

TMC | PULSE

NEWS OF THE TEXAS MEDICAL CENTER — VOL. 6 / NO. 9 — OCTOBER 2019

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WILLIAM F. McKEON

President and Chief Executive Officer, Texas Medical Center

My early childhood memories of robots come from dark science fiction movies, where these lifeless objects play menacing roles.

But as you can see from the photo on the cover of this magazine, robots in the real world aren't scary. In fact, they'll play an increasingly significant role in advancing health care within the Texas Medical Center.

Robots offer us an exciting opportunity to improve our treatment of patients and to streamline our processes. For nearly 20 years, surgical robots have assisted surgeons. A physician stationed at a terminal can direct a surgical robot, sometimes known as a "telem manipulator," to perform work with an incredible degree of precision. Robots also allow surgical procedures to be performed remotely, when a patient requires surgical expertise that is not available locally.

I am very excited to welcome ABB, the largest robotics company in the world, to the Texas Medical Center. Its mission here is to work closely with our physicians and researchers to identify and develop new, innovative applications for robots to transform health care beyond the operating room.

When I arrived in Houston six years ago, I'll admit: I was dismayed at the lack of leading technology companies operating in the world's largest medical city. We had some of the most talented clinicians and researchers on the planet, but we were missing the requisite industry presence that could accelerate our discoveries into technologies that better serve patients.

Today, that's all changed. We're now home to Johnson & Johnson (the largest health care company in the world), AT&T (the largest telecommunications company in the world) and now ABB (the largest robotics company in the world). Of course, this is just the beginning, as we will soon break ground on TMC³, our 37-acre campus designed specifically to encourage collaboration between our researchers and industry partners.

Robots will undoubtedly play a vital role in supporting our researchers as they develop cutting-edge treatments that help patients overcome disease. And just as they have for generations, robots will continue to push the boundaries of our imaginations.

A handwritten signature in black ink that reads "William F. McKeon". The signature is fluid and cursive, with a large, stylized 'M' at the end.

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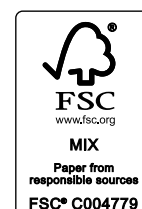


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daughter, Jaelyn, to rehabilitation therapy.

ON THE COVER: International robotics company
ABB is opening a new facility within the Texas
Medical Center Innovation Institute.



'Best Intentions' Won't Solve Implicit Bias

Medical institutions are creating arenas of awareness and understanding

By CINDY GEORGE



When you encounter a new person and start to write a story in your mind about them based on nothing more than your own experiences, that is called implicit or unconscious bias.

Implicit bias encompasses attitudes and assumptions about race and ethnicity, but also gender, weight, age, social stratum and other classifications.

In some ways, making snap judgments is how we order our world—slotting people quickly into our own predetermined categories.

But in medicine, implicit bias creates blind spots that can have real consequences for health outcomes.

Physical therapy students, for example, who tend to be young, athletic and fit, have confessed to biases against heavier patients or those with sedentary lifestyles, said Jeffrey S. Farroni, Ph.D., J.D., an associate professor of clinical ethics with the Institute for the Medical Humanities at The University of Texas Medical Branch at Galveston (UTMB). After learning about their unconscious attitudes, those same students aimed to transcend those thoughts to ensure that they provided all of their patients the same

level of care.

"It's compassionate honesty that puts us in a position to do our jobs better and take care of folks," Farroni said. "How can we get better if we don't challenge ourselves?"

For the past two decades, the implicit association test, or IAT, has helped people recognize their personal biases. Created in 1995 and first published in scientific literature in 1998, the IAT has become the foundation for equity, diversity and inclusion training across institutions in the Texas Medical Center and beyond. The test helps to educate medical students, edify employees and hire leaders.

The IAT quizzes different associations between photos, other images and words to determine whether someone has slight, moderate, strong or no preferences. For instance, to measure leanings toward Republicans or Democrats, quick-fire images of Ronald Reagan, Barack Obama, an elephant or a donkey appear. If you are faster responding to associations that pair "good" and "Republican" than associations that pair "good" and "Democrat," then you likely have some preference for Republicans over Democrats.

Baylor College of Medicine professor Anne Gill, DrPH, started working with bias after reading a 2007 medical journal article about how blood clot treatment for black and white patients could be predicted by the results of physicians' IATs. The groundbreaking study was the first to analyze whether unconscious racial bias predicted the clinical decisions of doctors.

"It was a very moving and compelling article that really began to show that our unconscious bias or our implicit biases *do* impact the way care is rendered," Gill said. "What was remarkable in this particular article was that the physicians that were included in the study were residents and so they were much younger and much more progressive and really felt that they did not have any biases."

The best intentions

One phrase in the article captured Gill's attention: "Implicit biases may affect the behavior even of those individuals who have nothing but the best intentions."

The best intentions.

Around the same time, Baylor received a National Institutes of Health grant to increase behavioral

and social sciences training in medical education. Gill used the funding to develop a workshop to determine whether or not the course was a useful strategy to identify bias.

It was. And not long after, Baylor added the unconscious bias workshop—taught by Gill until recently—to its third-year medical school curriculum.

"When we first began, it was so new and novel," Gill said. "Now, the students seem to be much more accepting of the process and more willing to admit that they have biases and they are concerned. They want to know how to deal with them."

But initiating conversations about sensitive topics isn't easy.

"The challenge from an educational point of view is how you make these topics resonate for people," Farroni said. "The great example is white privilege. I'll bring that up in some sessions and you see white students' eyes bulge out like: *What are you talking about?* or like it doesn't apply to them. When you open up that space, it's tricky. These tend to be very delicate topics that we tend to not talk about, which is why we need to. If you can create a space where students can explore these things and look into

themselves, it's pretty amazing how it opens their eyes."

Students at McGovern Medical School sit for mandatory unconscious bias lectures and "are encouraged to take the IAT," said LaTanya J. Love, M.D., vice president for diversity and leadership development at The University of Texas Health Science Center at Houston (UTHealth), which includes schools of nursing, dentistry and public health. She also serves as associate dean for admissions and student affairs, associate dean for diversity and inclusion and associate professor of pediatrics at the medical school.

"We're trying to bring a lot more awareness to what unconscious bias is and how it can affect health care delivery, how there can be unconscious bias against a health care provider and—once we recognize our own biases as health care providers—ways that we can overcome them," she said. "It's our responsibility to bring awareness in this diverse city."

In her role at UTHealth, Love has helped develop unconscious bias training for members of search committees, which are usually formed to fill leadership positions, such as dean, department chair or division director, "so we don't potentially overlook a wonderful leader," she said.

UTHealth also has worked with its partner, Memorial Hermann Health System, to address bias against health care workers.

"For instance, a patient says I don't want a doctor of a particular ethnicity, religion or gender. How do we handle that?" Love said. "We formed a committee to come up with policies about handling these types of situations."

Unconscious bias classes have been offered for the last eight years at The University of Texas MD Anderson Cancer Center, but are

now a mandatory part of annual training, said Larry Perkins, Ph.D., associate vice president of talent and diversity. Weekly courses are offered for the center's 21,000 employees and 3,000 leaders.

The commitment stems from Houston's status as a majority-minority city.

"Over 50 percent of our employees come from an underrepresented group. Our patient population is diverse. We have a global patient population. On any given day, 54 different languages can be heard in this institution," Perkins said. "Awareness is our priority. In our new employee orientation, we talk about diversity and inclusion."

In an era of mass shootings that sometimes target specific racial, religious and ethnic groups, medical personnel serve on the front lines, delivering trauma care to victims in emergency departments, psychiatric support to survivors and comfort to the families of the deceased. In such a high-stakes environment, medical workers who are trained to confront and push against their own biases have taken a significant step toward healing a troubled nation.

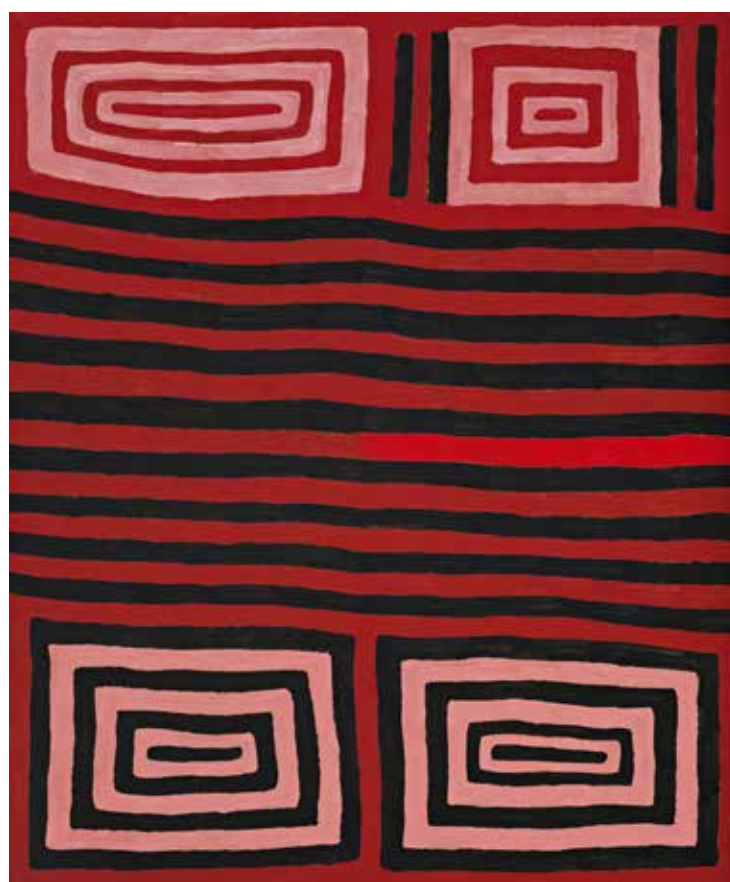
The implicit revolution

The "implicit revolution" is still evolving, said Janice Sabin, Ph.D., research associate professor at the University of Washington School of Medicine who works with IAT co-creator Tony Greenwald, Ph.D.

"It's a whole new way to understand why extremely well-meaning people can potentially behave in a biased way. In health care, people are altruistic and very well intentioned, so why are there still disparities in care?" she asked. Then she answered: "Bias in medical decision-making has been studied for 30 years. It's basically how our minds work. We make snap judgments. We assess things quickly so that we actually function in our world." ➡

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Ronnie Tjampitjinpa, *Tingari Cycle at a Site Adjacent to Wilkinkarra*, 1994. Synthetic polymer on canvas, 72 1/8 x 60 1/4 in. (183 x 153 cm). Fondation Opale, Switzerland. © Copyright Agency/Artists Rights Society (ARS), New York, 2019. Image courtesy of Fondation Opale, Lens, Switzerland. Photo: ReDot Fine Art Gallery

Sabin, who also is affiliated faculty of the University of Washington medical school's Center for Health Equity, Diversity and Inclusion, commends organizations that use the IAT, bias training and ongoing discussions, but cautions that the test itself should remain voluntary.

"We never force anyone as homework or as part of a program to take an IAT because to go into that cold and not know what that really means can be damaging," she said. "Giving people context on what an IAT result means is super important. You can come away demoralized or defensive. ... Understanding what it means—that you make associations really quickly and that this could impact patient care—that's the crux of what people need to know."

Baylor, UTHealth and UTMB are among the TMC institutions that spread awareness of unconscious bias to admissions, faculty hiring and health care delivery.

"One of the key things about implicit biases is that people generally don't know that they have

them," said social psychologist Kate Ratliff, Ph.D., an associate professor of psychology at the University of Florida. "We have these associations that can influence our judgment and the way we behave, but people typically aren't very aware of them. The IAT and measures like the IAT allow us to assess them."

Ratliff is the executive director of Project Implicit, an international collaboration of researchers including IAT co-creator Greenwald who are interested in implicit social cognition. The nonprofit advises universities, medical schools, corporations and other organizations about ways to reduce bias.

The test is not designed as a diagnostic tool, but as an educational first step that "can be really eye-opening for people who generally think that they're unbiased," Ratliff said.

Test results can bring people to new realizations about themselves.

"After that, the question is developing practices that help prevent those biases from influencing

behavior," Ratliff said. "You have to actively work to figure out how you're going to stop those biases from influencing how you actually treat patients."

'Off Label'

That's been the goal of a constellation of efforts at UTMB, where bias training has challenged health care provider assumptions about patient immigration status or disposition.

Farroni cites the frustration of physicians who complain about "non-compliant" patients—those who don't follow the prescribed treatment regimen.

"Maybe what's happening medically right now is not the most important thing in their life and it's just not a priority based on these other things," he said, reflecting on how he counsels doctors. "Now, to a medical person, they say: What do you mean? But, people have complicated lives."

