

TMC | PULSE

THE OFFICIAL NEWS OF THE TEXAS MEDICAL CENTER — VOL. 3 / NO. 1 — JANUARY / FEBRUARY 2016

Young at Heart

.....
*Treating congenital heart disease
in the Texas Medical Center*

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Young at Heart

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WHEN NOT WORKING WITH PATIENTS OR RESEARCHING THE LATEST MEDICAL DISCOVERY, THE HEALTH CARE PROFESSIONALS OF THE TEXAS MEDICAL CENTER ORCHESTRA HAVE BEEN PERFORMING IN HOUSTON AND AROUND THE COUNTRY.

ON THE COVER: An X-ray of an eight-month-old male’s chest reveals a healthy heart. The image has been color-enhanced to highlight the heart. (Credit: Scott Camazine / Alamy)



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ROBERT C. ROBBINS, M.D.
*President and
Chief Executive Officer,
Texas Medical Center*

We started out 2016 on a somber note, with news of the passing of our friend and community leader El Franco Lee, at the age of 66. He served as Harris County Precinct One commissioner for over 30 years, and cared very much about the health and wellbeing of his community.

His passing, of an apparent heart attack, highlights the importance of heart health, and the value of the work being done each day here in the medical center surrounding cardiovascular research and patient care.

I'm proud that our own Denise Castillo-Rhodes, executive vice president and chief financial officer for the Texas Medical Center, is serving as this year's chair of the American Heart Association's Go Red for Women campaign. More women die of congestive heart failure each year than all cancers combined. It is important that we engage in this conversation and help raise awareness for this devastating disease.

In this issue of Pulse, you will find a Spotlight interview with local American Heart Association Executive Director Yara El-Sayed. She speaks to the programs available through the AHA, and the value of community awareness and empowering individuals to be active participants in preventative care.

There are steps that we can all take to help reduce the risk of heart disease, but it all begins with knowing your numbers. How many steps do you take in a day? How much do you weigh? What is your body mass index? How are your cholesterol levels? Knowing these numbers—and talking to your doctor about them—can help you take control of your health, and make necessary lifestyle changes to improve your health for the future.

There are also a number of digital tools available to help individuals keep track of their numbers. iPhones come pre-programmed with the Health app, allowing users to track steps, body measurements, nutrition, test results and more. Similarly, Samsung users can explore the functions of the S-Health app.

Knowing your numbers is just part of the solution. We must also make healthy lifestyle choices a priority. Don't smoke. Don't drink too much. Enjoy everything in moderation. It can be challenging to find time in a busy day to fit in healthy, balanced meals and exercise, but both are critical to one's overall health.

You can learn more about heart health and the Go Red for Women campaign at www.heart.org.

Robert C. Robbins

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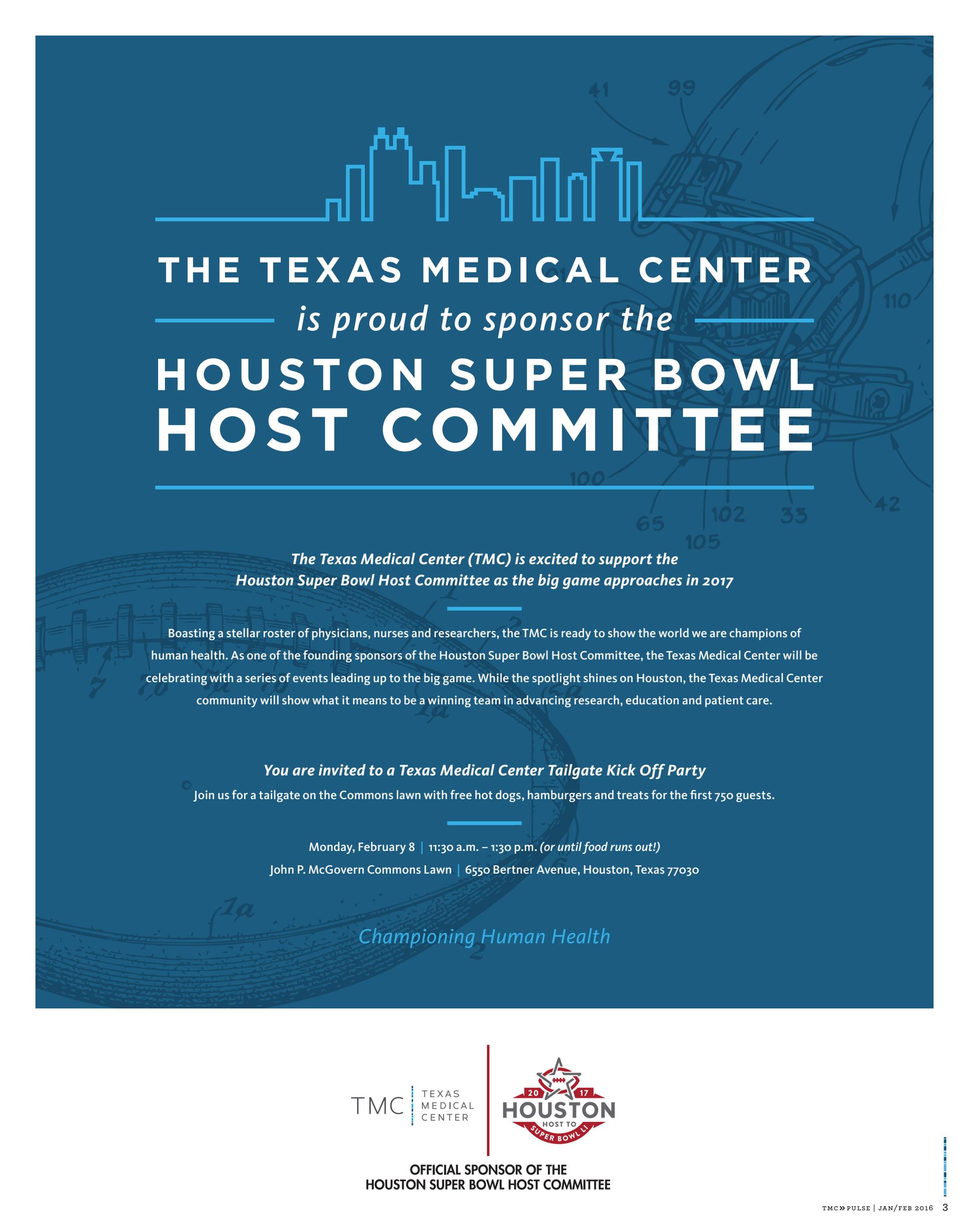
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Join us for a tailgate on the Commons lawn with free hot dogs, hamburgers and treats for the first 750 guests.

