they should have had a more or less random frequency. But in people with type 1 diabetes, they had a very consistent frequency. So that was when we thought that these must not be doublets, that these are real cells with a real function.”

The team decided to send a blood specimen from a patient with type 1 diabetes to Adaptive Biotechnologies, a Seattle firm that performs genetic sequencing. “They called me and said these cells are very interesting,” Hamad says, “because they have B cell receptors and T cell receptors, but the B cell receptors all seem to be a single clone.” Six months later, Hamad’s lab sent a specimen from a different patient with type 1 diabetes: It turned out to have the same clone. A few months later, a third patient: the same clone.

“To find the same 16-amino-acid sequence on cells from three of my patients with type 1 diabetes — the chances of that are millions to one,” Donner says. “And then we looked more closely at that 16-amino-acid sequence and saw that it had a lot of structural similarities to insulin.”

Here, Donner and Hamad knew, might lie answers to some of the most vexing questions about type 1 diabetes: What exactly triggers the autoimmune syndrome in the first place? Why does the body decide to attack its own pancreas?

A SEQUENCE WITH ANSWERS

DECADES AGO, RESEARCHERS thought that insulin itself might be the antigen that stimulates the autoimmune response. But that turned out to be wrong: In people with type 1 diabetes, insulin typically stimulates a modest autoimmune reaction, but not one strong enough to account for full-blown attacks on their islet cells.

More recently, scientists have been fixated on the fact that people who inherit certain variants of the HLA-DQ antigen — one of the molecules responsible for helping the immune system distinguish between “self” and “not-self” — are at high risk of developing type 1 diabetes. But that explanation seemed incomplete: Why do only a small fraction of people with the troublesome HLA-DQ variants



actually develop type 1 diabetes? And when it does happen, exactly which cells are the HLA-DQ antigen interacting with? Scientists couldn't tell.

The 16-amino-acid sequence on these X cells — which Hamad's team has termed the x-idiotype peptide — offers some answers. When Hamad's lab exposed autoimmune cells to this peptide, the cells reacted 10,000 times more strongly than they do to simple insulin. They released huge volumes of cytokines and recruited other immune cells to attack. Here at last was an autoimmune process strong enough to explain the destruction of a person's islet cells.

"Next, we wanted to see exactly why this peptide sets off such a strong reaction," Ahmed says. "We collaborated with Ruhong Zhou at Columbia University, who did molecular simulations for us. He found that this peptide has a perfect binding register for the high-risk version of the HLA-DQ molecule. In other words, they attach to each other very strongly." A second mystery was solved: Now it is clearer why people who inherit the high-risk versions of the HLA-DQ antigen can easily fall prey to type 1 diabetes.

Many questions remain. For one, many people who inherit the high-risk variants of HLA-DQ never actually develop type 1 diabetes. Why not? What exactly drives the onset of disease? For decades, scientists have suspected that acute viral illnesses can act as triggers for type 1 diabetes and other autoimmune conditions. The onset of type 1 diabetes appears to be more common in the winter, when viral infections are prevalent, and patients often recall having had the flu a few weeks before their diabetes symptoms began.

"We don't have any new evidence about this yet," Ahmed says. "I can only speculate. But one thing you can imagine is that viruses somehow integrate their DNA within the X cells so that they can evade the immune system." Or it may simply be that the body's immune response to the flu causes a temporary increase in the number of circulating X cells. For most people, that's no problem. But in people who have inherited the high-risk versions of the HLA-DQ antigen, the strong binding between the X cells and the



Crucial Funding from Grateful Patients

Several of **THOMAS DONNER**'s adult patients have shown enthusiasm for his team's research, donating funds to buy equipment and support postdoctoral salaries in **ABDEL-RAHIM HAMAD**'s lab.

Among them is Stephen Raab, a Pennsylvania philanthropist. Raab was diagnosed with type 1 diabetes when he was in elementary school. "The most difficult time for me was probably when I was 13, 14, 15," he says. "I went to boarding school. I took syringes and insulin with me, and I managed my own diabetes. I wasn't always a watchful diabetic."

When Raab needed a new endocrinologist several years ago, he asked around for recommendations, and Donner's name kept coming up. Raab says that he developed an almost-instant confidence in Donner's judgement. "I'd often tell him that my foundation might be able to send some money his way," Raab says. "But it wasn't until two years ago that he submitted a proposal for this particular project. We were glad to support it, and we're especially pleased to see how successful the work appears to have turned out to be."

Donor Mary Meyer has a less typical history with type 1 diabetes: Her disease didn't develop until she was in her late 30s. "I got my diagnosis the week of my 20th high school reunion," she says. "I'd lost a lot of weight, and I was constantly thirsty. I was shocked when I heard it was diabetes. There was no family history."

Meyer quickly became deeply involved with diabetes advocacy in Baltimore. For many years, she helped organize an annual golf tournament to support diabetes research. Her parents endowed the Hugh P. McCormick Family Professorship in Endocrinology, which is now held by **SHERITA HILL GOLDEN**, a vice president of Johns Hopkins Medicine.

"I'm very interested in supporting Tom Donner's research," Meyer says. "He thinks that he's coming close to a strategy for prevention, and it's very exciting to be a part of that."

DG

Pancreatic Precursors for Insulin Production

Alongside his work on antibody therapy for type 1 diabetes, **THOMAS DONNER** also leads Johns Hopkins' work on another cutting-edge treatment: implantation of pancreatic precursor cells derived from stem cells.

For more than two decades, scientists have experimented with transplanting islet cells from healthy donors to replace the cells that have been destroyed by the immune system in patients with type 1 diabetes. These experiments have shown promise, but they've been limited by two factors. First, the recipients must take immunosuppressive medications for the rest of their lives to prevent their bodies from rejecting the donor cells. Those medications can cause a variety of problems, including kidney damage. Second, there simply aren't that many potential donors of pancreatic tissue, so it's difficult to imagine this type of transplantation becoming a standard treatment.

In the last decade, researchers at a San Diego firm called ViaCyte have turned to a new strategy: culturing pancreatic stem cells from an embryonic stem cell line. These pancreatic precursor cells are then placed in capsules — which are meant to provide a physical barrier against the immune system — and implanted into the patient's body. Johns Hopkins is one of seven sites where this technique is currently being tested.

"There's hope that if we put enough of these precursor cells into a person and a large enough portion of the cells survive, mature and produce insulin, eventually we could get these patients off insulin entirely," Donner says.

The study has gotten past the basic proof-of-concept phase: In some patients, the implanted capsules have led to insulin production. But many challenges remain, Donner says, mostly having to do with the architecture of the capsules.

"The capsule membrane is a foreign substance," Donner says, "and so the body tends to form scar tissue around it. We can circumvent that by drilling tiny holes in the capsule to allow blood vessels to grow inside as well as around it — but because of these openings, we need to worry about immune attacks against the cells."

In the next iteration of the study, the team plans to use a new type of membrane that may be more biocompatible than previous versions.

"I'm very pleased that we've been able to be one of the first sites participating in this study," Donner says. "It's helped us all develop new kinds of expertise and become familiar with a procedure that one day may be able to successfully deliver cells under the skin that will mature and produce insulin." DG

HLA-DQ antigen sets off a cascade of autoimmune processes that ends with the destruction of the pancreas' islet cells.

PREVENTING DIABETES IN THE FIRST PLACE

NOW THAT THE X cell has shone new light on the immune mechanisms that underlie type 1 diabetes, are we any closer to a cure?

Donner is cautious about speculating about cures for people who have already developed type 1 diabetes. But he and his colleagues have high hopes that their discoveries might lead to treatments that would protect at-risk children from developing the disease in the first place.

"We have a very strong suspicion that these X cells are detectable before the actual onset of the disease," says **ADEBOLA GIWA**, a pediatric endocrinologist who divides his time between clinical care and bench science in Hamad's lab.