Another arena of reckoning at UTMB is an employee gathering called "Off Label," where

participants meet without wearing their identification badges.

"We get rid of hierarchies and there's no agenda—it's just whatever is on your mind. The only rules are to be respectful and attentive," Farroni said. "The experience has been awesome."

In one instance, some nurses were upset about the gravely ill patients selected for care on a floor.

"In that session, there was a senior faculty physician who got to listen to the experiences of the nurses who were faced with the consequences of decisions he was making as a physician. He had never gotten to hear that before," Farroni said. "He never had to be with the patients for long periods of time. What he also got to do was to provide an explanation about the decisions he made and the nurses understood. They were able to break down communication barriers and they all came away with new understanding." ■



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NEXT MED

New technology and techniques

By Shanley Pierce

A quick and easy data grab ... from your mouth

Aidar Health, formerly known as Multisensor Diagnostics, has developed a portable hand-held device that allows patients to measure and track vital signs in a matter of seconds.

Roughly the size of an iPhone, MouthLab consists of a hand unit and a mouthpiece that fits between the teeth and lips. The mouthpiece uses special sensors to gather information from breathing patterns, saliva and blood vessels in the lips and hands. Users inhale and exhale into the mouthpiece and, within 30 seconds, MouthLab measures 10 different parameters of their health: temperature, blood pressure, electrical activity of the heart, oxygen saturation, pulse rate, respiratory rate, breathing pattern, heart rate, heart rate variability and lung function.

“Let’s take, for example, a credit report or FICO score,” said Sathya Elumalai, president and CEO of Aidar Health. “People don’t look at it every single day, but if something is wrong and there’s a negative effect, they look at it. Those scores are not determined based on your credit card performance. It’s based on several other factors. Similarly, when it comes to health, there’s a variety of factors responsible for somebody’s health. We are collecting only a tiny percentage ... but everything adds value.”

The information is securely stored in the cloud and sent in real time to patients, caregivers and health care providers using technology to connect directly to a 4G network, called LTE-M.

Currently, MouthLab aims to help patients manage ongoing diseases, specifically heart failure and chronic obstructive pulmonary disease (COPD), but Elumalai said he plans to add more sensing capabilities to the device in the future to read other biological indicators of health, making it a useful monitoring device for everyone.

“The ultimate goal is to measure all the different parameters,” Elumalai said. “Ideally, we want every single individual in the world to use it. It is not just a device for helping patients, but we wanted to have this device as a daily monitoring tool.”

Aidar Health, which participated under its previous name in the TMC Innovation Institute’s TMCx accelerator program, is currently conducting clinical studies at Johns Hopkins University and plans to submit its application for U.S. Food and Drug Administration approval early next year. ■



Targeting Triple Negative Breast Cancer

Researchers are working on a new therapy for the nearly 50 percent of TNBC cases that are resistant to chemotherapy

BY ALEXANDRA BECKER

When chemotherapy fails, what's next? That's the question researchers at The University of Texas MD Anderson Cancer Center are trying to answer for patients with triple negative breast cancer (TNBC), which responds to chemotherapy only 50 percent of the time.

"The standard of care right now for all women with newly diagnosed TNBC is frontline chemotherapy, and that's because half of the women do very well. At the end of their course of treatment, they'll have very little to no tumor left," explained Helen Piwnica-Worms, Ph.D., a professor of experimental radiation oncology at MD Anderson. "However, 50 percent of the women will have significant residual tumor left. For those women, we have no molecularly targeted therapies to offer at this time, and most of them, within 3 to 5 years, succumb to their disease. This is very much an unmet need."

TNBC has a poorer short-term prognosis than other subtypes of breast cancer according to the American Cancer Society, which estimates that 15 to 20 percent of the approximately 268,600 new cases of breast cancer diagnosed in women this year will fall into the TNBC category.

Triple negative breast cancer is defined by what it is not as opposed to what it is, Piwnica-Worms explained. It is named for what is absent in the tumor, meaning that the three most common types of receptors attributed to the growth of breast cancer tumors—estrogen, progesterone, and a human growth promoting protein, known as HER2/neu—are not present.

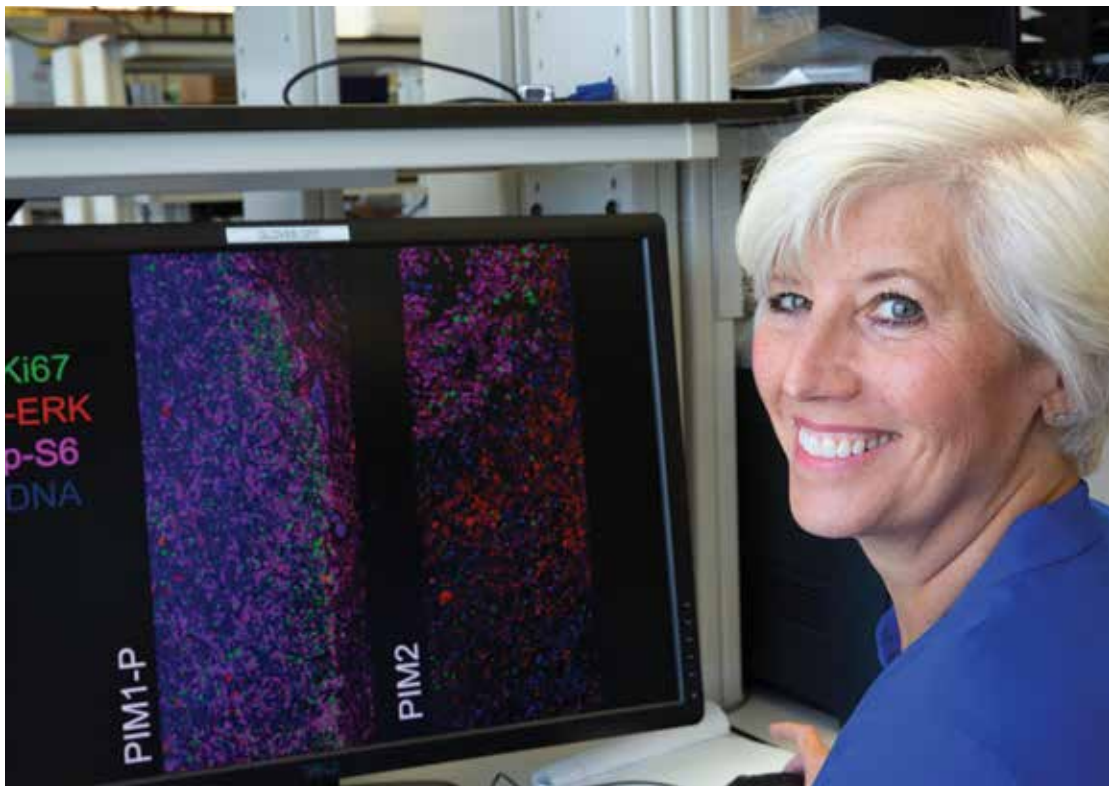
Identifying and developing molecularly targeted therapies for this type of breast cancer has been extremely difficult.

"TNBC is a particular challenge because, as the name implies, these breast cancers don't express any of the three proteins that can be specifically targeted with drugs. Treatment options are further limited because some TNBCs don't respond to conventional chemotherapies," said Lynne Elmore, Ph.D., director of translational research for the American Cancer Society. "Clues to designing better therapies will be revealed as scientists uncover the ways cancer cells adapt and survive treatments."

Thanks to Piwnica-Worms and a group of colleagues at MD Anderson and The University of Texas Health Science Center at Houston (UTHealth), the scientific community is one step closer to understanding those clues.

After creating mouse models of TNBC by using tumor biopsies from patients, the researchers discovered that TNBC cells can develop resistance to chemotherapy by turning on reversible molecular pathways—rather than by acquiring or selecting permanent adaptations, or genetic mutations, as researchers previously thought.

"These tumors were entering into this new state of drug tolerance, where they could survive in the presence of the chemotherapy drug, and then once the drug went away, they just regrew and you could



Helen Piwnica-Worms, Ph.D., is a professor of experimental radiation oncology at The University of Texas MD Anderson Cancer Center.

hardly tell the difference—it was as if they'd never been treated," Piwnica-Worms said of the discovery, which was published in the journal *Science Translational Medicine*, with trainee Gloria Echeverria, Ph.D., as lead author. The full study is part of the ARTEMIS clinical trial headed by Stacy Moulder, M.D., which is funded by MD Anderson's Moon Shots Program and focuses specifically on new therapies for chemotherapy-resistant TNBC.

The researchers then turned to the newly discovered molecular pathways to try to identify any vulnerabilities that could lead to new ways to target the tumor cells.

"We saw that one of the pathways that was downregulated in all three models that we were testing was glycolysis, and when we mined publicly available patient data sets, we saw this was common in patient samples, as well," Piwnica-Worms said. ➡

It so happened that MD Anderson's Institute of Applied Cancer Sciences recently developed a drug called IACS-10759 that targets a compensatory pathway, which compensates for the loss of the glycolysis pathway.

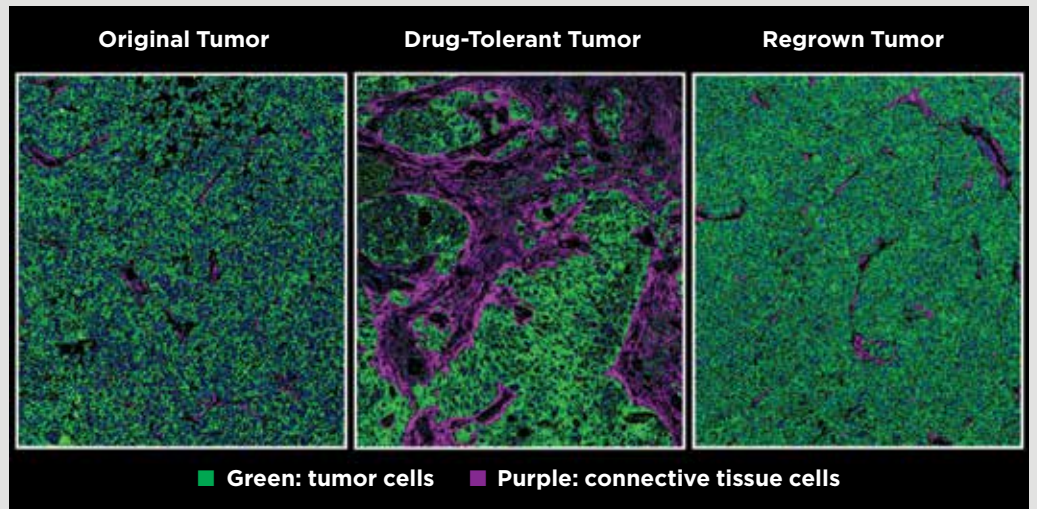
"Generally, cells that downregulate glycolysis have a dependency on a compensatory pathway to survive, in this case, oxidative phosphorylation, and this is what this new drug targets," said Piwnica-Worms. "We worked with that group and we said, 'OK, let's treat these tumors with the chemotherapy and then add in this novel inhibitor and see what happens.'"

While the IACS-10759 did not eradicate the tumor cells completely, it did significantly delay their ability to regrow after treatment—lending hope for a new "targeted" therapy for TNBC.

Eventually, the researchers hope to identify which TNBC tumors are resistant to chemotherapy prior to treatment, so that those patients can avoid chemotherapy altogether and, ideally, turn to a targeted combination therapy that could include the IACS-10759 drug.

"We don't expect a single targeted therapy will ever eradicate this, so we really need to think about its unique properties and how we can combine different therapies to make a major impact," Piwnica-Worms said. ■

TUMOR CELLS: THREE VIEWS



The images above show tumor cells from mouse models of triple negative breast cancer, created from patient biopsies. The first view shows the original tumor, the second view shows a tumor that has been treated with chemotherapy, and the third view shows a tumor that has regrown, despite the treatment from chemotherapy. Researchers found that some tumor cells developed a resistance to chemotherapy by turning on a molecular pathway that allowed the cells to survive in the presence of the chemotherapy drug (as shown in the second view), and then once the treatment was over, the tumor regrew. While the original and regrown tumors were highly similar to each other, the drug-tolerant tumors were distinct. The researchers are looking at therapeutic strategies to specifically target the drug-tolerant tumors.

Source: Amanda Rinkenbaugh, Ph.D., a postdoctoral research fellow in the Piwnica-Worms laboratory



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Could These Fibers Fix Your Heart?

A conductive thread keeps
damaged hearts beating

BY MAGGIE GALEHOUSE



Have you ever been in a place where the lights flicker and threaten to go out, thanks to faulty electricity? Now imagine that place is your body.