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The Beat of the Medical Center

After 16 years, the health care professionals of the Texas Medical Center Orchestra are still producing critically acclaimed performances

BY BRITNI N. RILEY



Libi Lebel founded the Texas Medical Center Orchestra and has been directing it ever since.

THE TEXAS MEDICAL CENTER ORCHESTRA WAS FOUNDED IN 2000 TO PROVIDE LOCAL HEALTH CARE PROFESSIONALS WITH A CREATIVE OUTLET.

Where can you find Texas Medical Center doctors, paramedics, medical students and employees during their free time? Every Wednesday evening, the 80 who belong to the Texas Medical Center Orchestra gather to indulge their creative sides.

In 2000, Libi Lebel left New York and a position as principal conductor of Princeton University's Sinfonia Orchestra for Houston to start an orchestra in the world's largest medical center. Lebel received a bachelor's and master's degree from The Juilliard School of Music and The Westminster Choir College.

Inspired by a performance she had seen by the Doctor's Orchestra of Philadelphia, Lebel wanted to give Houston's health care professionals a creative outlet through music.

With the help of then dean of The University of Texas Health Science Center at Houston McGovern Medical School, L. Maximillian Buja, M.D., Lebel was able to obtain space to hold auditions.

"The dean helped me send out an email to the medical center about auditions, and other than that, I put fliers up on every bulletin board I could find," Lebel said.

Lebel was pleasantly surprised when she had more people show up for auditions than she could take at the time, and they formed an incredibly talented group.

“I had given a research seminar at UTHealth Science Center and noticed a flier hanging on a bulletin board near the elevator for the orchestra auditions,” said Lynn Zechiedrich, Ph.D., principal flute and professor at Baylor College of Medicine. “I was so excited. I called Libi the second I was back at my office and told her I played flute and would like to audition. There were no flute positions available, so I auditioned to play piccolo. I played piccolo and co-principal flute for one year and have been the principal flute player ever since.”

In the beginning, the orchestra relied on support from all of the Texas Medical Center members. The orchestra was able to borrow concert music from the Shepherd School of Music at Rice University and the Moores School of Music at the University of Houston. They also utilized practice space at the McGovern Medical School, the Texas Heart Institute and the Michael E. DeBakey Veterans Affairs Medical Center Houston.

Today, the TMC Orchestra practices every Wednesday evening at the John P. McGovern Campus, formerly the Nabisco cookie factory.

SINCE 2000, THE TEXAS MEDICAL CENTER ORCHESTRA HAS GROWN TO 80 MEMBERS WITH THREE PERFORMANCES PER YEAR.

“This space has worked so well for us,” Lebel said. “It is a great location for most of our members because it is in the medical center. We just love it.”

Soon after its formation, the orchestra expanded to include not only doctors, but also professors, students, residents, medical examiners and more. The orchestra also now accepts members who work outside the medical center.

All of the members have hectic work and family schedules, but they look forward to the three hours a week they spend practicing as a way to escape their busy lives.

“As intense as our days might be, being pulled from patient to patient in critical condition, as tired as you are, when you come here you get revamped with all of the energy,” said Michael Siropaides, M.D., a viola player.

The TMC Orchestra performs at least three times a year as a group in addition to members spending time performing alone at many of the hospitals around the medical center.