"And if that's the case," Donner adds, "we could potentially knock this cell out even before there's been any destruction of the pancreas."

Here is how it might work: At a young age, every child could be screened for the presence of diabetes-related X cells — that is, those that carry the x-idiotype peptide. Children who screen positive on that test could be given an injection of monoclonal antibodies that specifically target that peptide.

"This 16-amino-acid sequence is not found in any other cell in the human body," Donner says. "Which is great. That means that we should be able to create an antibody to it without worrying about other cellular damage."

Hamad's lab has already begun to work on crafting such an antibody — using mouse models, so far. They expect to create a humanized version of such an antibody within a year.

To begin this antibody research, the lab had to establish a sustainable, immortalized line of X cells. That task fell to **ZAHRA OMIDIAN**, a postdoctoral researcher who joined Hamad's lab in 2017. "It was a very, very challenging process," she says. "It really took a year to get the process right." Compared to the initial arduous process of

cloning the cell line, Omidian says, the process of developing antibodies to target the X cell should be a bit easier.

Unfortunately, Donner says, an antibody to prevent type 1 diabetes may not be a one-time treatment. People at risk of the disease would probably require antibody infusions periodically, much as patients with rheumatoid arthritis (another autoimmune condition) receive antibody infusions on a monthly basis.

Would antibody therapy do any good for people who have already developed full-blown type 1 diabetes? Donner says it's possible. That is because even in full-blown disease, most type 1 patients show evidence of functioning islet cells. "Even in patients whose disease onset was quite a while ago," he says, "we can measure a substance called C-peptide that is only released by islet cells. It is possible that pancreatic stem cells mature into islet cells that survive a short time before undergoing autoimmune attack." If antibody therapy can shut down the autoimmune attacks, he says, such regenerating cells might be able to effectively produce insulin again.

"These patients might still require insulin injections," Donner says. "But it might be a much smaller amount than they require today and would make the management of their disease considerably easier."

All of these therapies are still theoretical, but Donner and his colleagues are hopeful that they can bring them to fruition. "My patients and their parents just light up when I ask them if they'd be willing to donate blood specimens for this research," Giwa says. "Diabetes is not easy to live with. When I tell parents that there's a chance they could help prevent this from happening to other kids — and conceivably even help their own child — they're really happy to participate."

IMPLICATIONS FOR OTHER AUTOIMMUNE DISEASES

THE EXCITEMENT AROUND the discovery of the X cell goes well beyond type 1 diabetes. Hamad believes that the cellular mechanisms his lab has discovered might be involved in other autoimmune disorders. Last



"IN THE EARLY PHASE OF THIS RESEARCH, SOME PEOPLE WERE SO SKEPTICAL. THE NICEST PEOPLE WOULD JUST SORT OF LOOK AT YOU AND CHANGE THE SUBJECT."

ABDEL-RAHIM HAMAD

summer, the lab received a \$3 million grant from the W. M. Keck Foundation to broaden its studies of the X cells. Already, Hamad and his colleagues have looked at Graves' disease and multiple sclerosis.

"At this point, I'm confident that peptide clones like the one we found for type 1 diabetes are also present for all organ-specific autoimmune diseases," Hamad says. "And we're starting to look at systemic autoimmune diseases, like lupus."

The strange hybrid form of the X cell, Hamad says, makes it an especially potent force in autoimmune disease. "Normally, T and B cells need to interact with each other to activate each other," he says. "But it appears that the X cell can sometimes essentially activate itself. It doesn't need any other collaborator. And that's what makes it dangerous. X cells have all the elements — they can just interact with each other without having to interact with an antigen-presenting cell or another T cell."

Donner says that this kind of novel discovery is exactly the kind of ambitious research he hoped to do when he joined Johns Hopkins in 2010. "Type 1 diabetes can cause very, very serious complications," he says. "If we can help lift that disease burden, that will be a great achievement." ■

1962

JOHN L. CAMERON, of Baltimore, director of the Department of Surgery and surgeon-in-chief of The Johns Hopkins Hospital from 1984 to 2003, has received the 2019 Henry Jacob Bigelow Medal from the Boston Surgical Society. After setting down his scalpel in 2016, Cameron remains active on the faculty, seeing patients and making rounds seven days a week.

1987

JAMES R. BARRETT, of Oklahoma City, began serving in December 2019 as the interim chair of the Department of Family Medicine at the University of Oklahoma.

1994

BENJAMIN R. LEE, of Tucson, Arizona, has been awarded the George W. Drach, MD, Endowed Chair of Urology at the University of Arizona College of Medicine. Lee is the chief of urology at the college and has focused his career on advancing new treatments for renal cell carcinoma and calculus disease, while developing new technologies and techniques for urologic oncology and endourology.

1995

MICHAEL J. CATERINA, of Baltimore, has been named director of the Department of Biological Chemistry. He currently is the Solomon H. Snyder Professor of Neurosurgery and director of the Neurosurgery Pain Research Institute.

Biotech Titan

Harr aims to harness gene- and cell-based therapies to transform medicine.

In the fast-growing biotechnology world — where experimental gene- and cell-based therapies are pursued energetically — **STEVE HARR '98** quickly has become a superstar.

Over the past decade, he has gone from managing director of biotechnology investment banking for Morgan Stanley to being a founder of several biotech companies that have garnered billions of dollars in investments and been among the leaders of research and development in harnessing the



power of genetic and cellular reprogramming to combat deadly diseases.

One company, Juno Therapeutics, was founded in 2014 and quickly raised \$265 million from investors. Clinical trials of one of its cancer therapies were promising, and Juno was acquired by another firm, Celgene, for \$11 billion in 2018. Last year, Celgene was absorbed by Bristol Myers Squibb for \$74 billion.

After the Juno takeover, Harr, several Juno co-founders and a group of other scientists launched another company focused on engineered cells, Sana Biotechnology, with Harr as president and CEO.

“We want to build something that is transformative in its impact for patients,” Harr said then. Sana focuses on engineering cells, with a goal of being able to repair or replace damaged cells. Examples include repairing the genetic mutations of inherited diseases and replacing cells after an insult, such as type 1 diabetes or a heart attack. The goal is to give patients a single treatment that leaves them free of the symptoms or even the underlying cause of disease.

Last October, Harr spoke at The Johns Hopkins Hospital about moving academic discoveries into industry. “Academia focuses on the creative process of discovery,” Harr said. “Industry focuses on reducing things to practice. Often there’s this gap that occurs between the creative process and reducing disruptive science to practice. We have to figure out how to bridge it.

“The Hopkins ecosystem, with the breadth and quality of both the science and clinical care, sits in a special place. Given the scientific and clinical complexity of moving engineered cells from the laboratory into broadly available medicines, it has rare potential to serve as a center of excellence. Patient selection, a deep understanding of the science and excellence across multiple domains of clinical care will all be essential for this next era in medicine.” **NEIL A. GRAUER**

Global Neurologist

Birbeck is dedicated to improving neurologic care and training in sub-Saharan Africa.

Sir William Osler famously observed: “He who studies medicine without books sails an uncharted sea, but he who studies medicine without patients does not go to sea at all.”

That’s a sentiment emphatically endorsed by **GRETCHEN L. BIRBECK** (HS, internal medicine, neurology ’98; fellow, neurology, 2004–05). She echoed Osler in a 2014 article, “Careers in Global Neurology,” published in *Annals of Neurology*:

“One simply cannot develop a career in global neurology without some time working and living abroad. Trying to do so is like trying to complete a medical degree having read all the books but never having examined a patient.”

Now a neurology professor at the University of Rochester Medical Center, Birbeck spends from six months to a year in sub-Saharan Africa — treating patients, teaching caregivers and promoting advanced neurological care.