Electrical impulses set the rhythm and rate of your heartbeat. The sparks start in a cluster of cells in the right atrium and then spread through the upper chambers of the heart, forcing them to contract and push blood into the ventricles.

When these electrical signals go haywire, though, the heart's ability to pump oxygen-rich blood from the ventricles out to the body is jeopardized. A heart that beats too quickly, too slowly or erratically can be life-threatening.

But what if there was a new way to repair the heart's electrical system? What if surgeons could sew a current directly into the soft tissue?

Most ventricular arrhythmias—the umbrella term for abnormal heartbeats—occur in hearts that contain scar tissue from previous heart attacks, heart surgery or diseased heart muscle. Why? Because scar tissue does not conduct electricity.

Typically, surgeons defibrillate the heart—send it a controlled electrical shock—to reset the electrical system, and then implant a pacemaker or defibrillator to maintain it. But a new material, developed and tested in the Texas Medical Center, might be able to repair the heart's electrical current in a more efficient way.

A highly conductive thread made from carbon nanotube fibers could build a bridge over or through soft scar tissue. In essence, surgeons would stitch an electrical bridge in the heart.

“There are two steps to making this material,” said Rice University chemical and biomolecular engineer, Matteo Pasquali, Ph.D., who led a team of scientists from Rice, the Netherlands, Israel and the U.S. Air Force that perfected the conductive thread in 2013. “The first step is turning gaseous hydrocarbons into carbon nanotubes, which are

produced in powder form. The next step turns the powder into a fiber.”

The thread itself is made of “lots and lots of tiny cylinders that are only about one to two nanometers in diameter, so each one of those cylinders is 10,000 to 100,000 times smaller than a human hair,” Pasquali explained, fiddling with a spool of the extremely ordinary-looking thread in his office.

Pasquali's friend, Texas Heart Institute (THI) cardiologist Mehdi Razavi, M.D., knew that Pasquali's lab was working on this special thread and took a keen interest.

“He played with it and kept thinking that it handles like thread, but he knew it was conductive,” Pasquali said. “Suture thread is not conductive. We started thinking about what we could do with it since

we now have something conductive, soft and flexible.”

For Razavi, Director of Electrophysiology Clinical Research and Innovations at THI, the material seemed like a perfect fit for a busy organ with continuous complex motion. He thought the thread could be particularly useful to treat the most serious type of arrhythmia, ventricular fibrillation (VF), which occurs when chaotic electrical activity causes the lower chambers of the heart to quiver (or fibrillate), rather than beat. ➡



Matteo Pasquali, Ph.D., the A. J. Hartsook Professor of Chemical & Biomolecular Engineering, Chemistry, and Materials Science & NanoEngineering at Rice University, holds up a strand of carbon nanotube fibers.

“At the beach, if you are standing waist-high in the water and a wave hits you, what happens?” Razavi asked. “The wave breaks. And if you look around your tummy, you’re going to see little eddy currents. Now, if you’re the scar and the heartbeat is coming and it hits an area where it can’t go through, the heartbeat wave can create an eddy current. When an eddy current happens in the bottom chamber of the heart, it’s called ventricular fibrillation. VF is why someone is talking to you one minute and then they drop dead the next.”

But carbon nanotube fibers allow the wave to go straight through you, with no eddy currents, he said, completing the metaphor.

“That’s how fundamental this correction of conduction velocity

is,” Razavi said. “These fibers maintain the electrical current. They can become a bridge, over or through scar tissue, to maintain the current without delay.”

There’s one question Razavi keeps getting asked by heart surgeons.

“The question everyone has is: You’re putting something that’s superconductive through scar tissue? Why now? Anyone can do that with a piece of silver or silver rod,” Razavi said. “That’s true, but the problem is, on the average, the heart beats 115,000 times a day. That’s a lot—and it’s not squeezing. It’s a torsion, where it’s getting closer from the tip to the base, so it’s squeezing and rotating.”

No metal would be able to keep up with those rapid and frequent torsions, Razavi said. No metal would be able to survive that environment. Until now.

Razavi and Pasquali led a study of the conductive thread in large preclinical models. Results were published in the American Heart Association’s journal, *Circulation: Arrhythmia and Electrophysiology*. Experiments showed the nontoxic, polymer-coated fibers, whose ends were stripped to serve as electrodes, were effective in restoring function, whether the initial conduction was slowed, severed or blocked. In addition, the thread functioned with or without the presence of a pacemaker.

On the down side, nanoparticles always carry with them the potential for toxicity.

“In our study, we had this suture in models for as long as

three months and there was no evidence of toxicity,” Razavi explained. “There is a concern, though, about an inherent hazard in nanoparticles. But the studies that have been done with nanoparticles in the past are using dust-like particles that are in the same vicinity of size as, say, asbestos. It’s not that asbestos itself is poisonous. What happens is,

when you breathe it, it provides a constant irritant for cells, so cells are reproducing, growing, trying to create an inflammatory response. Any time you have a lot of cells reproducing, one of them can be a black sheep and that black sheep can turn into cancer. But we didn’t find any problems with toxicity in any of the clinical studies and we weren’t expecting to.”

Carbon nanotubes are a

young technology, not to be confused with carbon fibers.

Carbon fibers—stiff, brittle, lightweight and five times stronger than steel—can be found in bicycle frames, softball bats, hockey sticks, golf clubs, tennis rackets and other items that need to be strong but not heavy.

Carbon nanotube fibers differ from carbon fibers in that they are electrically conductive and they are also extremely flexible.

Some questions must be answered before the conductive thread can be used in humans, though, including how long and how wide the fibers should be and how they would perform in the growing hearts of young patients.

Best-case scenario, the thread could be used in human patients in three years, Razavi estimated, adding that the applications are seemingly limitless. In addition to mending damaged hearts, carbon nanotube fibers are being studied for use in cochlear implants, electrical interfaces with the brain and for various applications in the automotive and aerospace industries.

“Every time a cardiac surgeon opens you up and cuts, they have to suture,” Razavi said. “If that suturing is done on cardiac tissue, that’s a scar that blocks the conduction impulse. So if the chest is open and they have to close it with a suture anyway, why not use this thread as a preemptive strike? All you have to do is put this in the hand of the surgeon. The suture already needs to be done.” ■



Mehdi Razavi, M.D., is a cardiologist and Director of Electrophysiology Clinical Research and Innovations at Texas Heart Institute.

Essay: Living with Sickle Cell Disease

A physician with sickle cell treats patients with the same disease

BY TITILOPE FASIPE, M.D., PH.D.

Sickle cell disease has always been a part of me. As a young child, I knew sickle cell meant I was always at risk for having pain and that I would always be tired. That meant I couldn't do everything everyone else was doing, otherwise I might get sick. For instance, if I played in the water during the day, I would probably have a pain crisis later that night. That was just the way things were.

I was inspired to become a doctor and help children with sickle cell disease because part of my childhood was spent in Nigeria, the capital of sickle cell. We're the most populated country in Africa and the amount of people with the sickle cell mutation is much higher than in other places.

Sickle cell is an inherited blood disorder, a disease of hemoglobin—the molecules in red blood cells that deliver oxygen. When I meet with parents who have a young child with sickle cell, I explain that hemoglobin is like an army of backpacks that carry oxygen throughout the body. Having a disorder of these oxygen carriers is what causes health problems. Patients are anemic; they often feel weak and tired. If you challenge someone with sickle cell to a race, the person with sickle cell would get tired faster, because there's less oxygen in their blood and less oxygen-carrying capacity.

Normally, red blood cells are circular, but sickled cells are shaped like crescent moons. Round blood cells can slide easily through tiny blood vessels, but sickle-shaped cells can clump and create blockages with inflammation, causing a traffic jam in your blood vessels. That's what creates pain—pain that can be pretty excruciating. Some patients say it feels like having glass in their veins or being hit with a hammer.

And because it's a blood disorder, it can affect any part of your body. This can be overwhelming and upsetting for a family to hear, especially when they read on Google that the life span of a person with sickle cell is shorter than normal. I am quick to let parents know that sickle cell affects



Titilope Fasipe, M.D., Ph.D., is a pediatric hematologist-oncologist affiliated with Texas Children's Hospital and Baylor College of Medicine.

people in different ways and the average life span is increasing because of medical advancements. More importantly, I tell them that I see their child as having a fulfilling life. I explain to them that babies born in America are tested for sickle cell as part of a newborn screening program; therefore, we can monitor them closely as they grow and work with parents to prevent serious complications. For example, we start babies with sickle cell on low-dose penicillin twice daily in order to protect against severe infections. At the first sign of fever, we send them to the emergency room to be evaluated and preemptively treated. Because of these preventive measures, we are now seeing more than 90 percent of children making it to their 18th birthdays—and beyond.

Sickle cell disease affects about 100,000 Americans and, although it can be found in people of any ethnicity, it predominantly affects those with African ancestry. As such, in this country, it is a disease marked by a lot of historical neglect. The first time doctors identified sickle cells in the United States was 1910, but nothing really happened to help patients until the 1970s, when President Nixon passed the National Sickle Cell Anemia Control Act—in part because of pressure from family advocates, physicians and the Black Panther Movement. This legislation opened the door to sickle cell disease research programs, screenings and treatments centers. Even so, funding for sickle cell initiatives pales in comparison to funding for diseases that affect fewer people. In many ways, sickle cell disease parallels the historical struggles of blacks in America.

But the winds of change are blowing due to ongoing advocacy by sickle cell champions.

Kindred spirit

I was born in Nigeria in 1981, the oldest of the four children in my family. Both my parents came from humble settings. We are from a city in the southwest called Ogbomoso. My parents met when my dad was studying theology and my mother was in nursing school.

In Nigeria today, children are not screened for sickle cell at birth, but many people know their sickle cell status. Elsewhere, people might talk about HIV status, but in Nigeria, sickle cell status is a way of screening a dating partner. ➡

People with normal blood are AA. If you're AS, that means you are healthy but a carrier and could pass the mutation on to a child. SS means you have sickle cell disease.

But my parents, who met in the 1970s, didn't talk about their status. They found out I had sickle cell when I was about 1. My mother noticed I was on the punier side and I seemed to get sick very easily. When I would cry, she couldn't figure out what was wrong. After one of my huge crying fits she took me to the doctor, who tested me and found out I had sickle cell.

My parents' first response, when I had pain, was *not* to go to the hospital. They would give me over-the-counter pain medication, massage the area until I felt better or fell asleep, and the crisis would eventually pass. I would have unpredictable horrible pain, in my belly and back or my arms and legs, but it was not an everyday occurrence. I learned how to manage most of my pain crises at home and I believe that helps a lot with how much you catastrophize the disease. Hence, my few trips to the hospital were usually for other sickle cell complications.

When I was 3, our family moved to Fort Worth, Texas, where my father went to seminary. I claim Fort Worth as my American hometown because that's where I learned English and have my earliest memories, including my beloved elementary

school education. My dad graduated while I was in 6th grade, and we went back to Nigeria. I was 11 years old.

That was when I got to know my cousin, Femi, the only other person in my family with sickle cell. She was three years older than me and I really looked up to her. We were similar in many ways. We were both calmer children, more on the rule-follower side. We even looked alike—eyes framed by glasses and long, beautiful hair. I'm a big fan of *Anne of Green Gables* and that book has this concept of the "kindred spirit." Femi was that person to me.

One difference between us that amazed me was that Femi went to boarding school. Up until meeting her, I thought all children with sickle cell were day students like me. She always seemed very healthy. During the summer and school breaks, she and her siblings would come over and it was always great fun.

But one day when I returned home from school, my dad gathered us all and said, "Children, Femi has died. She passed away this past week."

My only death experience up to that point was my great-grandmother, who died at 108. Femi was 17. I was distraught by her death. It was the first time I had the experience of food tasting like sawdust.

Femi's sister, Toyin, told me Femi had gotten

sick and was taken to a local "hospital" that was very rudimentary. They didn't even have oxygen. Femi was very weak and having trouble breathing. The doctors sent someone to drive several miles away to get oxygen. They told Femi's family that was the best they could do. I still don't know what caused her death. It may have been something we call acute chest syndrome—especially if they felt she needed oxygen—and that is a very serious condition that can lead to acute respiratory distress.

Femi's death really shook me. By that time I had started reading my mother's nursing textbooks, which stated that the average age of death for sickle cell patients was 18 years old. I was 15 and I just didn't know what to do with that information. I became very depressed and my dad noticed this and endeavored to help me feel better. He said, "No one knows when they will die and life is not determined by a ticking time clock. It's determined by how we spend our days. What do you plan to do with the time you have?"