Dwayne Wolf, M.D., deputy chief medical examiner for Harris County, plays double bass in the orchestra and also performs at various hospitals around the medical center.

“The TMCO is comprised of individuals from all walks of life, but many are based in the medical field or in allied health areas. Those who are not involved in the medical field are, nonetheless, generally professionals of some sort or another,” Wolf said. “This makes for some mutually shared experiences...long days at work, intense work life, exhausted by the time Wednesday practice rolls around, but committed to this artistic endeavor.”

The orchestra has performed throughout the medical center and the city of Houston over the past 16 years. In that time, the musicians have formed deep bonds and provided support for one another even beyond the musical. Two years ago, the group, led by Lebel, performed at Carnegie Hall in New York City. After the performance, Lebel extended her trip to celebrate her birthday. Upon returning, she was plagued with illness and exhaustion for two years.

“I didn’t know what to do,” Lebel said. “I had been struggling for months and nearly passed out on my podium at rehearsal. At that point, I asked the orchestra for help. After 15 years, we are like a family and they are all health professionals.”

After a long journey, Lebel was diagnosed with Lyme disease. Even with treatment, she still struggles to get through her days and it is more difficult for her to get to rehearsal.

“Having Lyme disease, I felt a bit fatigued today,” Lebel said. “The minute I heard the first three notes, I thought, ‘Oh my gosh they are sounding so good.’ I was ignited with this energy and I forgot that I was sick and in bed for the last three days.” ■

“As intense as our days might be, being pulled from patient to patient in critical condition, as tired as you are when you come here you get revamped with all of the energy.”

— MICHAEL SIROPAIDES, M.D.
TMC Orchestra Musician



MEET *the* MUSICIANS



RAJEEV RAGHAVAN, M.D.

Cello

Rajeev became involved with the orchestra when he was a medical student at Baylor in 2005. Although it was difficult to attend rehearsals due to clinical rotations or exams, he realized practicing and performing with the Texas Medical Center Orchestra was an excellent and healthy stress reliever. Rajeev has a wife and two daughters.



LYNN ZECHIEDRICH, PH.D.

Principal Flute

Lynn works as a professor at Baylor College of Medicine in its department of molecular virology and microbiology, biochemistry and molecular biology and in the department of pharmacology. She also serves as the Kyle and Josephine Morrow Chair. Zechiedrich has been part of the orchestra since its inception.



DWAYNE WOLF, M.D.

Double Bass

Dwayne is the deputy chief medical examiner for Harris County. Outside of the orchestra, he oversees medicolegal death investigation in Harris County, supervises a staff of 14 forensic pathologists, performs autopsies and testifies in criminal and civil cases.



MICHAEL SIROPAIDES, M.D.

Viola

Michael is a cardiologist in Houston and completed his fellowship at CHI St. Luke's Hospital. He has been a member of the Texas Medical Center Orchestra for the past 14 years. He joined the orchestra because of his passion for music and medicine.

ALEX SWEENEY, M.D., ASSISTANT PROFESSOR OF OTOLARYNGOLOGY-HEAD AND NECK SURGERY AT BAYLOR COLLEGE OF MEDICINE, MET WITH WILLIAM F. McKEON, EXECUTIVE VICE PRESIDENT AND CHIEF STRATEGY AND OPERATING OFFICER OF THE TEXAS MEDICAL CENTER, TO DISCUSS THE INCREDIBLE ADVANCES IN THE FIELD OF OTOLARYNGOLOGY OVER THE PAST 40 YEARS AND HOW SCIENCE HAS HELPED RESTORE HEARING FOR EVEN THOSE SUFFERING FROM TOTAL HEARING LOSS.



Q | Tell us about your formative years.

A | I was born in Baltimore and raised in the Houston area. My mother and father are both physicians in the Texas Medical Center, and I grew up with two brothers and a sister. My siblings and I graduated from William P. Clements High School, and, coincidentally, we all left Texas for college, we all played a varsity collegiate sport, and we've all been lucky enough to return to Houston. During that process, we've had the good fortune to be united with a wonderful stepmother, stepfather, five new sisters and a new brother.

Q | Coming from two parents who were physicians, was that path determined for you?

A | It was anything but predetermined. My interest in medicine actually grew from a variety of sports-related injuries and from time spent doing gene therapy research in college. However, there's no question that my parents were the primary reason that I was able to find a career that I love. No matter the task, they encouraged hard work and excellence. I can't imagine having more wonderful parents, and my gratitude to them for their guidance is endless.

Q | When did you know that you wanted to go to medical school?

A | I started thinking seriously about medicine when I was in college. I had my fair share of injuries as a football player, and the time I spent around doctor's offices made me realize how gratifying a medical career could be. I started volunteering in the emergency room at the Hospital of the University of Pennsylvania and the Children's Hospital of Philadelphia after the football season ended during my freshman year, and I made some great friends who were taking pre-med classes. It wasn't long before I felt like I had found my place in the world.

Q | How did you balance both the athletic and academic commitments at an Ivy League school?