In 1994, toward the end of her time at the University of Chicago medical school, Birbeck took a five-month elective in rural Zambia. She says she became “hooked” on treating patients in poorly served communities there. Ever since, she has provided clinical care and conducted research in Zambia, where she is director of the Chikankata Epilepsy Care Team. Her research also includes the pathophysiology and determinants of outcomes of pediatric cerebral malaria in Zambia and Malawi.

Her Johns Hopkins Bayview Medical Center fellowship mentor, neurologist **PETER W. KAPLAN**, says Birbeck “is one of the most enthusiastic researchers I have met.” She studied electroencephalography with him and also collaborated on projects involving children with malaria who suffered seizures. The two continue to collaborate, he says.

The Johns Hopkins University Alumni Association presented Birbeck with its 2019 Global Achievement Award, praising her “unparalleled” efforts as “a true pioneer in the field of global neurology.” **NAG**



1997

SETH BLACKSHAW, of Baltimore, has received the 2019 Stein Innovation Award from Research to Prevent Blindness, the leading nonprofit organization supporting research aimed at the prevention, treatment or eradication of all diseases threatening vision. The award provides flexible funding of up to \$300,000 over three years to support Blackshaw’s goal of using insights gained from learning how individual cell types operate and whether they can be replaced in patients with neurodegenerative diseases.

2001

MICHELE A. MANAHAN, of Baltimore, has been named the 172nd president of MedChi, the Maryland State Medical Society, the largest physician organization in the state. An associate professor of plastic and reconstructive surgery, Manahan joined the faculty in 2007 after completing her internship and residencies in general and plastic surgery at Johns Hopkins.

2003

SEAN R. MOORE, of Charlottesville, Virginia, has been appointed chief of the Division of Pediatric Gastroenterology, Hepatology and Nutrition at the University of Virginia Children’s Hospital. He also currently co-directs the university’s Microbiome Initiative.

2004

SARAH POLK, of Baltimore, an assistant professor of pediatrics, was selected last October as one of 35 fellows for the Robert Wood Johnson Foundation Clinical Scholars Program. Polk is medical director of the Children’s Medical Practice clinic at Johns Hopkins Bayview Medical Center and also works closely with the Johns Hopkins Center for Salud/Health and Opportunity for Latinos. She was recognized for her leadership on a project involving immigrant Latina mothers

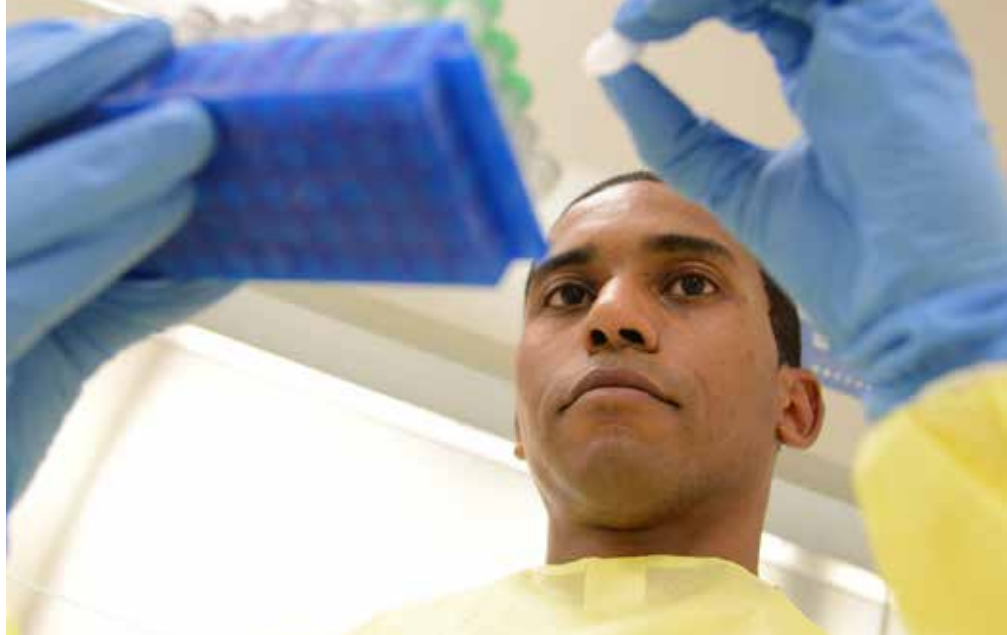
and their risks for depression and unmet social needs. She and other members of a scholars program team will receive funding and salary support of up to \$525,000 over three years to collaborate on a project to address complex health problems.

2005

CHETAN BETTEGOWDA, of Baltimore, a professor of neurosurgery and oncology, and director of the Meningioma Center, has been named head of the Physician Scientist Training Program (PSTP). Founded in 2016, the PSTP enhances the medical school's long-held status as a national leader in physician-scientist training. Among other activities, it hosts workshops to teach skills for success in research, provides constructive feedback on papers and funds proposals. It also provides travel allowances to enable students, residents and junior faculty members to attend scientific meetings, and funds mini-grants for exploratory research projects.

2007

FASIKA A. WORETA, of Baltimore, an assistant professor of ophthalmology who specializes in cataracts, corneal/anterior segment disease, corneal diseases and ocular immunology, has been named 2019 Physician of the Year, one of six honors bestowed annually by the Johns Hopkins Medicine Clinical Awards for Physicians and Care Teams. Woreta was nominated based on her attention to continuous improvement, commitment to evidence-based medicine and focus on continuing medical education.



Impatient Visionary

Kinde is focused on making early detection of cancer a routine affair.

In 2012, *Forbes* magazine published its annual list of the 30 Under 30 people deemed the brightest rising stars in 15 fields. All were dubbed “impatient to change the world.”

ISAAC A. KINDE '15 fit that criterion. Then a 29-year-old M.D.-Ph.D. student at Johns Hopkins, he already had applied for patents on his techniques for improving DNA sequencing accuracy.

Kinde also was helping develop a revolutionary blood test, CancerSEEK, collaborating with **BERT VOGELSTEIN '74**, **KENNETH KINZLER '88**, **NICKOLAS PAPAPOPOULOS** (fellow, oncology, 1993–97; faculty 2006–present), **LUIS DIAZ** (HS, fellow, faculty, 1998–2016) and **SHIBIN ZHOU** (fellow, 1994–98; faculty, 2008–present).

CancerSEEK aims to improve the early detection of multiple types of cancer, many of which — such as ovarian and pancreatic cancers — do not have screening tools available. The goal is to make it part of routine medical exams, since cancers are more likely to be treated successfully if diagnosed early.

After graduating from Johns Hopkins as a nationally recognized molecular cancer diagnostics expert, Kinde became chief scientific officer for PapGene, a company founded in 2014 to commercialize Johns Hopkins-developed “genetic cytology” technologies for the early detection of cancer.

In 2019, Kinde became a co-founder and head of research and innovation at Thrive Earlier Detection, which acquired PapGene. Thrive launched with a \$110 million Series A financing — the largest-ever, early-round investment in a Johns Hopkins-created technology firm. Thrive’s mission is to advance CancerSEEK and make earlier detection of multiple types of cancer a part of routine care.

“The excitement I felt in the lab Bert and Ken co-directed is even more tangible now because of how much closer we are to delivering on the mission that was started long before my time at Hopkins. Thrive is the culmination of lots of people’s efforts and insights into developing a test we think will help patients,” Kinde says.

The Johns Hopkins University Alumni Association honored Kinde with its 2019 Outstanding Recent Graduate Award. **NAG**

HOUSE STAFF, FELLOWS AND FACULTY

EDWARD S. BESSMAN (HS emergency medicine, 1982; faculty, emergency medicine, 1992–present), of Baltimore, has received an Excellence in Service and Professionalism Award from the Office of Johns Hopkins Physicians. The Johns Hopkins Medicine Clinical Awards for Physicians and Care Teams were launched in 2015 to honor those who embody the best in clinical excellence. Bessman has worked in Johns Hopkins Bayview Medical Center’s Department of Emergency Medicine for 28 years, including 20 years as director. He has been senior director of faculty practice in the department since 2017.