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I would be lying if I said I don't occasionally worry about dying young, especially when I hear about the deaths of other people with sickle cell, each one a vibrant life gone too soon. As The Band Perry says in the song "If I Die Young"—"the sharp knife of a short life." At those times, I draw encouragement from my Christian faith, which is really the crux of my father's words. Like the song, I want to be able to say, "Well, I've had just enough time."

Life can still be beautiful

Having sickle cell myself wasn't the trigger that made me become a doctor. But when Femi died, I thought: *This shouldn't happen.*

I went to medical school in Galveston at The University of Texas Medical Branch, and my admission essay stated: *I want to cure sickle cell.* By my residency and fellowship applications, the essay had evolved. It said: *I'm choosing pediatrics specifically because I want to reach sickle cell patients before they've defined how their lives are going to be. I want to give them hope.*

Fast forward to the present, where my experiences have taught me that sickle cell is a complex disease with several health care disparities and that there is still a lot of work that needs to be done. Now when I write essays, I say: *I want to be an advocate for sickle cell disease.*

Caring for children with sickle cell has given me a purpose; my goal is to show them that life can still be beautiful.

One of the reasons I came to Baylor College of Medicine and Texas Children's Hospital is because they have global health initiatives for pediatric hematology and oncology in sub-Saharan Africa. That meant the world to me, the fact that institutions in America are actually doing something for countries like my own, where the largest burden of sickle cell exists.

In addition to preventing severe infections, the current standard of care for the disease includes starting hydroxyurea, the first evidence-based sickle cell drug. Approved by the U.S. Food and Drug Administration for the treatment of sickle cell disease in 1998, hydroxyurea is what we call a "disease-modifying drug," meaning it has been found to improve many of the complications in sickle cell. We are learning that the earlier we give it to patients, the better. Some of our children get close to normal numbers of hemoglobin! Even so, it does not remove all the risks and, like any chronic illness managed by medication, you must still be watchful for potential emergencies.

The only approved cure for sickle cell is a bone marrow transplant, also referred to as a stem cell transplant. However, it's a complicated cure and not available to most people. For starters, you

have to find a perfect match—even better if it's someone in your family—and you need chemotherapy to help your body prepare for the transplant. A successful transplant removes the ability to make sickle cells, although the patient will still have sickle genes in their body.

The exciting news is that several drug companies are interested in making more disease-modifying drugs, so new sickle cell medications are currently in clinical trials and right around the corner. In fact, a second drug was approved in 2018. In addition, gene therapy clinical trials provide hope for a cure without requiring a donor. Baylor and Texas Children's are among the institutions who participate in these important, long-awaited clinical trials.

We still have a long way to go, but I'm happy I've seen these changes in my lifetime. Sickle cell is a challenging disease, but we're able to let families know that their children can make it. I'm happy that on this side of the planet, we're able to change the story for kids. On the other side of the world, in my home country and elsewhere, we're starting to change the story, as well. ■

Titilope Fasipe, M.D., Ph.D., is married to 1st Lt. Adedayo Fasipe (Chaplain Candidate, U.S. Army) and is aunt to several awesome children. Her first name, "Titilope," means "forever grateful," and that exactly sums up how she feels about her life, her faith and her family.

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Houston Methodist Hospital's chief innovation officer, **ROBERTA SCHWARTZ, PH.D.**, always knew she wanted to work in health care. She built her career on leadership roles in health insurance companies, in the Clinton administration and at New York's Mount Sinai School of Medicine—now the Icahn School of Medicine at Mount Sinai. Schwartz, a breast cancer survivor who co-founded an advocacy group for younger patients, now runs the Houston Methodist Center for Innovation, the research and development team driving new technologies at the hospital.

Q | You've said that you knew you "only ever wanted to do health care." What made you choose this specific career path?

A | My great uncle started working in hospitals right at the time of the Great Depression. He was a billing clerk at the New York City Health and Hospitals Corporation and spent his whole career there. He retired as the head of human resources and payroll. I had a stepfather who was a physician.

More influentially, I started candy stripping when I was 13 years old at a hospital outside of Pittsburgh. I spent most of my spare hours in high school volunteering at hospitals on the floors, volunteering in the gift shop, the soda shop, delivering flowers, handing out water. I was one of those teen volunteers and did thousands of hours of volunteering.

I just fell in love with hospitals, but never really wanted to be a doctor.

Q | In your 18 years at Houston Methodist, what has changed and what remains the same?

A | What has remained the same is the absolute dedication to the patient and putting patients first. We are, at our roots, a hospital system. Now, we've grown to have a physician organization, a research institute, the Physicians' Alliance for

Quality and the Center for Innovation. We're here to cure the patient. We're here to make patient care more accessible. We're here to create digital experiences that make it easier for you as a patient. We create training academies to teach our staff how to do a better job in taking care of the patient.

In the recent era, what you're seeing is transformation and innovation in all parts of the health care industry. Part of it is these new technologies that have become available and part of it is the recognition that we, as an industry, need to transform ourselves to become much more consumer-friendly and less expensive.

Q | How did the Center for Innovation at Houston Methodist start?

A | Many of us at the hospital were doing our own innovations in different departments. We said, 'Let's just start meeting.' The beginning was almost like a journal club. We set up a committee and ordained ourselves on the invitations as the committee for Digital Innovation Obsessed People, or DIOP for short. DIOP was born in March 2018.

The group was about half operational people and half IT people. One of the tenets of DIOP was: Succeed fast and fail fast. We would try things and admit that failure was no longer bad.



Q | The Center for Innovation, launched at the end of 2018, has generated several initiatives, including CareSense (an automated patient education program that sends texts, emails and resources before or after surgery), BlockIt (a scheduling tool for patients) and virtual urgent care. How would you describe the Center for Innovation's core mission?



A | Many of these projects started before we began the Center for Innovation. Each person was working on their own. Now, we've been able to hyperdrive many of the projects and coordinate. Our goal is to transform the way consumers and patients interact with the physician and the hospital to make it easier for consumers and staff to do what they need to do to either interact with the hospital or do their jobs at the hospital.

Q | You were diagnosed with stage 1 triple negative breast cancer at a young age. Tell me more about that.

A | In 1997, I was diagnosed with breast cancer. I was 27. It was an unusual finding in that it was caught by an OB-GYN who sent me to a surgeon. He thought it was just a benign growth that he needed to take out and it was diagnosed, unexpectedly. I have no family history of breast cancer. It was an aggressive breast cancer. I did a series of surgeries and, unable to finally get the cancer out, we did a mastectomy and followed that with six months of chemotherapy.

I feel very thankful to be living at this point. Unfortunately, breast cancer in young women has a very high mortality rate as the cancers are generally more aggressive and there are fewer screening tools to catch them. Mine was caught—thank God—very early. I've lost many friends to the disease who were diagnosed around that time and, therefore, feel like it's incumbent on me to live every day not only for the blessings I've been given by being alive, but in their stead—because they count on us to carry forward the things they started.

Q | How did your personal battle with breast cancer influence your career?

A | I set on this career path when I was 13. I never wavered from it, but it gave me a very personal inside look at the health care system in a way that other people didn't have.

Q | You co-founded the Young Survival Coalition in 1998 to unite young women diagnosed with breast cancer under the age of 35. What compelled you and the other co-founders, breast cancer survivors Lanita Moss and Joy Simha, to launch the organization?

A | We found there was a deep need for young women living alone in disparate communities to connect with one another. It wasn't so rare to have a breast cancer diagnosis under 40, but no one talked about it. Whenever I went into a doctor's office, they ushered me very quickly out of the waiting room and into another room because it freaked people out that it wasn't my mother they were treating—it was me. It was interesting how

quickly they got me out of a waiting room.

It was really hard for us three to find each other, so we started to recognize how important it was to connect. We were able to use the internet and chat sites to start connecting with other young women. When we found more, we started having in-person meetings and conferences.

All the breast cancer research studies were done on post-menopausal women. We said to a community of researchers: 'You won't do the studies on young women because you say you don't have enough of them. Well, we've gathered the young women. Don't tell that to us. Just tell us what study you're opening and when you'd like us to have the young women there.'

One of our early goals was to teach OB-GYNs to never say to a woman: 'You're too young for breast cancer.'

Q | Drawing from your own experiences, what message do you have for breast cancer patients undergoing treatment and recovery?

A | Take things one step at a time. Listen to your body. Accept help from friends. And keep a sense of humor. The best way to have chemo treatment is while laughing with friends.

Q | What skills have you honed through your breast cancer journey that have helped in your role as chief innovation officer at Houston Methodist?

A | Most people in this organization and on that journey would tell you that I'm pretty unflappable. I can calmly move forward on a path that is sometimes messy, one step at a time. I did that in my personal life to make it through—whether it was cancer or now with my special needs child or the journey with innovation.

There is no roadmap for where we're going as an industry and where this hospital is going to go down the road of innovation, but we're putting one foot in front of the other and we're not scared to continue to move forward. ■

Roberta Schwartz, Ph.D., was interviewed by Pulse columnist and writer Shanley Pierce. The conversation was edited for clarity and length.



SHARING THE LAB WITH ROBOTS

BY RYAN HOLEYWELL

International robotics company ABB opens a new, 5,300 square foot facility within the Texas Medical Center Innovation Institute this month. Its charge: identify and develop new applications for robots to help improve the efficiency of health care in the 21st century.

ABB's effort is focused on "non-surgical" robots that work primarily in hospital laboratories. The idea is that robots can perform repetitive, delicate and time-consuming tasks such as dosing and mixing liquids, or loading and unloading other devices like centrifuges, allowing time for humans to perform more advanced tasks.

"With this exciting partnership, the Texas Medical Center continues to push the boundaries of innovative collaboration with cutting-edge industry partners by establishing the TMC as the epicenter for ABB Robotics' entry into the health care space," said Bill McKeon, president and CEO of the Texas Medical Center.

ABB arrives at the TMC at a time when it expects demand for non-surgical robots to nearly quadruple by 2025, according to its internal research.

TMC Pulse spoke with José Manuel Collados, who recently moved from Barcelona, Spain, to Houston to run ABB's new facility at the Texas Medical Center. "We're wide open to ideas," Collados said. "We are trying to understand the highest needs in health care where we can contribute and support with our expertise. It's a great mission."

Q | Why did ABB view the Texas Medical Center as the right fit for this first-of-its-kind facility?

A | We feel really honored to be part of TMC Innovation. We started a process several months ago to look at new fields where robotics can help, and health care is a sector that has clear opportunities for robotics and automation. The decision was to start with an accelerator, focused in one place, and we truly believe Houston really offers the best ecosystem. We are inside the Texas Medical Center, the largest medical center in the world, working together with some of the most advanced researchers and physicians. ➡

Left: A robot dispenses liquid into a test tube.

Right: José Manuel Collados will run ABB's new facility at the Texas Medical Center.



The mission of the TMC and the TMC Innovation Institute is unique. Here, there are well-established companies like Johnson & Johnson, AT&T and now ABB, alongside great, smaller companies and innovative startups, all together in the same building. It creates an energy we think is very special.

Q | Tell me about your new facility. Who will be working there and what will they be doing?

A | Houston is the first facility for the ABB Robotics health care team. This is the first one in the world. We will be a team of around 20 people, including scientists, engineers and researchers, working with hospitals and other external companies.

We would like to accelerate the development of the ABB strategy for health care, starting from a deep understanding of hospitals' needs and regulation. We want to work together with the TMC to identify the challenges where flexible automation can help and, later, develop the concepts and technologies that will be used in the future to overcome them. All of this will be done in Houston.

Q | What are some examples of how your robots could be used in a hospital?

A | Our vision for the hospital of the future is humans and robots working together to enhance a variety of medical support procedures and tasks.

Robots can easily handle repetitive or dangerous tasks. Some examples might be loading or unloading lab equipment or medical devices, or cleaning surgical equipment.

Other examples include the sorting and handling of samples as they enter and exit laboratories. Another case is repetitive and labor-intensive tasks where it's absolutely necessary to maintain quality.

Q | You've talked about "collaborative" robots working in the lab. What exactly do you mean by that?

A | A collaborative robot is a robot that can work together with people. In the past we have always seen robots working inside of fences or safety enclosures, working on a repetitive task, always going to the same place (typically using rigid fixtures).

With the use of collaborative robots, safety fences are not required for them to operate safely and efficiently alongside people. This will allow the use of robots in highly-populated environments, like laboratories. The small footprint of the applications and integrated security allows them also to fit in the existing laboratory environments and processes.