A | The way I saw it, my life in college was one part academic, one part athletic and one part social, and I quickly learned that I had enough time to put myself simultaneously into two of those areas. My coursework always came first. Even though I was recruited to play football, I went to Penn for an education above all else. If I was going through the trouble of leaving Texas, bad grades weren't going to be a part of the deal. Football practice started a few weeks before classes, so sports were on my mind from the very beginning. But when I wasn't in practice, I was studying, and vice versa. As time went on, I branched out and ended up finding time to pledge a fraternity, run a tutoring service at a west Philadelphia elementary school, and I made some lifelong friends along the way.

Q | When did you turn your sights on medical school?

A | I knew that I was interested in health care during my freshman year in college, but I wasn't firmly set on applying to medical school until my junior year. At the end of my sophomore year, I started a six-month internship in an ophthalmologic gene therapy lab at Penn. I met some remarkable people during this experience, and their mentorship guided me towards the idea of being a clinician-scientist. As I explored this idea with my friends and family, it became clear that there was no career path better suited to my interests and personality.

Q | What led you to the field of ENT (ear, nose and throat)?

A | I'm not sure that I really knew much about otolaryngology—head and neck surgery or my particular subspecialty (otology/neurotology and skull base surgery) when I was a medical student. My experiences as an athlete and the desire to have the 'ball in my hands' made me interested in surgery, and once I saw the remarkable breadth of practice encompassed in the world of otolaryngology—otology/neurotology and skull base surgery, head and neck oncologic and endocrine surgery, facial plastic and reconstructive surgery, rhinology and sinus surgery, laryngology and care for the professional voice—

I was hooked. The mentorship I had from the experts here in the Texas Medical Center sealed the deal.

Q | What was the focus of your otolaryngology residency?

A | A well-trained otolaryngologist can be an expert in the science and art of 'communication,' whether verbal, auditory or visual, and that idea caught my attention. Through rotations with the BCM and MD Anderson faculty as a BCM resident, I had the opportunity to train with some of the leaders in the field. It's really a remarkable existence to spend one day resecting cancer from head and neck and reconstructing the resulting defect with grafts from another part of the body, only to spend the next day implanting a device into the inner ear that can rehabilitate profound hearing loss. As time went on, I became increasingly fascinated with the anatomy, physiology and pathology found in the base of the skull, and I was lucky to have Jeffrey Vrabc, Robert Williamson, Paul Gidley and William Brownell as examples of how my interests could be channeled into a comprehensive specialty.

Following residency, I completed a two-year fellowship with the otology group of Vanderbilt, under the mentorship of David Haynes, Michael Glasscock, George Wanna, Marc Bennett, Alejandro Rivas, Robert Labadie and Reid Thompson, during which I was able to focus on complex surgeries of the ear, facial nerve and skull base, as well as the science behind our understanding of auditory function and the natural history of skull base tumors. It was a wonderful experience. Through the collaborative efforts of the skull base team at Vanderbilt during just those two years, there were approximately 10,000 patient encounters, 400 cochlear implants, 200 skull base surgeries, 90 scientific publications and book chapters, 10 workshops and CME courses sponsored and five NIH-funded grants.

Q | Tell us about cochlear implants and the advancements that excite you the most?

A | Cochlear implants represent one of the greatest recent technological breakthroughs within our field. We've known for quite some time that electrical currents can be perceived as sound

by our auditory system. However, over the past 40 years, the brilliant work of scientists and surgeons around the world has revealed that a device can be implanted into the inner ear through a relatively short, straightforward surgery, and, with the help of an advanced processor, sound can be delivered electronically to your brain and interpreted in a meaningful fashion. In essence, we are able to rehabilitate one of the major ways people interact with the world—through speech and sound. In fact, hearing is the only one of the five senses that we can reliably restore after a complete loss. Over time, the field of cochlear implantation has only become more exciting. In recent years, we've learned that cochlear implants can potentially complement natural, acoustic hearing. Implant candidacy criteria are expanding, and there's been an explosion of new knowledge regarding surgical technique, implant design and programming. I firmly believe that the present and future are bright for patients who suffer from hearing loss.

There have been some intriguing advancements in the field of lateral skull base surgery in recent years, as well. The most common tumors treated are vestibular schwannomas, which are also called acoustic neuromas. These are generally non-cancerous tumors that grow on the hearing and balance nerve between the brain and the inner ear. More than ever, research is exploring the factors that drive quality of life in patients with these tumors. At different times in the history of vestibular schwannoma treatment, it has been thought that either surgery or radiation was the best option for every patient. However, tumor management is becoming much more patient-centric, and with the emergence of multidisciplinary care teams that specialize in the management of skull base tumors, it's becoming easier to tailor-make treatment plans that optimize outcomes. I feel very fortunate to be a part of such a team, made up of skilled neurosurgeons, neurologists, audiologists, speech pathologists, voice and swallowing specialists, balance therapists, and

plastic and reconstructive surgeons, among others. The collective expertise of this group allows us to provide very comprehensive care for patients with skull base tumors as well as those with advanced hearing loss.