MARK F. TEAFORD (fellow, cell biology and anatomy, 1983–84; faculty, cell biology and anatomy, 1984–2015), of Vallejo, California, has received the American Association for Anatomy’s 2020 Henry Gray Distinguished Educator Award, the highest award in the country for anatomy education. He currently is a professor and vice chairman of basic sciences of Touro University’s College of Osteopathic Medicine. An anthropologist and anatomist, he has specialized in what the wear on teeth can reveal about a creature’s diet.

CHRISTOPH STEIN (faculty, anesthesiology and critical care medicine, 1992–97), of Berlin, Germany, has been named to the editorial board of *Scientific Reports* and a member of the Narcotics Board in the German Ministry of Health. He served as professor and chair of anesthesiology and critical care medicine at Freie Universität Berlin from 1997 to 2018, when he became chair of the workplace of experimental anesthesiology at Charité

Hospital’s Benjamin Franklin Clinic in Berlin. He has been invited to give the Founder’s Lecture at the International Narcotics Research Conference 2020.

TED M. DAWSON (fellow, neurosciences, 1990–92; faculty, neurosciences, 1992–present), of Baltimore, currently director of the Institute for Cell Engineering, has received a 2020 Zenith Fellows Award from the Alzheimer’s Association. The award recognizes the innovative science Dawson had used to contribute to the understanding of Alzheimer’s disease and dementia. Specifically, the award cited Dawson’s work examining whether a protein known to cause nerve cell death in people with Parkinson’s disease plays a similar role in Alzheimer’s disease. He and the two other winners of the 2020 awards each will receive \$450,000 over a three-year period to support their research.

SUSAN L. GEARHART (HS; fellow, faculty, surgery, 2000–present), of Baltimore, an associate professor of surgery and oncology, received the Southern Surgical Association’s 2019 Shipley Award in recognition of her presentation of the best scientific paper at the association’s annual meeting. The award is named for Arthur Shipley (1878–1955), who in 1911 was named the first surgeon-in-chief at Johns Hopkins Bayview (then Baltimore City Hospitals).

JOSEPH W. STAUFFER (HS, anesthesiology and critical care medicine, 2000–02; part-time faculty, anesthesiology and critical care medicine 2002–16), of Princeton, New Jersey, was appointed last May as chief medical officer of Inheris Biopharma Inc., a wholly owned subsidiary of Nektar Therapeutics. It will focus on developing and marketing drugs for central nervous system disorders.

MARY ARMANIOS (fellow, oncology; molecular biology and genetics, 2003–05; faculty, oncology; genetic medicine, 2005–present), of Baltimore, was elected as a 2019 fellow of the American Association for the Advancement of Science, a lifetime distinction that recognizes her outstanding contributions to science and technology. Armanios, clinical director of the Telomere Center at Johns Hopkins, studies the dysfunction of telomeres, the protective ends of chromosomes, in an effort to understand the role of telomere abnormalities and DNA repair defects in disease susceptibility.

DIVYA SRIKUMARAN (HS, ophthalmology, 2009–10; faculty, ophthalmology, 2011–present), of Baltimore, was named one of *Baltimore* magazine’s Top Doctors for 2019. An annual peer review survey of the metropolitan area’s physicians led to the honor. An assistant professor of ophthalmology and chief of the Wilmer Eye Institute’s satellite office in Odenton, Maryland, Srikumaran specializes in cornea and external diseases, cataracts, and refractive surgery (LASIK).

RHEANNA PLATT (HS, pediatrics, 2006–09; faculty, psychiatry and behavioral sciences, 2013–present), of Baltimore, has been chosen to be one of 35 fellows for the Robert Wood Johnson Foundation Clinical Scholars Program. An assistant professor of psychiatry and behavioral sciences and medical director of the Latino Family Clinic at Johns Hopkins Bayview, Platt’s expertise includes child, adolescent and adult psychiatry, as well as child development and behavioral health. Her fellowship recognizes her leadership skills and ability to collaborate on projects that address complex health problems.

SCHOOL OF
MEDICINE

1949

CAPT. ERNEST F. LATHAM, of San Diego, a decorated, 32-year career U.S. Navy officer with tours of duty throughout the United States and overseas, including Vietnam, died on Dec. 26, 2019. He was 94. Entering the Navy, Latham, a gynecologist and obstetrician, “assisted the stork” on thousands of occasions, was a member of the American College of Emergency Physicians, and earned a Bronze Star, Combat “V” and RVN Gallantry Cross during his service in Vietnam. He retired from the Navy in 1977.

1959

MENELAOS A. ALIPOULIOS, of Weston, Massachusetts, a surgical oncologist who served on the medical school faculties of Harvard and the University of Massachusetts, and was chief of surgery at both Cambridge and Saint Vincent hospitals in Worcester for 15 years, died on Feb. 3, 2020. He was 89. A Navy veteran of the Korean War, Aliapoulos was a widely published expert in breast and colon cancer, as well as part of the team that discovered thyrocalcitonin, a previously unknown hormone. Aliapoulos also was a visiting professor in Russia, Kenya and Shanghai.

1964

DAVID C. LEVIN, of Bryn Mawr, Pennsylvania, longtime professor and chair of radiology at Thomas Jefferson University — as well as a former U.S. Air Force fighter pilot — died on Jan. 15, 2020, of head trauma after experiencing cardiac arrest at home. He was 85. From 1986 to 2002, Levin was the leader of radiological services at Jefferson. He established the Center for Research on Utilization of Imaging Services at Jefferson, and in 2008, an endowed chair was created in his name. An expert in vascular imaging and a prolific researcher on imaging utilization trends, he received gold medals from the



Formidable Recruit

Allen devised landmark neurosurgical operations.

Soon after **DONLIN LONG** (faculty, 1974–present) signed on as director of Johns Hopkins’ new Department of Neurosurgery in 1973, he asked **GEORGE S. ALLEN** to be his first faculty recruit.

“I didn’t ask Don what he was going to pay me; I didn’t ask him anything, except I said I’ve got to have a lab to continue my research,” Allen recalled three decades later.

That was precisely what Long wanted Allen (faculty, 1975–84) to do. Over the next nine years, Allen devised and perfected landmark neurosurgical operations, developed important new uses for existing medications, and rose rapidly in the academic ranks to a full professorship.

Allen died on Dec. 7, 2019. He was 77.

In Johns Hopkins’ operating rooms, Allen devised and performed the world’s first intracranial vertebral endarterectomy to remove blockage-causing plaque in the vertebral arteries and significantly improved the procedure for carotid endarterectomies, performed to prevent strokes in patients who have carotid artery disease.

Allen’s research at Johns Hopkins showed that nimodipine, a calcium-blocking drug, was extremely effective in preventing arterial spasms following operations for subarachnoid hemorrhages. It remains the go-to drug for preventing these potentially deadly spasms, benefiting innumerable patients.

In 1984, Vanderbilt recruited Allen to become the first head of its new Department of Neurosurgery. Over the next 25 years, he turned it into a powerhouse of productivity and innovation — adding 13 full-time faculty members, creating five subspecialty groups and training 45 residents.

“There was only one George Allen,” says **REID THOMPSON ’89**, a Johns Hopkins neurosurgery resident who succeeded Allen as head of Vanderbilt neurosurgery in 2010. “He was sharp, observant, creative and inventive. He was a tough taskmaster — with a heart of gold. His patients adored him, and he taught us — his faculty and residents — to treat patients as if they were family.”