Our collaborative dual-arm and single-arm YuMi robots have integrated safety features. If YuMi senses an unexpected impact, such as a collision with a co-worker, it can pause its motion within milliseconds, and the motion can be restarted again as easily as pressing play on a remote control.

Q | How will patients benefit from the use of robots?

A | There's a global shortage of skilled medical staff. Some laboratory test processes limit access due to a bottleneck. Automating some processes will enable higher productivity, safety and quality for the patient.



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An ABB team member demonstrates a robotic controller.

Today, medical experts spend a large part of their time doing very repetitive and low-value tasks, such as preparing slides and loading centrifuges. Using robots to automate these tasks will reduce the potential for any human errors caused by fatigue and distraction and enable medical professionals to focus on more highly-skilled and productive tasks.

Finally, we see increases in personalized health care. Flexible robotic automation will support productive and reliable processes to be personalized down to the care of individual patients.

Our experience from other industries and our forecasts from what we've researched already suggest we can improve productivity of some processes by 50 percent. This means, for example, faster delivery time of tests while improving quality and traceability.

Q | What lessons has ABB learned from using robotics in other industries that can be applied to health care?

A | We've learned about the need to continually invest in innovation.

Our focus will be non-surgical, as this is very close to the current uses of ABB's technology today. We see enormous potential for us to take our experience of developing automation solutions in food and beverage laboratories and apply this to health care laboratories.

Simplification is also a good strategy, and our robots are easy to install, program and commission. You do not need to be a robot expert to program them.

We have also learned the importance of collaboration. Today, we've talked about collaboration between humans and robots. But we also know well the importance of working together with partners to accelerate development, and this is why we are in Houston. ■

This interview has been edited and condensed for clarity.

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A LIGHT INSIDE

Coming

Rendered unconscious after a car crash, Jaclyn Pellicotte was not expected to ever wake up. Her parents refused to accept that.

.....
EL PASO, TEXAS —
.....

Jaclyn Pellicotte reclined on the couch in her family's one-story home on Trinidad Drive. A feeding tube gradually drained nutrients into her stomach as her dog, Coal, shifted in her lap. Her legs lay still under a blanket, thin from the loss of muscle, and her hair—once long and blonde, captured in dozens of pictures scattered throughout the house—was clipped short. It is slowly coming back—brunette this time—and, despite the odds, the

young woman in the photographs is, too.

The 21-year-old's eyes shone bright as she scrolled through her Instagram feed, watching old videos and giggling to herself. She was engrossed by posts prior to October 30, 2018—the day her life changed in an instant.

It was a Tuesday, and Jaclyn remembers nothing. But every detail still haunts her mother.

Sheri Pellicotte was on her way to Chick-fil-A, the one closest to the elementary school where she was



back from a brain injury

BY ALEXANDRA BECKER

principal, when her phone lit up with an unfamiliar number. It wasn't ideal for Sheri to be gone during a school day, but it was her husband's 53rd birthday, and the couple and their two children had planned to meet midday to celebrate.

Sheri was going to ignore the call, but at the last second, she picked up.

"Hello?"

The voice on the other line asked if she knew someone named David.

Sheri replied yes, David was her

daughter's boyfriend. "Is everything OK?" she asked.

The voice said she was a trauma nurse at University Medical Center of El Paso. She told Sheri that David had been in an accident.

"Was someone with him?" Sheri asked.

"I can't tell you that," the nurse said.

Sheri's chest began to ache. If there was a blonde girl with him, she said, that's my daughter. Then she asked again, "Is David OK?"

"He's OK," the nurse said slowly.

"But you might want to come."

Jaclyn had been riding in her then-boyfriend's Jeep, shopping for a birthday present for her father. They were turning left into a parking lot off Montana Avenue, a main thoroughfare into the heart of El Paso, with three lanes on each side. Two of the lanes waved them through, but a Ford F-150 barreled through the third lane and struck Jaclyn's side of the car, crushing it.

The blunt force shifted her brain to one side and caused massive trauma to her entire body. She was transported to the hospital where a team worked to keep her alive. They named her Mayflower until someone could come and identify her.

When Sheri and her husband, Dennis, rushed into the hospital waiting room, they were told that their daughter's outlook was grim. Surgeons removed a section of her skull, called a bone flap, to reduce massive swelling in the right side of her brain. ➡➡



Five days later, Jaclyn was still unresponsive and more pressure was building in her head, so they surgically removed the left bone flap, too.

Jaclyn remained unconscious and breathing on a ventilator, alive by the grace of machines. She spent November and December in the intensive care unit, eventually

graduating to the intermediate care unit—one small step in the right direction.

“We were constantly talking to her,” Dennis recalled. “Jaclyn, wake up! Jaclyn, wake up! Jaclyn, can you hear me? Jaclyn. JACLYN.”

Jaclyn was considered to

be in what’s often termed a vegetative state. Clinicians did not offer much hope, but her parents remained determined. They prayed incessantly.

“You’re going to speak life into our room and you’re not going to speak death—you’re going to give her that chance,” Sheri told people.

In December, surgeons decided that Jaclyn was well enough for them to reinsert one of her bone flaps. Soon after, family members thought they noticed Jaclyn tracking them with her eyes when they moved around the hospital room.

But that stopped as quickly as it started. Pressure and fluid had returned to her brain, so the bone flap was removed yet again. It was another of what had become numerous surgeries—a tracheotomy, repair of a broken femur, insertion of a feeding tube, insertion of a shunt to drain fluid.

By late December, Sheri and Dennis began looking into rehabilitation options. Their daughter continued to be unresponsive, immobile—but they would do anything for their baby girl.

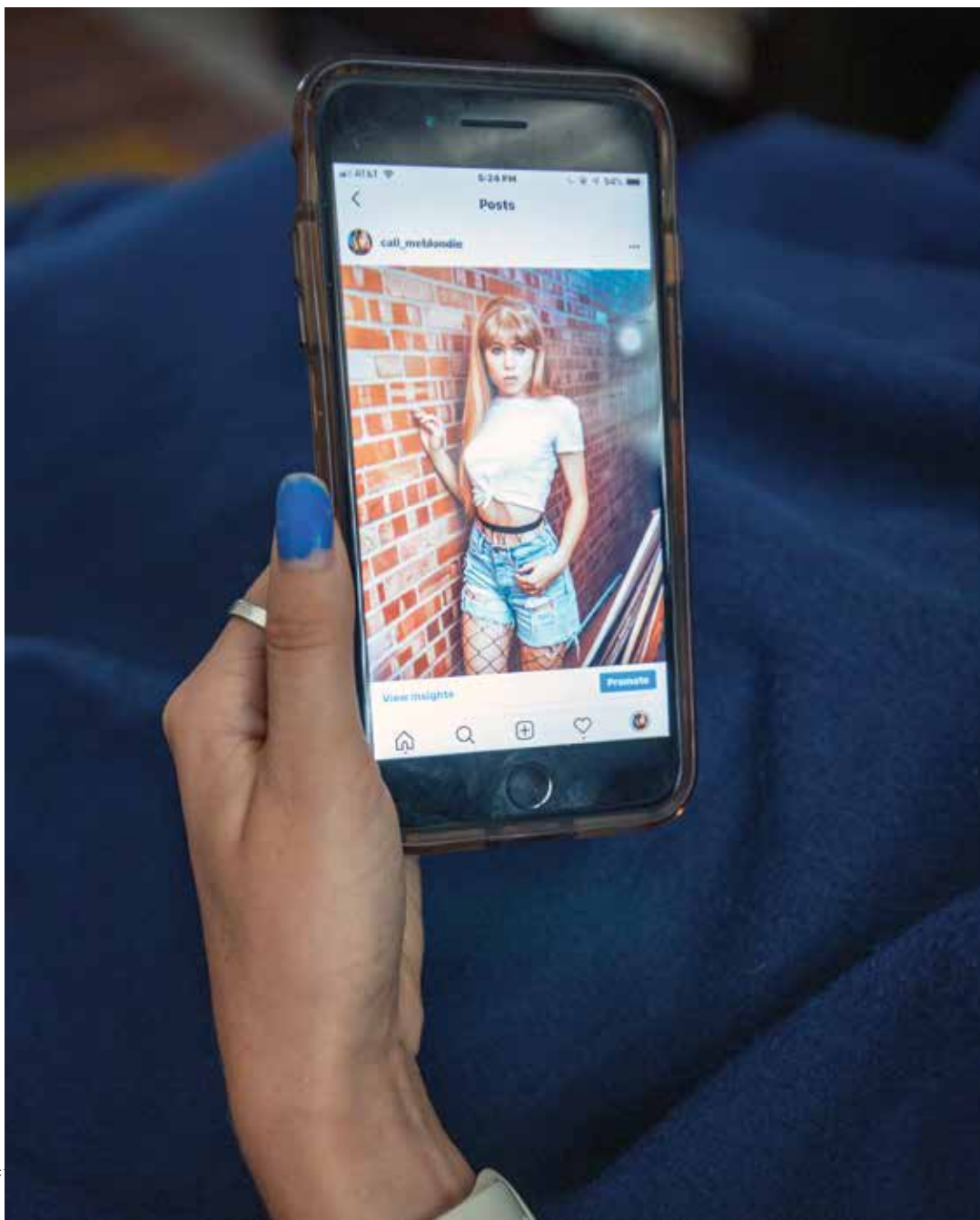
Sheri put a call out on a Facebook page she’d been updating with entries about Jaclyn’s progress, asking if anyone knew of a good neuro-rehabilitation center. A few people suggested TIRR Memorial Hermann in Houston, and in an unlikely chain of events the Pellicotte family can only attribute to answered prayers, a spot for Jaclyn became available and they flew across the state of Texas on January 8.

“They said, ‘Bring her tennis shoes, bring her sweats—we’re going to dress her,’” Sheri said. “We thought they were crazy.”

But sure enough, the morning after the Pellicottes arrived at TIRR, a group of therapists walked into Jaclyn’s room, sat her upright for the first time in months, and put her in something other than a hospital gown.

Jaclyn was enrolled in TIRR’s Disorders of Consciousness Program (DoC), which works with patients who have severely impaired levels of awareness, including those in a vegetative or minimally conscious state. Most of the patients who enter the program have suffered a traumatic brain injury, sustained lack of oxygen to the brain, or a stroke. Like Jaclyn, they aren’t ready for a traditional rehabilitation program, but need to take the initial steps toward discovering their potential.

The DoC team works to assess consciousness, cultivate communication techniques, improve alertness, initiate mobility and help patients achieve the greatest quality of life possible. The team also



Top left: Jaclyn outside her El Paso home in August.

Left: Jaclyn pauses at an old photo of herself as she scrolls through her Instagram account.

Facing page: Dennis Pellicotte helps Jaclyn get up from a midday nap.



provides specialized training and support for families and caregivers.

Programs like these, which give patients a chance they may not otherwise have, are rare. Only 10 or so exist in the U.S., said Sunil Kothari, M.D., medical director of the DoC program at TIRR.

“We really do feel that we’re the last chance for many patients,” said Kothari, who is also an assistant professor of physical medicine and rehabilitation at Baylor College of Medicine. “We’re the last place they’ll go to or they have an option to go to ... and so we take

that very seriously.”

Historically, “unresponsive” patients were sent to long-term care facilities or withdrawn from life-support rather than enrolled in rehabilitation, said Katherine O’Brien, Ph.D., a clinical neuropsychologist at TIRR. But in 2009, a landmark study published in *BMC Neurology* revealed that nearly 41 percent of patients diagnosed as vegetative during a bedside evaluation were, in fact, conscious—they just couldn’t show it.

“A doctor might walk in and ask the patient to ‘Touch my hand’ or

‘Lift your leg’ or ‘Open your mouth.’ The patient doesn’t do it, but maybe the patient is sedated from anesthesia, maybe the patient is in excruciating pain, maybe they’ve been sedated from other medications, maybe they’re not attending to it because they’re upset because they’ve been sitting in a dirty brief all day,” O’Brien said. “Or, they’re trying to respond and the leg’s just not moving.”

Some medical experts argue that patients in this state who are not given the proper opportunity for rehabilitation have been denied

basic civil rights.

“While this is surely an insurance issue and an access to care issue, it’s also a civil rights and disabilities rights issue. And it’s really a violation of the Americans with Disabilities Act to not treat these people in a way that allows them to maximally integrate into society,” said Joseph J. Fins, M.D., chief of the division of medical ethics and professor of medicine at Weill Cornell Medical College and co-director of the Consortium for the Advanced Study of Brain Injury. “Rehabilitation is a medical intervention, but it’s also a social intervention that gets people back into their homes and to their families and to their communities.”