Q | Looking forward, what excites you about the future of this field?

A | In one word, 'potential.' There have been some remarkable discoveries regarding hearing loss and skull base tumor management, but there is so much left yet to discover. With a growing emphasis on translational research and multidisciplinary approaches to complex problems, I feel like we are knocking on the door of a revolution in the ways we diagnose and treat skull base tumors as well as hearing, facial nerve and balance disorders.

Q | Do you imagine a day when we will be able to implant devices that will provide quality hearing for the remainder of someone's life?

A | I think that day has already come, and the newest research makes me very excited for the future. This fall, I participated in an international cochlear implant conference in which scientists and surgeons from around the world came together to discuss the newest developments. The current rate of innovation is absolutely breathtaking. Both the surgical techniques and the devices have changed quite a bit in the past decade, and there's no telling what we'll be able to achieve in the near future.

Q | Any closing thoughts?

A | I am honored to have the chance to do what I do. Working as an otologist, neurotologist and skull base surgeon in Houston is a dream come true for me. I don't know of another place in the world where there are as many brilliant minds and excellent institutions so close to each other. Through collaborative relationships, I think we can solve some of the perplexing issues that have plagued human health for centuries. It is a very exciting time to be in Houston and the Texas Medical Center. ■

“Cochlear implants represent one of the greatest recent technological breakthroughs within our field.”

Battling Infection

Rice University researchers have developed an antibiotic-infused, time-released gel for space holders in facial reconstruction

BY ALEX ORLANDO

“Infection is an important problem that needs to be considered with medical devices because bacteria can prevent the body from being able to heal. [...] Infection can not only limit the ability of a medical device to perform, but it may also require the removal of the device itself.”

— ANTONIOS MIKOS, PH.D.
Louis Calder Professor of Bioengineering and Chemical and Biomolecular Engineering at Rice University



Antonios Mikos, Ph.D., and Sarita Shah work to develop materials to help repair severe craniofacial injuries.

Within the fast-paced laboratory of Antonios Mikos, Ph.D., Louis Calder Professor of Bioengineering and Chemical and Biomolecular Engineering at Rice University, researchers strive to develop a wealth of materials to repair severe craniofacial injuries—often ones sustained through trauma or pathological defects like tumor removal. Unfortunately, one familiar, pesky interloper has the potential to jeopardize healthy recovery and tissue growth as patients receive temporary implants for facial reconstruction: infection.

“Infection is an important problem that needs to be considered with medical devices, because bacteria can prevent the body from being able to heal,” said Mikos, also director of the Center for Excellence in Tissue Engineering at Rice. “Infection can not only limit the ability of a medical device to perform, but it may also require the removal of the device itself. Depending on the extent of the infection, it can even lead to tissue necrosis—the death of previously healthy tissue.”

In their battle against the looming threat of infection, Mikos and his

colleagues have come up with a solution—a unique way to deliver time-released antibiotics, warding off infection while a patient heals.

“Think of this as something that allows us to infuse a prefabricated implant with an antibiotic gel that would be slowly released after implantation,” Mikos said. “This would address any issues surrounding infection.”

For patients who have sustained a craniofacial injury, the lab’s prefabricated implants—essentially, specialized space maintainers—are designed to keep a pocket for new bone open



The process for the fabrication of the lab's specialized space maintainers, designed to keep a pocket for new bone open while the overlying soft tissue heals.

while the overlying soft tissue heals. In later surgery, the implant is removed to make way for reconstruction of the bone itself.

In this latest advance—the subject of a paper that appeared in the Royal Society of Chemistry journal *Biomaterials Science* in December—the space holders, known as porous polymethyl methacrylate (PMMA) implants, are filled with a gel that leaches its protective antibiotic contents to surrounding tissue. This protects the tissue from infection for at least several weeks.

“At the time of surgery, the physician can decide what kind of antibiotic they want to put into the implants by directly mixing it with the thermogel,” said Sarita Shah, one of the paper’s co-authors and a graduate student at Rice University and Baylor College of Medicine’s M.D./Ph.D. Medical Scientist Training Program (MSTP). “That gives the surgeon incredible flexibility.”

Led by Paschalia (Lina) Mountziaris, M.D., Ph.D., an MSTP alumna and post-doctoral fellow in Mikos’s lab, the researchers noted that infections from the external environment and from neighboring structures—such as nasal passages, sinuses and the mouth—

can attack vulnerable tissue. Several studies have indicated wound infections from gunshot injuries to the face are common.

While researchers at Rice and elsewhere have experimented with porous implants previously, they are susceptible to invasion by infectious bacteria. The Mikos lab’s solution? Fill the pores at the point of care with a thermogel that infuses the spacer as a liquid and solidifies into a gel when exposed to body heat.

“PMMA can be thought of like a plastic,” Shah said. “It’s really there to maintain space. But by introducing the porosity into it, we’re able to make it a little bit rough on the outside. That roughness makes it easier for tissues to attach, so that when you put it into the mandible, the gums can attach—and stay attached—to it.”