NEIL A. GRAUER

American College of Radiology, the Radiological Society of North America, the Association of University Radiologists and the Society of Interventional Radiology.

1965

WILLIAM E. WOODWARD, of Oxford, Maryland, an epidemiologist and infectious disease expert whose research on diarrheal diseases had a worldwide impact, died of leukemia at his home on Nov. 16, 2019. He was 80. The son of Theodore E. Woodward, an internationally known University of Maryland infectious diseases expert, Woodward followed in his father's footsteps and earned an international reputation of his own. From 1967 to 1970, he served with the Epidemic Intelligence Service and the National Communicable Disease Center, now the Centers for Disease Control and Prevention. He was a member of a Southeast Asia Treaty Organization team that confirmed the efficacy of oral rehydration therapy, employing water, salt and sugar to bring diarrhea under control in Bangladesh. The therapy had been developed in the 1950s for infants by **HAROLD HARRISON** (1908–89) and **LAURENCE FINBERG** (1923–2016) at what now is Johns Hopkins Bayview Medical Center. Woodward was an assistant professor of medicine at Johns Hopkins from 1971 to 1973 and held faculty and research positions elsewhere before retiring in 2009.

FORMER FACULTY, FELLOWS AND HOUSE STAFF

EVAN CALKINS (HS, medicine, 1945–50), of Hamburg, New York, a much-honored gerontologist who was the first chair of the department of medicine at the University of Buffalo, then later the first head of its division of geriatrics and gerontology, died on Jan. 24, 2020. He was 99. In 1951, Calkins joined the Harvard faculty at Massachusetts General Hospital's arthritis unit, of which he rose to become head. In 1961, he was recruited to UB, where he created a large, nationally funded clinical and basic research program in its new department of medicine. Geriatrics became his focus. UB's geriatrics and gerontology division began as only one of seven in the nation, and its fellowship program became the largest of its kind.

FREDERICK H. LINTHICUM JR. (HS, otolaryngology, 1949–52), an internationally recognized expert in sensorineural hearing loss and temporal bone histopathology, died on Jan. 1, 2020, in his home in Malibu, California. He was 99. In 1958, he helped establish what now is the House Ear Clinic in Los Angeles and founded the Eccles Temporal Bone Laboratory, now the House Histopathic Temporal Bone Laboratory at UCLA. After winning numerous national and international awards for his work, he retired at the age of 96 from positions as a professor-in-residence at UCLA's David Geffen School of Medicine and as a clinical professor of head and neck surgery at USC medical school.

MICHAEL M. GEDULDIG (HS; fellow, medicine, 1960–62), of Mechanicsburg, Pennsylvania, a former professor of medicine and director of gastroenterology at Hahnemann Medical College, as well as a professor of medicine at Hershey medical school, died on Dec. 13, 2019. He was 89. Establishing a private practice in Harrisburg in 1964, he was the first board-certified gastroenterologist in central Pennsylvania. During his 40-year career, he served in leadership positions at local hospitals, became president of the Pennsylvania Society of Gastroenterology and belonged to numerous professional organizations.

THEODORE L. "TED" MOBLEY (HS, urology, 1960–61), of Scottsdale, Arizona, died of leukemia on June 13, 2019. He was 84. A highly regarded member of the Arizona medical profession, he was associated with Affiliated Urologists, a group practice with five locations in the Phoenix and Scottsdale regions. He served on the board of the Maricopa County Medical Society and as president of the medical staff for St. Joseph's Hospital in Phoenix from 1980 to 1983. In 2003, he joined the Carl T. Hayden Veterans' Administration Medical Center, where he continued to serve as a urologist until his death.

RICHARD T. "TIM" COUSSONS (HS, medicine, 1963–65), of Denver, the former chair of the Department of Medicine at Oklahoma University Health Sciences Center, died on Dec. 3, 2019. He was 81. A 1963 graduate of the University of Oklahoma medical school, he returned to it following his internship and residency at Johns Hopkins. His leadership roles there also included being chief medical officer and chief operating officer.

CHRIS P. TOUNTAS (HS, orthopaedic surgery, 1965–68), of Mount Pleasant, South Carolina, died on Nov. 26, 2019. A skilled hand surgeon, he received a patent in 1992 for inventing the disposable pneumatic digital tourniquet, used in hand operations. He also served as medical adviser to the 3M Company, which includes surgical products among the large list of the items it manufactures.

WILLIAM W. MORGAN JR. (HS; fellow, surgery, 1966–68), of Clyde, North Carolina, a nationally acclaimed pediatric surgeon whose life of achievements led to a two-hour 1979 NBC television profile that won an Emmy, died on Dec. 21, 2019, of complications from Parkinson's disease. He was 84. Morgan, a protégé of pediatric surgery pioneer **ALEX HALLER '51**, established the pediatric surgical programs at Memorial Mission Hospital in Asheville, North Carolina, and Washoe Medical Center in Reno, Nevada. He also was recognized for developing pediatric surgical techniques still in use.

JARED M. EMERY (fellow, ophthalmology, 1967–70), of Great Barrington, Massachusetts, a pioneer in cataract surgery whose patients included Lady Bird Johnson and former President George H.W. Bush, died on Nov. 29, 2019. He was 79. After his fellowship at the Wilmer Eye Institute, Emery joined the Cullen Eye Institute at Baylor College of Medicine. He was one of the earliest proponents of the cataract treatment technique phacemulsification. His 1974 study established the validity of the method, which remains the predominant procedure today.

PABLO E. DIBOS (fellow, nuclear medicine, 1969–71), who founded the nuclear medicine departments at Baltimore's Franklin Square and Good Samaritan hospitals, heading them for three decades, died on Dec. 19, 2019. He was 82. A native of Lima, Peru, he did his post-doctoral medical training at St. Agnes Hospital in Baltimore and settled here. With nuclear medicine pioneer **HENRY N. WAGNER JR. '52**, he co-authored the 1978 book *Atlas of Nuclear Medicine: Bone*. He also helped found and volunteered for years at the Esperanza Center's health clinic in Baltimore's Fell's Point, serving its growing Latino immigrant population.

GEORGE H. THOMAS (faculty, medicine, pediatrics, pathology, 1969–2014), of Baltimore, who spent his entire 45-year career as a physician/scientist at Johns

Hopkins, died on Dec. 12, 2019. He was 83. In addition to his professorships in the school of medicine, which included a faculty appointment in the McKusick-Nathans Institute of Genetic Medicine, he established and served as director of the Kennedy Krieger Institute's Medical Genetics Laboratory.

LEONOR T. RIVERA-CALIMLIM (fellow, pharmacology, 1970), of Bridgewater, New Jersey, who taught for 22 years at the University of Rochester medical school, died on Dec. 2, 2019. She was 92. Born in the Philippines, where she obtained her medical degree from the University of Santo Tomas in Manila, she pursued a U.S. State Department fellowship in clinical pharmacology at Indiana University Health Medical Center from 1963 to 1965. She and her family then moved permanently to the U.S., after she was invited to join the faculty at Rochester. Upon her retirement in 1994, she was named a professor emeritus.

OSMAR P. STEINWALD JR. (faculty, surgery, 1971–76), of Hobe Sound, Florida, a former president of the Chicago Society of Plastic Surgeons and one-time chief of the medical staff at Lake Forest Hospital in Illinois, died on Jan. 17, 2020. He was 82. The son of the founding director of The Johns Hopkins University's alumni relations office, Steinwald began his medical career in Baltimore, but in 1974, he moved to the Chicago area, having done his surgical training at Rush University Medical Center. He maintained a large private practice and volunteered with Interplast, a nonprofit organization that offers medical treatment to impoverished people overseas.