The issue has gained momentum, so much so that in 2018, the American Academy of Neurology released new guidelines to address this specific patient population. Its No. 1 recommendation: patients with disorders of consciousness be referred to specialized, transdisciplinary, acute rehabilitation centers, like TIRR, before entering long-term care.

“It was clear from the extensive evidence reviewed that many patients with prolonged disorders of consciousness demonstrate meaningful recovery of function that continues over a period of years, and approximately 20 percent eventually regain functional independence,” said Joseph T. Giacino, Ph.D., lead author of the new guidelines addressing disorders of consciousness, who is also associate professor of physical medicine and rehabilitation at Harvard Medical School and director of rehabilitation neuropsychology at Spaulding Rehabilitation Hospital in Boston. “The window for recovery appears to be substantially longer than previously believed, justifying referral to inpatient rehabilitation centers for aggressive multidisciplinary treatment unless contraindicated.”

Jaclyn was lucky to have had a window at all. On the day of the accident in El Paso, her brain showed no sign of activity. But the surgeon who was called in to remove her bone flap noticed a small spark after a second brain scan—a hint of life. ➡

With discussions about life support looming, he decided to operate and give her a chance.

When Jaclyn arrived at TIRR, her family witnessed the facility's unique approach to therapy.

"To date, there is no mechanism using technology that can, with a high sensitivity and specificity, tell us that someone is conscious or not conscious," O'Brien said. "The No. 1 way right now is behavior."

Although TIRR does use advanced technology to support its efforts—including magnetic resonance imaging (MRI), media nerve stimulation, trans-cranial direct current stimulation, and surface electromyography—the team relies on the industry's "gold-standard" technique for detecting consciousness, known as the Coma Recovery Scale-Revised. This assessment monitors auditory, visual, motor and verbal function. Team members administer the test twice a week to

every DoC patient, and they aim for a comprehensive approach. For example, an occupational therapist and neuropsychologist might administer the test at the beginning of the week, and then a few days later, a speech therapist and physical therapist will repeat the exercise, O'Brien explained.

"Each duo is combined with someone who is more physically based and someone who is more cognitively based, and you have four sets of eyes looking at the patient in a standardized fashion each week to assess them," O'Brien said, adding that the assessment is only part of the ongoing daily therapy and rehabilitation regimen.

It's an approach that's proven successful. Kothari estimates that



almost 90 percent of the patients they see who have been labeled vegetative are actually conscious.

Jaclyn was one of them.

Within the first few days, Jaclyn's TIRR team confirmed that although she was unresponsive, she was, in fact, tracking with her eyes—and very much aware. They helped her into a chair and she moved her leg on her own ever so slightly. Soon, she could swipe the screen on her cell phone with her knuckle; then, she paid attention to a movie, moved her head and swallowed ice chips.

Her therapists learned everything they could about Jaclyn so that they could tailor their treatment to her interests. She had been pre-med at The University of

FOLLOW JACLYN'S JOURNEY:

Since the accident, Jaclyn's mother, Sheri Pellicotte, has been updating a Facebook page about her daughter's progress. Follow along by logging into Facebook and typing "jaclynstrong."



Texas at El Paso, with hopes of becoming a pediatrician. She had loved her long hair, makeup, modeling and Snapchat. She was known as the most thoughtful, loyal and funny friend—a literal ray of sunshine in her tiny corner of the Chihuahuan Desert.

“There’s an object recognition test where you hold two objects up at once and ask the patient to identify one specific object to see if she can distinguish the two,” O’Brien explained. “It tells me that not only does she understand me, but she can see. For Jaclyn, we used her favorite ChapStick and a brush, because that was meaningful to her—it wasn’t just a random ball and a cup.”

Because she had been bedridden for so long, Jaclyn’s feet were pointed and stiff, so her therapists built her walking casts in the shape of wedges just so she could stand.

Over the next few months, Jaclyn grew stronger, more limber, more alert. She pushed bike pedals, ate applesauce, yogurt and pudding, hummed in an effort to speak. She smiled, but cried when she was frustrated. With the help of therapists, she stood up on two flat feet.

Not all progress was linear. On March 4, surgeons in Houston attached both bone flaps back to her skull, but in April, her brain began to swell again and she later developed an infection near the incision from the surgery. Occasionally, she suffered small seizures.

But her young body pushed on. She kept humming. She smiled. She moved her legs, tried more food, lifted her head and began to use her thumb to scroll Instagram. She

learned to wave hello and goodbye while moving her fingers, then she mastered the thumbs-up and the “OK” sign. She learned to say “I love you” by pointing to her eye, her heart and her parents, who remained by her side every step of the way.

O’Brien and Kothari said a large part of Jaclyn’s recovery should be attributed to her parents’ dedication and their involvement in her therapy. Both extended their leave from work so that they could live with her during her months in Houston. Her older brother, Jacob, came as often as he could, too.

“We believe strongly that the family’s observations are as relevant and valuable as the ones we make,” Kothari said, “partly because they spend more time with the patients, but also because they’re more likely to see or illicit behavior that might indicate consciousness.”

On May 9, the Pellicotte family returned to their home in El Paso. Jaclyn moved back into her childhood bedroom, decorated with images of the Eiffel Tower.

“As soon as she gets better, we’re going to Paris,” Dennis said. “You can’t put things off.”

Jaclyn began therapy three times a week at a local NeuroRestorative, part of a nationwide network of rehabilitation centers. She continued to make strides in her recovery, standing in a walking frame, playing tic-tac-toe with her therapist and giggling for the first time since October. She was told if she could unscrew the lid of one of her lip glosses, her father

would serve as a model. Sheri said Dennis looked great in glitter lip balm.

In June, a local speech therapist reached out to Sheri and offered to visit Jaclyn once a week to help her eat, swallow, regain feeling in her tongue, and eventually, speak. She insisted on doing it for free, saying she felt called to help after reading about Jaclyn’s journey on social media. A few weeks later, in early July, Jaclyn started talking. Sheri called it “whisper-talking,” because it was very soft. But she said “I love you,” and not long after, began speaking in sentences. Her father realized that she grew louder lying down because of the pressure on her diaphragm. A tight hug, he discovered, could do the trick, too.

Little by little, Jaclyn continues to amaze her family. She is standing with more ease, walking in therapy

and talking more loudly. She can hug, play catch from her wheelchair, and loves watching her old videos and spending time with her brother and his girlfriend, Jackie, who happens to be Jaclyn’s best friend.

Still, some days are harder than others. On a Tuesday in August, Jaclyn’s family went to lunch at a Great American Steak Burger near their home. Jaclyn ordered chicken tortilla soup, and Sheri broke off small pieces of bread for her to try. Sheri and Dennis cheered Jaclyn on—it was a breakthrough, chewing the soft bread and swallowing it—until their daughter’s face crumpled in anguish. Little by little, the pieces of bread fell out of her mouth. She had wanted to swallow them so badly, to make her parents proud of how far she had come, but she just couldn’t—not yet. ➡

Top left: Sunil Kothari, M.D., is medical director of the Disorders of Consciousness program at TIRR Memorial Hermann and assistant professor of physical medicine and rehabilitation at Baylor College of Medicine.

Bottom left: Sheri and Dennis Pellicotte stand by for support as physical therapist Jimmy Moody, director of rehabilitation at NeuroRestorative in El Paso, helps Jaclyn walk during a therapy session.

This page: Occupational therapist Kaleigh Stevens, bottom left, and student Julie Holguin, top right, work with Jaclyn during a NeuroRestorative therapy session.



So, there in the restaurant, surrounded by dozens of people on their lunch breaks, Jaclyn's laugh turned to tears, and she allowed herself the indulgence of a good cry.

But her parents believe that someday, she'll be back to herself, to 100 percent. Back to college, back to her friends, back to Starbucks and Body Pump class with her mother. After all, her parents said, she is the same girl who, at nine months old, climbed out of her crib and walked—for the first time—into the kitchen to find them cooking. Now, she is learning how to live all over again.

Not all patients who suffer a traumatic brain injury will recover, even if they have the opportunity to go to a rehabilitation program like TIRR's. For these individuals, the focus turns to quality of life.

"We try to think about, in very concrete terms, for someone who may be minimally conscious, or fully conscious but essentially locked into their body—what would give them quality of life? And it may be as simple as making sure that they get out and feel the sun on their

face, or the wind," Kothari said. "Our job isn't over just in terms of assessing whether they're conscious or not and then doing everything we can to maximize their level of consciousness, but it's embedding that into the larger framework of personhood and quality of life."

For patients who remain minimally conscious, TIRR's program can offer their families as much information about their loved one's future potential as possible.

These families are in "a very traumatic situation, something no one really plans for, and I feel that by providing them the appropriate assessments and interventions, we can allow them to move forward with making really hard decisions," O'Brien said.

Not all stories have a happy ending, she added, but every patient has a right to a chance.



Jacob, Sheri, Jaclyn and Dennis Pellicotte at their home in El Paso on August 20.

each of the families with slain or injured loved ones felt. She knew they were starting a new journey in their lives, an agonizing journey that requires strength, positivity, love.

"We know that Jaclyn is a miracle, there are no other words for it," Sheri said. "When we were at TIRR, we saw all the pictures in the hallway of the people who had been there. I would touch a spot on the wall and tell Jaclyn, 'This is your wall. You're going to be one of those miracle stories just like all of these other people.'"

One day, Sheri and Dennis plan to return to TIRR. They want to donate all of Jaclyn's rehabilitation equipment to other patients—she'll no longer need it, they explained—and of course, they want to say thank you to everyone who helped them come so far.

The Pellicotte's don't know it yet, but TIRR has already picked out a spot for Jaclyn's portrait. ■

On August 3, 2019, Jaclyn Pellicotte turned 21. Her family had planned a party to celebrate not just her birthday, but how far she'd come over the past 10 months. They expected more than 100 people to attend, but then that morning, as Sheri was out running errands and picking up the cake, a man with a semi-automatic rifle entered the Wal-Mart a few miles from their home and opened fire, killing 22 people and wounding dozens more.

Sheri, on a day of celebration for her daughter's life, knew the pain

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An exhibit exploring epidemics is spreading to The Health Museum, where it will stay on display for the next six months.

Outbreak: Epidemics in a Connected World is a do-it-yourself version of an exhibit originally created and still on display at the Smithsonian National Museum of Natural History (NMNH) in Washington, D.C.

"We had the idea for the exhibit in 2014 at the peak of the Ebola epidemic in West Africa," said Sabrina Sholts, Ph.D., curator of biological anthropology at NMNH. "We felt that there was clearly a need for the public to better understand how these new diseases emerge and how they spread, in keeping with our mission of helping people understand humans in the natural world."

The main message of the exhibit is that humans, animals and bacteria are all connected.

"The secondary message of the exhibit is about working together," Sholts said. "We have to work across disciplines—we have to work and collaborate across countries—because an outbreak anywhere is a threat everywhere."

Sholts and her team at the NMNH conceived the idea of traveling DIY exhibits to promote their "one health" goal.

"Certainly, we are not reaching the entire world with our exhibit in D.C.," she said. "The DIY versions of the exhibit still retain the basic concepts, main messages and core information that we have in our exhibit, but make it translatable and customizable so different communities can use those tools and build on them for the most appropriate experiences for their visitors and their audiences and communities."

The exhibit in Washington, D.C. explores the outbreaks of Ebola, SARS (severe acute respiratory syndrome), MERS (Middle East respiratory syndrome) and other infectious diseases, Sholts said.

The Health Museum's version of the exhibit will highlight the polio outbreak in the Houston area, the HIV/AIDS epidemic throughout the region and the Bubonic plague in Galveston.

"We didn't look at current things that were happening; we thought it would be interesting to look at things over a period of time and to compare and contrast them," said Rebecca Seabrook, senior director of guest engagement at The Health Museum. "Not many people realize the plague is something that happened in Galveston in 1920. Most people think of medieval Europe, but about 20 people contracted it in Galveston."

The polio outbreak in Houston lasted nearly two decades. From 1937 to 1955, Houstonians lived in fear of the mysterious and debilitating disease.

"Some of the money from the Victory over Polio campaign was used as the foundation for The Health Museum, so that was interesting as we are celebrating our 50th anniversary this year," Seabrook said. "Harris County was one of the two hardest-hit counties in the U.S. and the outbreak kind of informed the whole museum's history and very existence."

The Health Museum used local medical and public health experts to source unique information and materials for the exhibit, including Galveston National Laboratory, a research laboratory run by The University of Texas Medical Branch.

To date, the DIY version of the Smithsonian exhibit has been shared in more than 100 community institutions around the world.