The porosity of the PMMA space maintainer compounds with the special properties of the thermogel itself. It consists of a block copolymer, a self-assembling combination of two polymers that is also under investigation for the controlled release of chemotherapy drugs.

“Block copolymers can offer a lot of benefits since they are designed to take advantage of the strengths of individual

“At the time of surgery, the physician can decide what kind of antibiotic they want to put into the implants by directly mixing it with the thermogel. That gives the surgeon incredible flexibility.”

— SARITA SHAH

Graduate Student at Rice University and Baylor College of Medicine’s M.D./Ph.D. Medical Scientist Training Program

polymers,” Mikos said. “The block copolymer we used for our study was designed to be able to take on water, become a gel at body temperature and slowly degrade over the course of implantation.”

According to Mikos, soldiers are at particular risk for infection, as battlefield injuries are often susceptible to multidrug-resistant species of bacteria that invade between the time of injury and treatment.

“The technology was designed to address problems in infected wounds of soldiers coming back from Iraq and Afghanistan,” Mikos said. “What we’re trying to do in our laboratory, in collaboration with colleagues at The University of Texas Health Science Center (UTHealth), is to develop materials and technologies that will enable us to regenerate composite tissue

defects that are infected.”

The project is part of a \$75 million, five-year Armed Forces Institute of Regenerative Medicine grant to Rice, UTHealth and collaborating institutions to develop technologies to not only treat soldiers on the battlefield, but advance care for the public, as well.

“Right now, the people that this would be useful for in a non-military setting would be individuals who have either cancerous tumors or benign cysts of the jaw—because those are very defined resections,” Shah added. “In addition, cancer patients may also get radiation treatment along with the resection, which also makes them prone to infection. This would be a great advance for that kind of reconstruction.” ■

Deciphering Zika

Arbovirus experts at UTMB travel to Brazil in wake of virus outbreak linked to devastating birth defect

BY ALEXANDRA BECKER

In 2015, Brazil witnessed a catastrophic increase in babies born with microcephaly, an incurable and detrimental condition in which head circumference is strikingly small and the brain fails to fully develop. Cases are historically rare and typically caused by genetic abnormalities, prenatal exposure to toxic substances or disease like herpes or rubella during pregnancy, but with nearly 3,000 cases reported in Brazil last year, the surge has prompted international concern as well as speculation that the worst is yet to come.

While scientists and public health officials do not yet have the data needed to conclusively determine what is causing the majority of microcephaly cases that are part of the epidemic, early evidence points to the Zika virus, which was first detected in the country



around the same time and in the same regions as the microcephaly cases. Zika DNA has also been identified in the brain tissue of several stillborn babies with microcephaly.

“I believe there is more than enough evidence to tentatively link the virus to these microcephaly cases, but we’re working on scientific confirmation,”

BECAUSE THE AEADES MOSQUITO SPECIES IS PREVALENT THROUGHOUT TROPICAL AND SUBTROPICAL PARTS OF THE WORLD, IT IS LIKELY THAT OUTBREAKS WILL SPREAD TO EVEN MORE COUNTRIES VIA TRAVELERS.

said Nikos Vasilakis, Ph.D., an associate professor in the department of pathology and a member of the Center for Biodefense and Emerging Infectious Diseases at The University of Texas Medical Branch at Galveston (UTMB). At the request of the Brazilian government, Vasilakis and his colleague, Shannan Rossi, Ph.D., a research scientist in the department of pathology and at the Institute for Human Infections and Immunity at UTMB, traveled to the country in December to help set up diagnostic capabilities to verify the suspected link.

Utilizing reverse transcriptase polymerase chain reaction (PCR) assays, Vasilakis and Rossi worked with members of FioCruz, a public health research institute based in Brazil, to detect viral RNA in blood samples as well as amniotic fluid. A majority of their trip was spent setting up local PCR capabilities in Salvador, a city located in the Bahia state of Brazil, which is one of the hubs of the epidemic.

“Having onsite diagnostics is essential when you are in the middle of an outbreak such as this,” Rossi explained. “Right now we don’t have a lot of answers, and that is very frustrating to the public and especially pregnant women in Brazil.”

Because viral RNA only tells part of the story, Vasilakis, Rossi and their team at UTMB are also developing a technique for detecting the presence of immunoglobulin M antibodies in cord blood. Once that test is refined, they’ll transfer the technology to Brazil for clinical use.

The chief epidemiological question concerns the link between the virus and these cases of microcephaly, but



Saravanan Thangamani, Ph.D., associate professor in the department of pathology at UTMB and director of the ACL-3 Laboratory and Insectary Services Core at the Galveston National Laboratory, demonstrates techniques used to study pathogen-infected mosquitoes.

“There is actually a big concern that this could become an issue in Texas because we have both the population density and the vectors capable of transmitting the disease.”

— NIKOS VASILAKIS, PH.D.