FLOYD J. MALVEAUX (fellow, allergy and clinical immunology, 1976–78), of Ellicott City, Maryland, former dean of the college of medicine and vice provost of health affairs at Howard University, died on Jan. 9, 2020, two days shy of his 80th birthday. A lifelong asthma sufferer, Malveaux's own condition influenced the path of his medical career. His research findings while a Ph.D. candidate in microbiology at Michigan State Univer-



‘Brain Team’ Protégé

Neurosurgeon Irving Sherman was also a generous benefactor to Johns Hopkins.

IRVING J. SHERMAN '40, the last surviving neurosurgery resident trained by Johns Hopkins' legendary brain surgeon Walter Dandy (1886–1946), died at his Palm Beach, Florida, home on Dec. 4, 2019. He was 103.

As a postdoc, Sherman undertook the rigorous, intense training on what was known as Dandy's five-physician “Brain Team.” Dandy demanded perfection, as well as a clockwork precision that enabled the team to perform “over 1,000 major operations per year,” Sherman later recalled.

In 1943, Sherman joined the U.S. Army, serving as a neurosurgeon in the 108th Mobile Auxiliary Surgical Evacuation Hospital that landed on Utah Beach in July 1944. He performed neurosurgery on the battlefield in 1944 and 1945 throughout France, Belgium, Holland and Germany, and was honorably discharged in 1946 at the rank of major.

Sherman served as chief of neurology at Columbia Presbyterian Medical Center and as a clinical professor at Yale before moving on to a long career practicing in Staten Island, New York; Bridgeport, Connecticut; and elsewhere.

In addition to his work as a clinician, Sherman was a philanthropist whose generosity to the departments of neurosurgery and neurology helped to support and advance brain science and neurosurgery at Johns Hopkins. “I like to help people,” Sherman said in 2016, when he turned 100. “That’s what doctors are for.”

In 2002, Irving and Florence Sherman established the Irving J. Sherman, M.D. Research Professorship in Neurosurgery as well as the Sherman Traveling Fellow Fund, which has supported overseas educational travel for more than 50 Johns Hopkins faculty members. In 2004, the Shermans' support helped create the Walter E. Dandy, M.D. Professorship in Neurosurgery. The couple also were among the lead donors to the Henry Brem Professorship in Neurosurgery, established in 2014, and gave substantial sums to establish five other endowed professorships. **NAG**

sity and as a fellow at Johns Hopkins led to the groundbreaking development of omalizumab, a medication that is effective in treating severe asthma. He oversaw the creation of Howard's National Human Genome Center, which concentrates on genetic variations and their relationships to the causes, prevention and treatment of diseases among African Americans. After retiring from Howard in 2005, Malveaux spent the next decade as executive director of the Merck Childhood Asthma Network.

IRA H. KOLMAN (faculty, medicine, 1989), of Baltimore, an audiologist and former head of the speech and hearing department at Loyola University of Maryland, died of complications from leukemia on Feb. 21, 2020. He was 77. After earning a Ph.D. in audiology and hearing science — and later a master's degree in public health from the Bloomberg School of Public Health — Kolman began his career as an audiologist and speech pathologist at Mount St. Agnes College, which later merged with Loyola. He was on its faculty from 1970 to 1985. He joined the University of Maryland St. Joseph Medical Center in 1991.

DEAN C. MAAR (fellow, orthopaedic surgery, 1991), of Indianapolis, was murdered by robbers who invaded his countryside cabin in Brownsburg, Indiana, Nov. 27, 2019, and shot him as he tried to protect his wife. He was 61. Maar was described by colleagues as “the cornerstone” of OrthoIndy, one of the Midwest's most respected orthopaedic medical groups, with 13 offices throughout Indiana, including its own hospital. Maar was instrumental in establishing the group's renowned trauma program, spending the bulk of his career treating seriously injured accident victims.

MICHAEL T. CROW (faculty, pulmonary medicine, 2002–16), of Baltimore, an associate professor of medicine and an innovative, inspirational scientist who was director of research in the Division of Pulmonary and Critical Care Medicine, died on Dec. 3, 2019, of Alzheimer's disease. He was 66.



A Pioneering Oncologist

Wolter was also a highly respected mentor to many.

When **JANET M. WOLTER** began practicing medicine in the 1950s, the word “oncology” was not yet part of the medical lexicon. Initially focusing on polio patients — in the days before the polio vaccine — she began her cancer care career in 1963 and went on to become a pioneer in the field.

“She was not just a leader in breast cancer patient care but breast cancer research,” says Ruta Rao, medical director of the Rush University Cancer Center.

Wolter (HS, medicine, 1952–53), the inaugural Brian Piccolo Chair of Cancer Research at Rush University Medical Center, died on Feb. 4, 2020, at her Chicago home. She was 93.

Her early initiatives included a 1970 clinical trial that assessed the value of a brief regimen of chemotherapy after a breast cancer operation — even if the operation was supposed to have removed all the cancer. That “adjuvant,” or adjunct to surgery, treatment proved successful. Her research also included trials of hormone therapy.

When Wolter herself developed breast cancer in 1984, she participated in many clinical trials, advancing her strong advocacy of them.

Wolter was also a highly respected mentor who would tell the physicians she mentored that they were Wolter-trained men (“WTM”) or Wolter-trained women (“WTW”) and needed to live up to that. “It was a call to excellence and a reminder to buck up when days were long and tough cases abounded,” noted the *Chicago Sun-Times*.

The first woman president of the Rush medical staff, Wolter received the National Surgical Adjuvant Breast and Bowel Project's 2004 Investigator Lifetime Achievement Award. She continued working 50-hour weeks into her 80s.

“I love it,” she said. “All these people are so interesting, and they're so grateful for whatever you do for them. It's the most satisfying thing you can do.” **NAG**

An Appetite for Networking

BY TRACY VOGEL

SHARING A MEAL OFFERS A VALUABLE OPPORTUNITY to bond.

That's the unassailable logic behind a dinner series hosted by Johns Hopkins University School of Medicine Alumni Relations, which brings students and alumni together to socialize, network and get advice during a relaxed meal out at a local restaurant.

The Molecules and a Meal series connects Ph.D. and M.D.-Ph.D. candidates and alumni, while Dine with a Doc brings together those with a medical focus. The business-casual dinners, which take place two to three times per year and include Underrepresented in Medicine and Science-specific events, attract a diverse group that ranges from neurosurgeons to researchers testing therapies for the U.S. Food and Drug Administration. Students get to benefit from the experiences of alumni who still work at Johns Hopkins and those who have moved into different areas, including government and industry.

When **MICHAEL FLIOTSOS '21** signed up for his first Dine with a Doc dinner, he was thinking of the alumni donations that have helped make Johns Hopkins an option for him. "These are alumni who are passionate about education, and I thought that would be a rich and meaningful experience," he says. "And then I went to one, and it was also so much fun."

An M.D. student with plans to pursue a residency in



Left to right, Eugene Shenderov '13 and students Sahba Seddighi, Alex Girgis, Max White and Chirag Vasavda.



Left to right, Student Malgorzata Latalo, Ethan Nyberg '19, Charlene Depry '12, and students Stephanie Pitts and Beza Woldemesel.

ophthalmology, Flioticsos met professionals in his field, including an ophthalmologist of more than 30 years. "It was so cool getting his perspective about the field I'm going into and how it's changed dramatically over his career, because we'll experience similar change," he says.

ELIZABETH PEIJNENBURG '18, an anesthesiology resident at The Johns Hopkins Hospital, found that questions at Dine with a Doc differed based on what year students had reached in school. The first- and second-years chatted with her about teachers in common, her own medical school experiences and the transition from preclinical to clinical student. Third- and fourth-year students were curious about the interview process, what it's like to be a resident and how to make it through the difficult intern year.

"One question that frequently came up was how to choose the career you're going to be doing for the rest of your life, because that is a very daunting task for younger medical students," she says.