"People are interacting and actually enjoying the experience of learning about it and feel empowered by the information they are getting," Sholts said. "We give them action items. We point to ways that we, as communities and individuals, can stop the spread of infectious disease." ■

On this page: Detail from a MERS (Middle East respiratory syndrome) virus.

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The Intersection of ARTS and MEDICINE

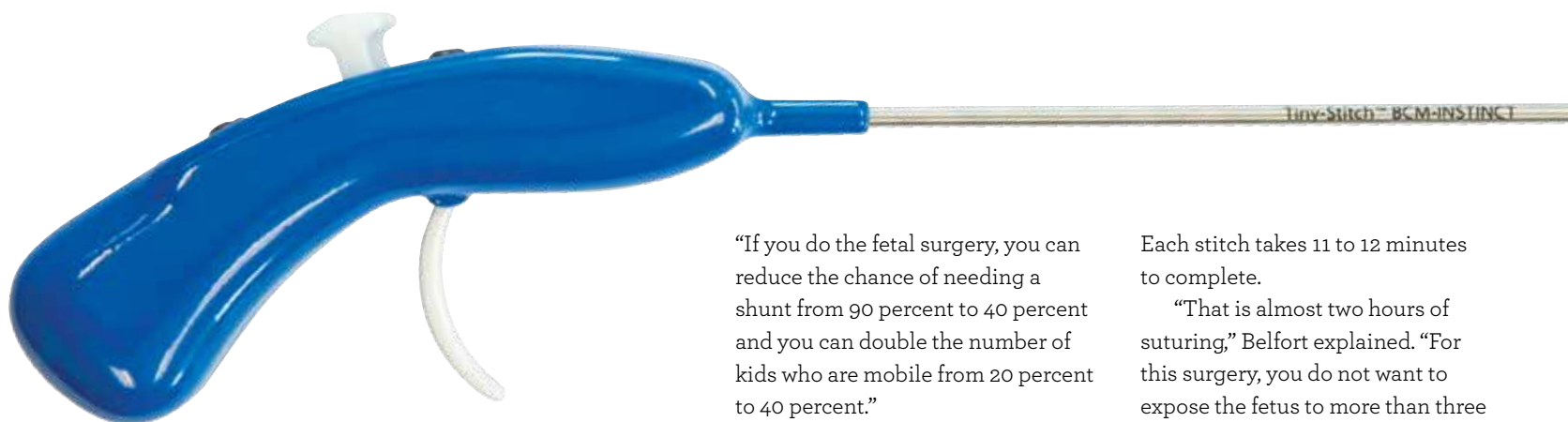
By Britni R. McAshan

Outbreak: Epidemics in a Connected World
will be on display from October 5, 2019 to May
2020 at The Health Museum, 1515 Hermann Dr.
Information: 713-521-1515

TinyStitch for the tiniest patients

A multidisciplinary Texas Medical Center team has developed a micro human sewing machine

BY BRITNI R. McASHAN



Doctors who pioneer new surgeries often discover they need new tools to perfect them.

That's how TinyStitch, a micro-suturing device, was born.

Five years ago, Michael A. Belfort, M.D., Ph.D., developed a two-part fetoscopic surgery (a procedure that accesses the fetus by way of the uterus) to repair spina bifida, a birth defect in which a developing baby's spinal cord and nerves are exposed through a gap in the backbone. In addition to paralysis, spina bifida often causes hydrocephalus—water on the brain—necessitating a shunt to drain the fluid.

"Spina bifida is not a lethal anomaly, it is a life-altering anomaly," said Belfort, chair of obstetrics and gynecology at Baylor College of Medicine and gynecologist-in-chief at Texas Children's Hospital.

"If you do the fetal surgery, you can reduce the chance of needing a shunt from 90 percent to 40 percent and you can double the number of kids who are mobile from 20 percent to 40 percent."

Although Belfort has performed more than 70 of these fetal surgeries, he knew that a better surgical tool could streamline the entire process.

"I knew instantly that we needed a new tool," he said. "Everything was a compromise. Everything that we were trying to do required smaller, more maneuverable instruments. And because we were working inside an enclosed space from the outside—with instruments that didn't fit down the ports we were trying to use—we had to compromise."

Surgeons have been operating on fetuses to repair spina bifida for two decades, but Belfort created a specific technique. During the nearly three-hour surgery, he and his team suture the gap in the spine in two layers—three to four sutures in the first layer and five to six sutures in the second.

Each stitch takes 11 to 12 minutes to complete.

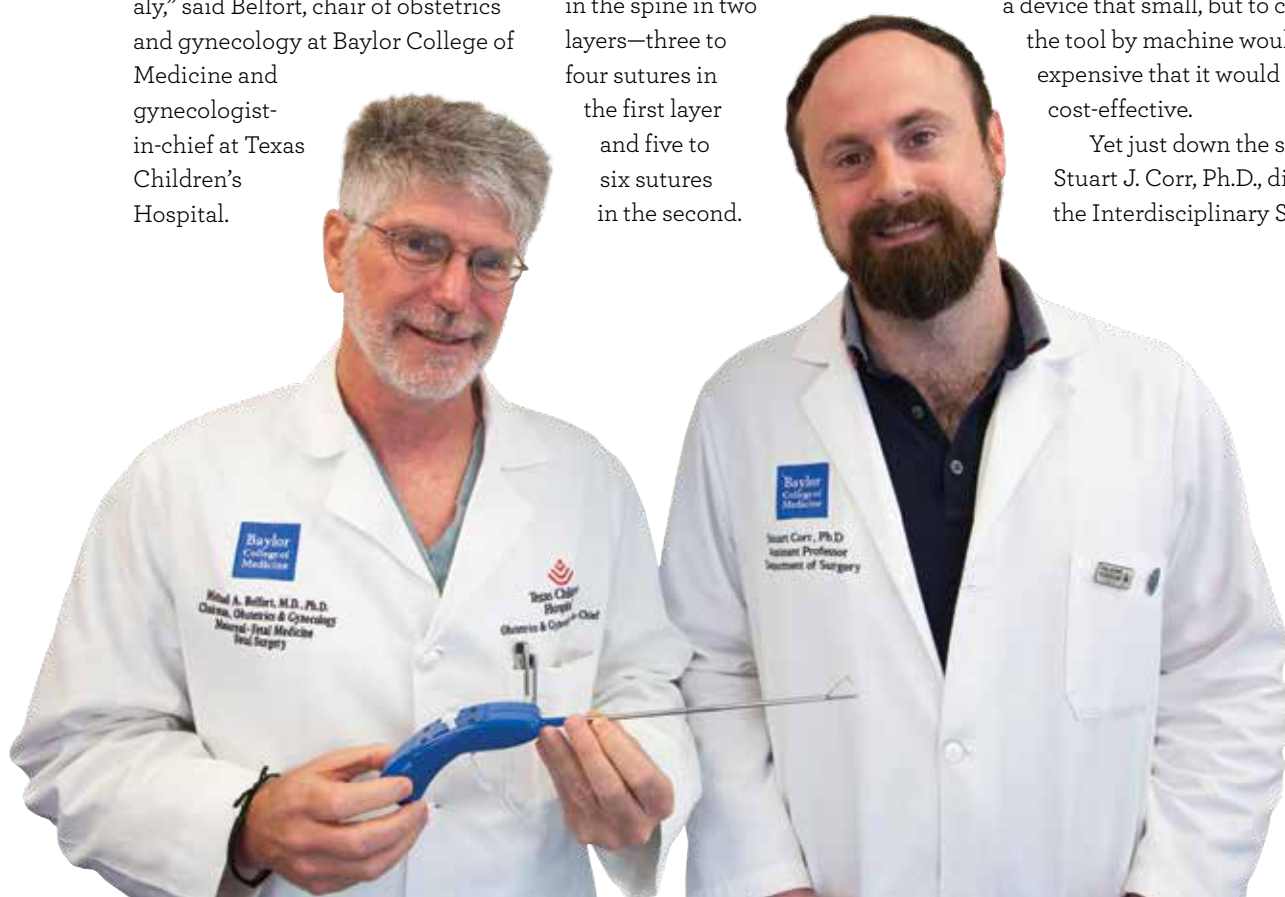
"That is almost two hours of suturing," Belfort explained. "For this surgery, you do not want to expose the fetus to more than three hours of anesthesia and, now, we are right at that, so we want to get our time down."

As soon as he started performing the surgery, Belfort began sketching devices that could work better for the in-utero laparoscopic procedure. But he had a hard time finding a team to build the new device.

"The main thing for us is that this device will shorten the time of surgery," Belfort said.

Many engineers around the country tried to make a smaller version of the predicate device—the tool Belfort is currently using to perform the surgery. They all said that it was too technically difficult. Not only was it a challenge to 3D-print a device that small, but to create the tool by machine would be so expensive that it would not be cost-effective.

Yet just down the street, Stuart J. Corr, Ph.D., director of the Interdisciplinary Surgical





Technology and Innovation Center (INSTINCT) at Baylor College of Medicine, was up for the challenge.

"It was a nightmare to begin with," Corr recalled. "We went about it in-house. I had a couple of team members and we started jotting down concepts. The first thing we did was directly trying to make a smaller version of the predicate device, but the physics just didn't allow it. ... When you start making those things smaller, the whole thing changes so we had to completely redevelop the concept."

To gain insight, Corr attended one of Belfort's spina bifida surgeries.

"Watching the surgery was a very interesting experience. It was life-changing," Corr said. "I had just had my two children and seeing that, and my wife being pregnant at the same time, was like, 'Wow. OK. We've got to get Dr. Belfort exactly what he needs.'"

With funding from the Sue Nguyen Incubator Award, Corr put together a team of Rice University students and experts from the

Center for Device Innovation at Texas Medical Center (CDI @ TMC), a collaboration between Johnson & Johnson Medical Devices Companies, Johnson & Johnson Innovation and the Texas Medical Center.

"We sponsored a Rice Capstone project so we had four engineers who used this idea and went about it for two semesters," Corr said. "Then we took it to Joseph Labdik, who runs JSL Innovations at CDI and, two months later, they popped it out."

TinyStitch is roughly a foot long and looks like a kitchen utensil or a long-reach lighter, but Belfort believes it will trim operating time significantly—from three hours to a mere 15 minutes.

"This is the first iteration of what we believe will be a significant improvement of the predicate device," Belfort said. "It's basically a human sewing machine. ... It will require much less time-intensity and training-intensity."

Because the predicate device has already been tested and approved for humans by the U.S. Food and Drug Administration, TinyStitch may not require further testing before it is used in surgeries.

"The whole thing only took a couple of years, but now we know we can make these devices at that scale and we know what we can add to it to make it better," Corr said. "We just kept pushing and prevailed." ■

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Investing in the Future of Nursing

TMCx alumnus Trusted Health connects health care workers with flexible jobs

BY RYAN HOLEYWELL

Karen Jones is looking for her next adventure. The Louisiana-based nurse, 54, is wrapping up her second 13-week stint at Texas Children's Hospital in The Woodlands. Next up: 13 weeks at a hospital in Washington state. And after that—who knows? She'd love to treat patients in Hawaii, New York or Miami, and she's in the phase of her life where she can travel anywhere she wants.

"My husband and I have an empty nest for the first time in 29 years," Jones said, contemplating her next destination.

Jones is part of a cadre of health care professionals known as travel nurses who take short-term jobs

across the country, filling the gap for hospitals and other health care providers that face temporary staff shortages. In some cases, they're younger professionals who aren't bound by family or homeownership to a specific location. Others, like Jones, are exploring newfound freedom after their children leave home.

The arrangement gives nurses the chance to explore the country and gain new professional experiences. And it allows employers to respond quickly when their staffing is affected by turnover, new facility openings, natural disasters or seasonal fluctuations.

San Francisco-based Trusted Health is Jones' 21st-century

matchmaker, and the company is attracting significant investment for its innovative approach. Part of the Texas Medical Center's TMCx accelerator in 2018, Trusted Health received investment from the TMC Venture Fund. In May, the company announced it had closed a \$20 million funding round. Earlier this year, Trusted Health reported that more than 1,000 nurses per week were signing up for its platform.

"For us to have an impact on health care is such an incredible mission," said CEO Matthew Pierce. "If we really connect people to opportunities in a much more efficient way, we can have an incredible impact on an industry that needs it."

Travel nurses, Pierce said, want flexibility, autonomy and new experiences. He cites one group of Trusted nurses that works in San Diego in the winter and Colorado in the spring.

Pierce's company didn't invent the industry, but it streamlined the process of recruiting and hiring travel nurses using a two-pronged approach. Its app—similar to a dating app—introduces nurses to potential job opportunities based on their background and preferences. Then, during the hiring process, Trusted employs clinicians called "nurse advocates" to offer a human touch.