Associate Professor in the Department of Pathology and Member of the Center for Biodefense and Emerging Infectious Diseases at The University of Texas Medical Branch at Galveston

there are still countless other unknowns intrinsic to this outbreak. What is the window for a mosquito to spread the infection? Are you contagious before you are symptomatic? When are you no longer considered infected? How does the virus cross the placental barrier? What is the rate of replication? The virulence? If a correlation does exist, at what point in the pregnancy does an infection cause microcephaly in the fetus? Answers to these questions will help guide public health education efforts and infection control processes, as well as the development of potential vaccines or treatment options. Until then, Brazilian authorities are proceeding with an abundance of caution, declaring a state of emergency and even advising women in infected regions to delay pregnancy until further notice. The CDC recently issued a travel warning to pregnant women planning to visit any of the infected areas, which include all of northwest Brazil as well as countries in Central and South America and the Caribbean.

Because the vector for the disease—the *Aedes* mosquito species—is prevalent throughout tropical and subtropical parts of the world, it is likely that outbreaks will spread to even more countries via travelers. In fact, two cases have already been confirmed in Texas. While neither was acquired locally (both were tourists who acquired Zika while traveling), all it would take is one infected individual to be bitten by a mosquito, and for that mosquito to bite a different individual after incubation, then for another mosquito to bite that individual, and so on, to establish a transmission cycle.

“There is actually a big concern that this could become an issue in Texas because we have both the population density and the vectors capable of transmitting the disease,” said Vasilakis. “And with the jet age, it takes just a few hours for an individual to come all the way from Brazil to Texas.

George Bush Intercontinental is a major hub, so that is a problem.”

Classified in the same family as dengue and West Nile, Zika was first discovered in Africa in 1947 and was, until now, considered a relatively mild arbovirus, causing only about a week’s worth of symptoms such as fever, rash, joint pain or conjunctivitis. Because there is currently no vaccine or treatment for the virus, individuals in infected countries have been asked to take standard precautions, including wearing long-sleeved shirts, utilizing screens on doors and windows, using mosquito repellents and clearing any standing water in broken flower pots or abandoned buckets, which are typically used as breeding grounds for the mosquitoes. Unfortunately, some of the hardest hit areas are also some of the poorest, where there is no air conditioning, few buildings with screens and very little access to repellents.

“What we’re seeing, I fear, is just the tip of the iceberg,” Rossi said. “As the rainy season starts to progress over the next few months, these cases are going to pick up because mosquitoes are going to be around to transmit the virus. And unless something drastic happens, we’re going to see another spike in microcephaly cases.”

It’s easy to read the data and nod along to the news about another mosquito-borne virus in tropical regions, but if the microcephaly cases are, in fact, fueled by Zika, this arbovirus could emerge as one of the most consequential in the world to date.

“It’s heartbreaking knowing so many babies are either going to die quickly or have a very substandard quality of life,” Rossi said. “Most of these babies are not going to walk, they’re not going to talk, and, with the most severe cases, they’re going to die soon after birth.”

Rossi retold a story about a woman at a clinic in Salvador who was happy and showing off her baby despite his



UTMB scientists with expertise in arboviruses, including Zika, worked alongside Brazilian colleagues in December to establish diagnostic capabilities in local clinics. (Credit: Shannan Rossi, Ph.D., UTMB)

THE ZIKA VIRUS WAS FIRST DETECTED IN BRAZIL AROUND THE SAME TIME AND IN THE SAME REGIONS AS THE MICROCEPHALY CASES.