Molecules and a Meal offers a glimpse into the paths available to school of medicine Ph.D. and M.D.-Ph.D graduates and also highlights a shift in perspective that's occurred over the years, says **PETER ESPENSHADE**, associate dean for graduate biomedical education and a cell biologist, who recently served as the host of the Ph.D. dinner.

"Many years ago, if a student discovered they didn't want to pursue an academic career, they often felt like a failure. Our alumni are excited to see how we've used events like Molecules and a Meal to change the culture here and celebrate nonacademic careers," he says. "In reality, the majority of our graduates [like those at] all schools in the U.S. move into nonacademic careers, and we're training people for that. However, it is less obvious how to access these careers. These personal interactions reinforce that it's possible. If you know their story and you know that they made it, it shows that you can make it too."

The dinners can also offer that kind of reinforcement to alumni attendees, says Peijnenburg. "I was able to discuss with them what their different career paths looked like and why they made the decisions that they did," she says. "And that allows me to look forward toward the next step in my life as well." ■

A Permanent Path for Telemedicine

BY JUSTIN C. MCARTHUR

IN THE PAST SIX WEEKS, MY PRACTICE AS A NEUROLOGIST IN academia has changed drastically. I still see some hospitalized patients, including those with COVID-19, but most of my clinical time is spent in providing telemedicine visits. We have scaled up from 10 “teleneurology” visits weekly before COVID-19 to now conducting 95 percent of visits with this platform.

Prior to the pandemic, many institutions struggled with the logistical challenges of enacting telemedicine in such a complicated health care climate. But the COVID-19 crisis enabled the Centers for Medicare & Medicaid Services (CMS) to relax rules over the use of and reimbursement for telemedicine services for Medicare recipients. (This was formerly only covered for patients in rural areas.) Now that the trial-by-fire dust has settled, most neurologists say they strongly support the federal government continuing to relax the regulatory hurdles to providing telemedicine services to Medicare recipients or to patients in other states.

Personally, the ability to continue to provide care remotely has been a sanguine experience, assuring me that patients who need care can continue to receive it. Just these past two weeks through using telemedicine, I gave a new diagnosis of multiple sclerosis to several patients and treated new-onset seizures and concussion. I also continue to see my established patients, adjusting their medications, assessing the treatment response and ordering diagnostic tests. To be clear, telemedicine can substitute for office visits, but it isn't a replacement for emergency care in the case of serious injury, heart attack or stroke.

My patients report a very positive experience and appreciate connecting during the pandemic. For patients with neurological disorders that affect mobility, telemedicine represents an opportunity for in-home visits and prevents the necessity of burdensome, sometimes expensive and, in the COVID-19 era, potentially unnecessary travel to a distant clinic. An added advantage: The neurologist can see the home environment and easily conduct a quick survey of potential safety issues.

We neurologists often say our discipline relies more on phys-

ical examination than other specialties. While true, we developed new methods and tools to perform and quantify elements of neurological exams during a televisit. Now, we conduct remote cognitive assessments; assess tremor, strength, dexterity and walking ability; and even examine the retina using smartphone photographs of the eye.

Even before COVID-19, research suggested — though the evidence was inconsistent — that teleneurology visits could improve access, reduce costs and improve health outcomes, particularly for patients living in areas under-served by neurologists.

In addition to clinical care, telemedicine holds promise to reduce access barriers to neurological clinical trials.

Given the excitement over the potential for teleneurology to revolutionize access and convenience for our patients, what are the challenges?

Much has been written about the disproportionate impact of COVID-19 on people of color and underserved populations. This certainly applies to access to telemedicine. Bridging the digital divide will require significant investment in broadband access both in rural and low-income urban areas. Another barrier to care exists for neurology patients with vision, hearing or cognitive issues. These

technical challenges aren't adequately addressed on our current platforms, and we need creative solutions now.

Although the telemedicine expansion via CMS is temporary and on an emergency basis, several barriers remain from implementing telemedicine permanently. More permanent low-cost platforms that maintain patient security and privacy need to be developed, and enacting either a national licensing practice or removing state-to-state practice barriers will be necessary following the pandemic.

Enabling permanent changes at the federal level will allow neurologists and other specialists to better care for an increasingly aging population efficiently, conveniently and safely, both during the COVID-19 crisis and afterwards. ■

Justin C. McArthur is director of the Department of Neurology at Johns Hopkins. Excerpted from U.S. News and World Report, “Establishing a Permanent Path for Delivering Neurological Care Via Telemedicine.”



HANNA BARCZYK



Confronting Crisis with Courage

BY PAUL ROTHMAN, M.D.

AS I WRITE THIS, I KNOW THAT ALL OF YOU ARE INCREDIBLY busy dealing with the unprecedented challenge of COVID-19. This crisis requires enormous dedication and sacrifice from all of us, and I know that each of you is doing everything you possibly can to help.

We are immensely grateful for the courage and dedication of all of our staff members, especially those who are on the front lines: doctors, nurses, technicians, environmental services workers, cafeteria workers and so many others. Our gratitude also extends beyond Johns Hopkins, to all front-line health workers, all over the country. All are working so hard, under enormously demanding circumstances, doing everything possible to help those whom they serve.

At Johns Hopkins, our entire institution is focused on caring for patients during this health crisis and pressing forward with the research that will help us defeat this epidemic. We are treating patients with COVID-19 at all of our hospitals, and to prepare for an expected surge in cases, we have partnered with the University of Maryland Medical System to set up a field hospital in the Baltimore Convention Center. **JIM FICKE**, director of orthopaedic surgery at Johns Hopkins, who has considerable military field hospital experience, is the medical director.

We continue to do hundreds of COVID-19 tests a day and are continuing to ramp up. No one who meets criteria for testing is being denied. We have implemented platforms that allow quicker testing and are exploring other promising technologies that may reduce the turnaround times even further.

Our scientists are also doing all they can. As you'll read on page 5, a group of Johns Hopkins researchers has embarked on a study to see whether blood plasma from recovered coronavirus patients can help others suffering from COVID-19. Early studies on the therapy done in China are promising; if confirmed by trials in the United States, the approach could dramatically lessen the severity of the virus for many patients.

Longer term, Johns Hopkins scientists **T.-C. WU** and **CHIEN-FU HUNG** are diligently working to develop a coronavirus vaccine. They are working tirelessly, but to ensure the vaccine is safe, it may take up to 18 months to move from the lab to human trials.

And Johns Hopkins engineers are pushing to develop a 3D-printed ventilator splitter that won't lead to cross-contamination and will allow for independent control of air flow for each patient. **SUNG HOON KANG**, a mechanical engineer at the Johns Hopkins Whiting School of Engineering, is leading a team that includes ICU intensivists and pulmonary specialists at the school of medicine.