In the past, nurses found short-term jobs through recruiters. Trusted's approach, Pierce said, is a much-needed alternative. "The old, antiquated way is you're held hostage and have to get on the phone with the recruiter," Pierce said. "The recruiter is haggling with you. The recruiter doesn't have a clinical background, and you're struggling to get information."

Unlike traditional recruiters, Trusted employees aren't paid based on commissions or quotas, company leaders said. As a result, they aren't pressured to get a nurse contract signed at all costs.

Jones, the Louisiana nurse, said Trusted's approach is unique, since the use of technology streamlines a process that can be cumbersome. She also said other nurse recruiters are known to harangue nurses, while Trusted has a softer approach.

Nurses input their background

information onto the platform and are presented with job options based on their preferences, including when they want to work, their specialty and their preferred locations. If they like what they see, they can request an interview. Trusted's "nurse advocates" screen the nurses to make sure they're the right fit.

If all works out, Trusted handles licensing, benefits and payroll. Trusted—not the health care provider—pays the nurses.

"Trusted sends you an email with [job] matches," Jones explained. "You apply if you want to and you don't if you don't want to. It's very technologically savvy."

She also texts regularly with her "nurse advocate," which she says is helpful because their schedules don't align. (Jones works nights.)

"The whole process is just so easy," said Jones, who secured her gig with Texas Children's Hospital just 24 hours after applying through Trusted.

The company is starting to explore "on-demand" nursing assignments—think Uber for nursing. It's also developing a platform that connects directly to health care providers' scheduling and human resources systems.

Sarah Gray, Trusted Health's founding nurse and head of clinical operations, said the company is responding to the changing demands of the nursing workforce. "What a nurse wants, values, and cares about—and the tools they expect to manage their careers—has really evolved," she said. "We saw Trusted as an opportunity to be a fresh face for the profession and empower nurses to take control over their careers and perceive themselves as the professionals that they are."

The company works to build communities of travel nurses in their new cities, organizes events for them and promotes respect and dignity for the profession through its marketing channels.

"That's what really draws nurses to Trusted," Gray said. "The relevance, the technology, the ease, the seamlessness, our 'nurses first' mission and brand. To us, nurses aren't a commodity." ■

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VITALS

Trending topics in health, science and medicine

By Shanley Pierce

Psychedelics are back, man

Thanks to a new wave of research interest in a class of drugs that became stigmatized by its association with the 1960s counterculture movement, psychedelics are poised for a comeback.

Johns Hopkins Medicine is set to launch the first-ever research center in the country dedicated to studying psychedelic medicine and its effects on behavior, brain function, learning, memory neurobiology and mood. Funded by a group of private donors, the Center for Psychedelic and Consciousness Research hopes to find new therapeutics to treat depression, addiction, Alzheimer's and other diseases.

The three main psychedelics are LSD (acid), MDMA (ecstasy) and psilocybin (a naturally-occurring compound found in more than 200 species of mushrooms). Psychedelic drugs lead to mind-altering experiences by binding with serotonin receptors in the brain.

"By binding to these receptors, these [drugs] in turn elicit euphoric, sensory enhancement effects and these visual and mental hallucinations that individuals experience," said Austin De La Cruz, Pharm.D., clinical assistant professor at the University of Houston College of Pharmacy.

Currently, psilocybin is the most studied psychedelic

and has been shown to create "enduring, positive changes in attitudes, moods and behaviors lasting months," according to Roland Griffiths, Ph.D., director of the Center for Psychedelic and Consciousness Research at Johns Hopkins.

"There's a lot of exciting research to be done—both in terms of exploring therapeutic applications, as well as understanding the basic pharmacology and neuroscience underpinnings that account for the potential therapeutic effects of these drugs and their remarkable ability to alter consciousness in a way that's deeply meaningful to people," Griffiths added.

Serotonin is a neurotransmitter that plays an integral role in regulating mood, appetite, cognition memory and perception. A class of antidepressants called selective serotonin reuptake inhibitors (SSRIs) work by increasing serotonin levels in the brain to mitigate depressive symptoms.

"There's a lot of data out there showing that too little serotonin can lead to habitual repetitive thinking," De La Cruz said. "An individual might think that they're not good enough, no one understands them, no one loves them, everything is terrible."

Psilocybin has been shown to help reframe and recalibrate

people's mindsets. A 2006 study by Griffiths and his team at Johns Hopkins showed that psilocybin produced perceptual changes and "mystical-type experiences having substantial and sustained personal meaning and spiritual significance."

"Taking psilocybin helps down-regulate that network of stories that we've been playing over in our head so that we can, in a way, come up with new stories and have a new perspective," De La Cruz said.

In 2016, Griffiths and his team published another psilocybin study in the *Journal of Psychopharmacology* that showed approximately 80 percent of participants experienced a decrease in depression and anxiety, 83 percent reported improved sense of well-being or life satisfaction and 70 percent reported their experience as "one of their top five spiritually significant lifetime events" six months after the final treatment.

Unlike other antidepressants, which can take weeks to become effective, psilocybin works in a matter of hours.

"After just a single session that takes place over a 6-hour period or maybe a couple of sessions, people are changed enduringly," Griffiths said. "We don't have any model of that kind of intervention being effective in the entire

field of psychiatry."

Psilocybin was sold to psychiatrists and psychologists in the 1950s and 1960s as a therapeutic for patients, but the drug gained a negative reputation due to its recreational use by the hippie, anti-war counterculture. As a result, in 1970, psilocybin and other drugs of its class were categorized as Schedule 1 drugs—meaning they have a high potential for abuse with no therapeutic benefits.

Risks include blood pressure changes, nausea, accelerated heart rate, panic attacks, anxiety and acute psychotic episodes, but psilocybin has an extremely low toxicity level and deaths due to the drug have been "extremely rare," according to the Drug Policy Alliance.

"The profile of risks of these compounds had been so demonized and distorted by what occurred in the 1960s," Griffiths said. "It really undermined the respectful scientific approach to investigating these compounds and over-weighted what was viewed as potential risks of these compounds. Again, they're not without risk, but the risks aren't as catastrophic as was portrayed and came to be believed in the 1960s."

Psychedelics are still Schedule 1 drugs and still stigmatized, but increasing scientific interest is beginning to reverse public perception. ■

1 | MARK BARR, left, a Paralympian and a trauma-surgical ICU nurse at Harris Health System's Ben Taub Hospital, won the ESPY (Excellence in Sports Performance Yearly) for best male athlete with a disability and posed for a photo with his brother, Paul Barr.

2 | Paula Gómez Rodríguez, a cancer survivor who was treated at **THE UNIVERSITY OF TEXAS MD ANDERSON CANCER CENTER** for osteosarcoma and lived for a year at **RONALD McDONALD HOUSE HOUSTON**, received a 10-week-old apricot Australian Labradoodle she named Mateo from Stuff the Sleigh, a Houston-area nonprofit that provides support to pediatric cancer and hematology patients.

3 | JOSEPH PETROSINO, PH.D., has been named chair in the department of molecular virology and microbiology at Baylor College of Medicine by the Baylor Board of Trustees.

4 | KATHERINE Y. KING, M.D., PH.D., associate professor of pediatrics – infectious diseases at Baylor College of Medicine, has been invited by the National Institutes of Health's Center for Scientific Review to serve on the Molecular and Cellular Hematology Study Section through June 2025.

5 | Nearly 100 physician-musicians from across the globe traveled to Houston to participate in the 29th World Doctors Orchestra concert held at Rice University.

6 | THE UNIVERSITY OF TEXAS MD ANDERSON CANCER CENTER unveiled plans to expand its Proton Therapy Center. The \$159 million expansion will more than double the center's size.

7 | CHRISTOPHER D. HARNER, M.D., professor and vice chair for academic affairs in the department of orthopedic surgery at McGovern Medical School at The University of Texas Health Science Center at Houston, was inducted into the American Orthopaedic Society for Sports Medicine's Hall of Fame.

8 | JEREMIAH JOHNSON, M.D., assistant professor of neurosurgery at Baylor College of Medicine, was elected chair of the American Association of Neurological Surgeons' Young Neurosurgeons Committee.

9 | Formerly conjoined twins Knatalye Hope and Adeline Faith Mata have started pre-kindergarten 4 in Littlefield, Texas. The twins were safely delivered at **TEXAS CHILDREN'S PAVILION FOR WOMEN** in 2014, and underwent separation surgery on Feb. 17, 2015.



Credit: Nos. 1, 3, 4, 8, 12, 14, courtesy photos; No. 6, Stantec; No. 7, 11, 15, Dwight C. Andrews, UTHealth; No. 9, Elysse Mata; No. 10, Country Park Portraits; No. 13, CJ Martin; No. 16, Darius Dalton



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10 | LOUISE McCULLOUGH, M.D., PH.D., professor and chair of neurology at The University of Texas Health Science Center at Houston received the 2019 Landis Award for Outstanding Mentorship from the National Institute of Neurological Disorders and Stroke.

11 | MICHAEL WEAVER, M.D., professor of psychiatry and medical director of the Center for Neurobehavioral Research on Addiction at McGovern Medical School at The University of Texas Health Science Center at Houston, was invited to the White House's Office of National Drug Control Policy to help set the national agenda on addiction medicine.

12 | State Representative **HAROLD DUTTON**, along with Deputy Assistant Director of the Houston Health Department **FAITH E. FOREMAN-HAYS, DrPH**, MAYOR **SYLVESTER TURNER** and Community and Social Services Director of Good Hope Missionary Baptist Church **CHRIS JOHNSON**, commemorated the launch of Prostate Cancer Awareness Month in Texas.

13 | Virginia Quintanilla and her daughter, Eliza, were among the hundreds of children and families reunited with **TEXAS CHILDREN'S HOSPITAL** doctors, nurses and caregivers at a "Made in Texas" themed neonatal intensive care unit (NICU) reunion in August, celebrating former patients who graduated from the hospital's NICU in 2018.

14 | IMAD JARJOUR, M.D., associate professor of neurology and pediatrics at Baylor College of Medicine, was elected to the board of directors of the United Council for Neurologic Subspecialties to represent the subspecialty of Autonomic Disorders.

15 | JOYCELYN ASHBY CORNTHWAITE a certified diabetes educator at the UT Physicians Women's Center and a registered dietitian for the department of obstetrics, gynecology and reproductive sciences at The University of Texas Health Science Center at Houston, has been named the 2019 Texas Diabetes Educator of the Year by the American Association of Diabetes Educators.

16 | THE UNIVERSITY OF TEXAS MD ANDERSON CANCER CENTER youth development organization First Tee, and PGA Tour professional Tony Finau, left, raised awareness about the dangers of tobacco at a "Too Cool to Smoke" event in Atlanta in August.

Do you have TMC photos you would like to share with *Pulse*?
Submit high-resolution images to: news@tmc.edu

October 2019

10/15

Exposing the 20 Medical Myths: Why Everything You Know About Health Care is Wrong and How to Make it Right

A discussion with authors
Arthur Garson Jr., M.D., and
Ryan Holeywell

Tuesday, 5:30 – 7:45 p.m.

Third Coast Restaurant

6550 Bertner Ave., 6th Floor

Register: tmchealthpolicy.org

10/22

San José Clinic's Fall Speaker Series Luncheon

Resiliency and Expansion

Tuesday, 11:30 a.m. – 1:30 p.m.

InterContinental Houston -
Medical Center

6750 Main St.

Tickets start at \$100.

Purchase at sanjoseclinic.org

713-228-9411

10/23

Culture, Cuisine & Contagion: Ancient Egypt & Today

A discussion with Smithsonian
anthropologist Sabrina
Sholts, Ph.D., and American
University in Cairo professor of
Egyptology Salima Ikram, Ph.D.

Wednesday, 5:30 – 8 p.m.

The Health Museum

1515 Hermann Park Dr.

Tickets are \$15.

Purchase at thehealthmuseum.org

bseabrook@thehealthmuseum.org

713-521-1515

10/29

Leading with Emotional Credibility

A discussion about leadership and
influence with John Bates,
a TED-format trainer

Tuesday, 9:30 a.m.

JLABS @ TMC

2450 Holcombe Blvd.

vtilden@its.jnj.com

713-532-3376



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Please don't say,
“I wish I'd done
something
sooner.”

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Sue Atlas, 713.446.5551



Westchester

West University, \$3.3+ mil.
Cathy Blum, 713.320.9050



Piney Point

Piney Point, \$2.1+ mil.
Sharon Ballas, 713.822.3895



Berthea

Rice/Museum District, \$2 mil.
Tim Surratt, 713.942.6830



Cason

West University, \$1.7+ mil.
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