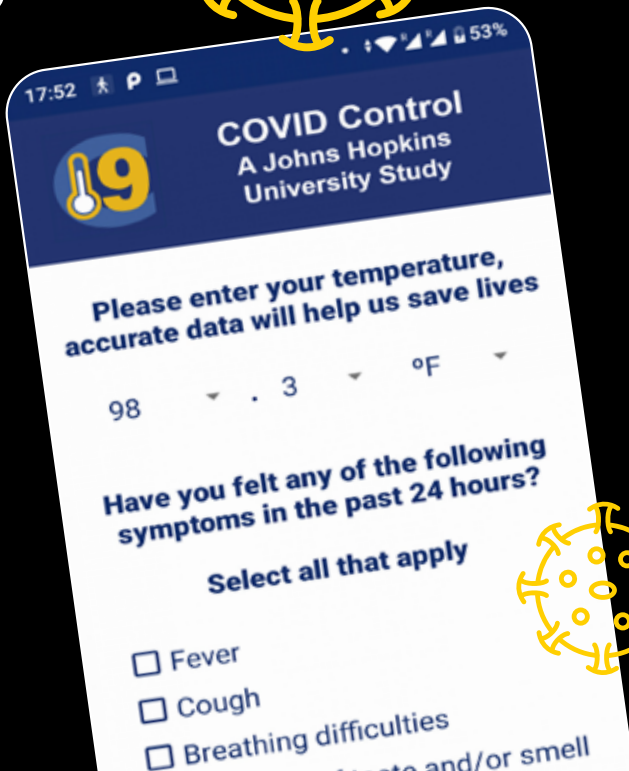
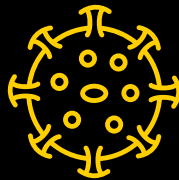
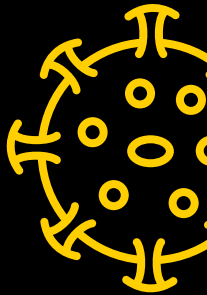
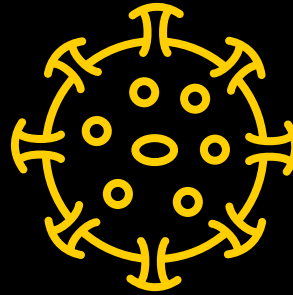
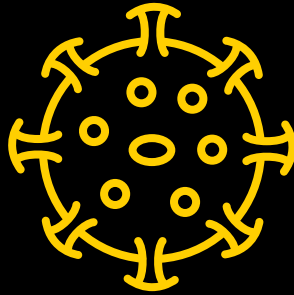
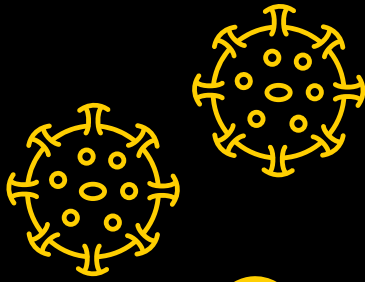
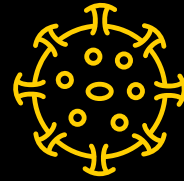
We are also grateful for support from the community and from our fellow health care providers around the region. The Johns Hopkins Health System has entered into a partnership with other area health providers, including the University of Maryland Medical System, as well as Baltimore City and health insurer CareFirst BlueCross BlueShield. The goals are to provide area residents with helpful information on coronavirus and

with phone and online help from health care professionals. In addition, Johns Hopkins Medicine and Under Armour are working together to manufacture masks for use by the Johns Hopkins Health System. Under Armour's high-speed fabric cutting machines are cutting nearly 100 pieces of fabric at once and are producing 300,000 masks per week, for use by a range of Baltimore area hospitals. We are also partnering with the Baltimore distillery Sagamore Spirit to manufacture disinfectant for use by the Johns Hopkins Health System. The distillery, which usually makes whiskey, is producing tens of thousands of liters of hand sanitizer, with more on the way.

As we continue to battle this pandemic, I want to thank everyone at Johns Hopkins, and at all the hospitals and clinics across the country, for your courage and dedication. ■



HANNA BARCZYK

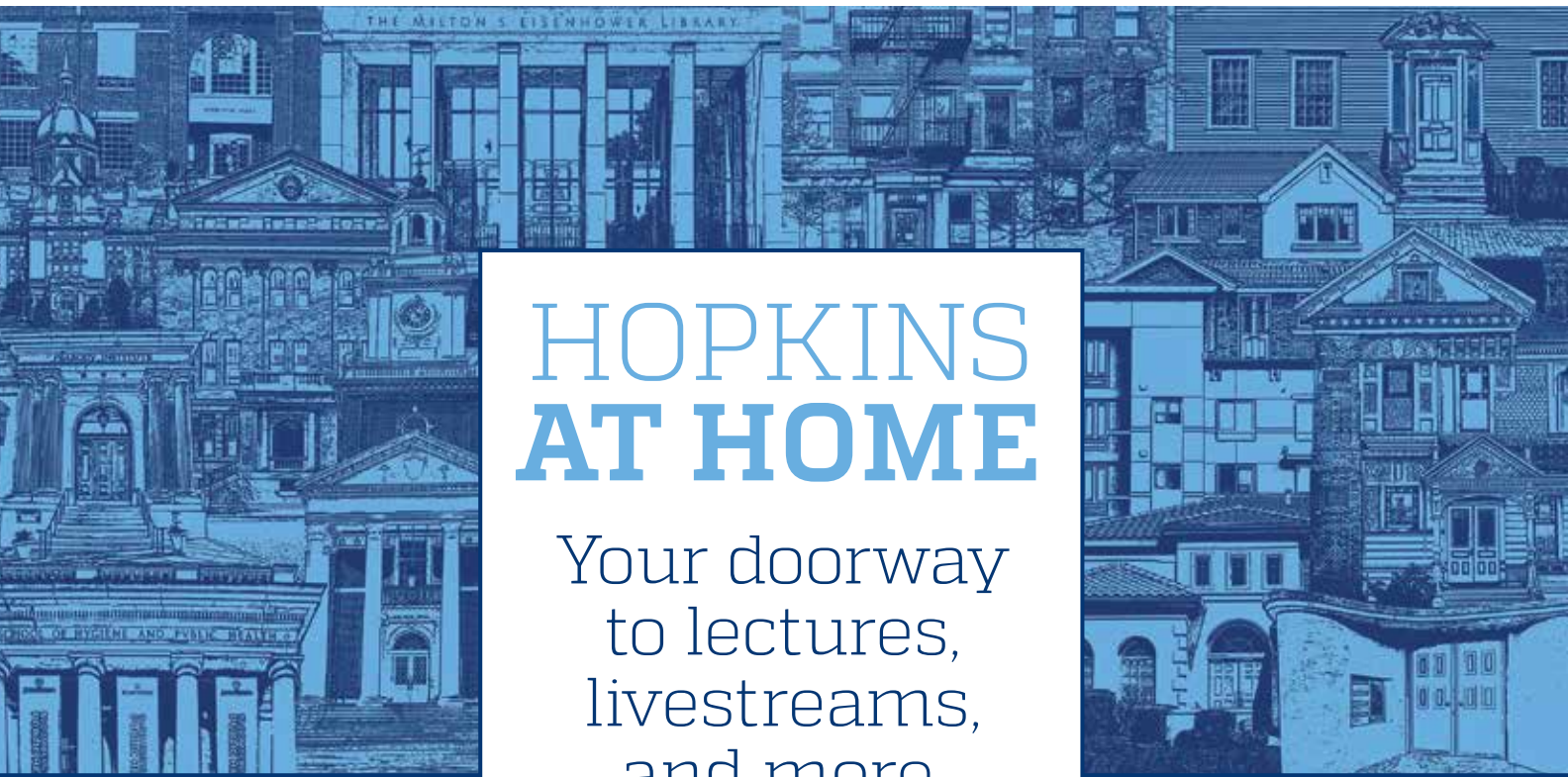


Tracking Hot Spots

In the weeks to come, tracking hot spots of fevers across the United States will be key to containment of COVID-19, believes a Johns Hopkins team that has developed a smartphone app that analyzes a user's body temperature as part of a study to predict geographical areas at risk of outbreaks. The study relies on users recording their body temperatures, as well as other symptoms, daily. COVID Control is available on Google Play and the Apple Store and is very easy to use: It takes fewer than 10 seconds to submit data daily and will allow users to view results via a dashboard of analytical maps. The team hopes to reach a large sample of the population nationwide.

"Because we will be getting this information before people will be seeking health care, this can aid the deployment of resources in a time-sensitive manner," says team member **ROBERT D. STEVENS**, associate director of the Precision Medicine Center of Excellence for Neurocritical Care at the school of medicine. **WICK EISENBERG**





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