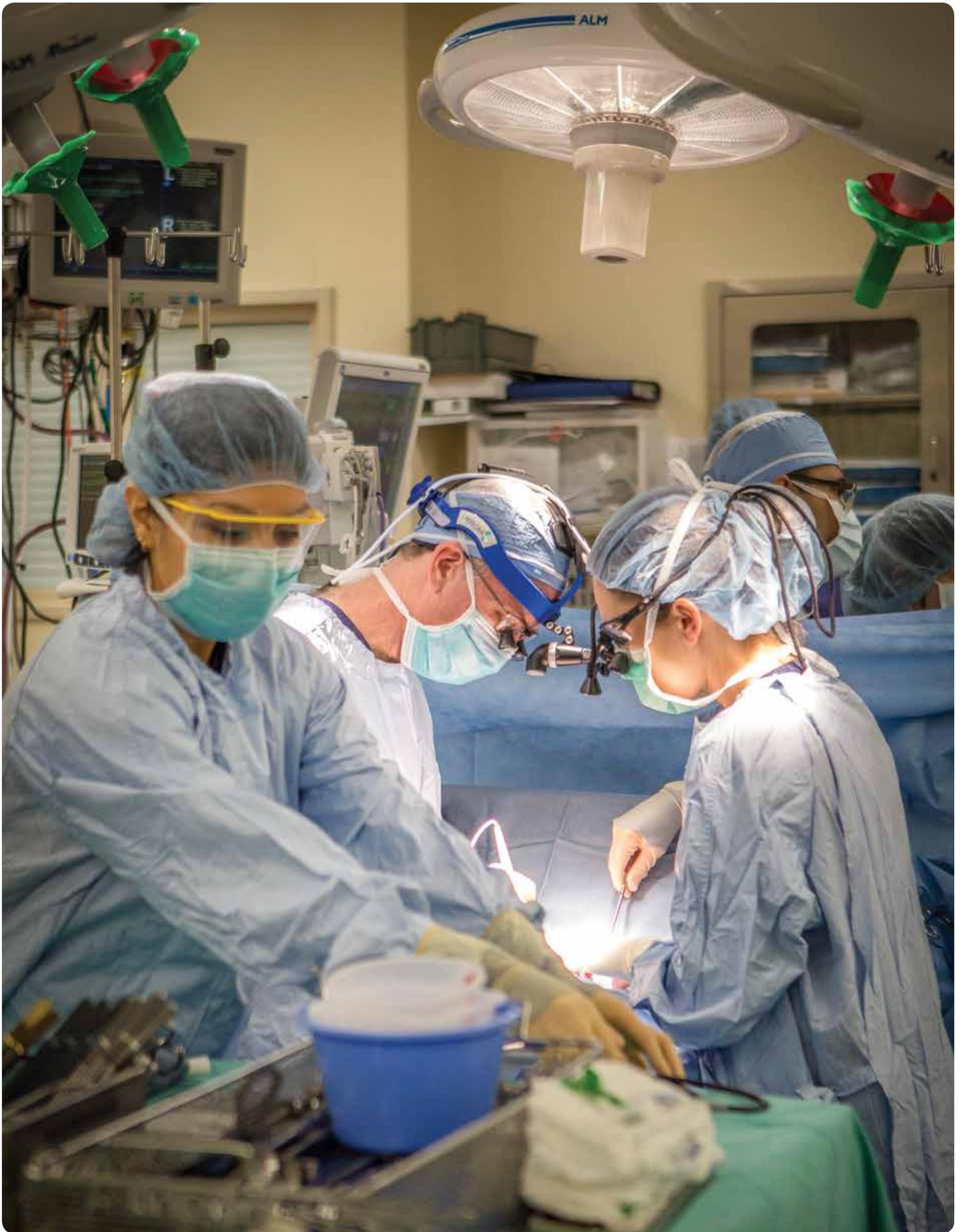
microcephaly diagnosis. One of the social workers asked, “Why are you so happy?” and the woman replied, “They told me my baby was going to be dead when he was born. And he’s alive, he’s still with me.”

That’s going to be one of the big challenges moving forward, Rossi explained—helping these families navigate their future.

For now, UTMB is doing everything it can to gather information that will hopefully help control the disease. The Institute for Human Infections and Immunity is home to the Galveston National Laboratory (GNL), one of only two national biocontainment laboratories funded by the National Institutes of Health. Their state-of-the-art facilities include a CDC-inspected arthropod

containment facility as well as the World Reference Center for Emerging Viruses and Arboviruses (WRCERVA), which serves as the world’s primary virus reference center. Zoonotic viruses are identified, characterized and analyzed for the purpose of understanding their mechanisms and developing approaches for their control. The work Vasilakis and Rossi did in Brazil would not have been possible without the research gathered in these facilities.

“We need to continue to be vigilant and ready,” Rossi said. “We’re going to continue to stay on the bench and do everything we can here. We have a good core team at UTMB and we’re committed to getting these answers.” ■



YOUNG *at* HEART

HOW THE PEDIATRIC HEART PROGRAMS IN THE TEXAS MEDICAL CENTER ARE CARING FOR THE CHILDREN OF TODAY AND ADULTS OF TOMORROW

BY ALEXANDRA BECKER

On a recent Thursday morning, a nurse anesthetist held open the door to Operating Room No. 25 for William Douglas, M.D., a pediatric cardiothoracic surgeon affiliated with Children’s Memorial Hermann Hospital and chair of the Division of Pediatric Cardiovascular Surgery at McGovern Medical School at UTHealth. His patient had already been prepped by the surgical team, who paused and individually stated their names before assuming their respective roles for the 2.5-hour procedure ahead. Douglas would be opening up the chest of a young baby whose heart was no larger than the size of a plum.

The baby was born with a congenital heart defect (CHD) that disrupted the directional flow of the arteries, and Douglas and his team were tasked with re-routing the blood so the patient’s circulatory system would function properly. The procedure required the creation of a small hole between the upper two chambers of the heart as well as the placement of a shunt between the pulmonary arteries and the aorta; without the surgery, blood would continue to bypass the lungs and the patient would not survive.

The field of fixing children’s hearts is at once specialized and comprehensive—and vastly different from the world of adult cardiology. The focus is not acquired heart disease but rather a malformation of the organ itself. Pediatric cardiologists and cardiovascular surgeons are skilled in handling these organs that, while mechanically and anatomically are nearly identical to the adult heart, present the challenge of being miniaturized. Moreover, congenital heart defects, also known as congenital heart disease, can run the gamut of potential malformations: leaky or blocked valves, holes in the heart’s chambers

or walls, a narrowing of the aorta, the reversal of major arteries, underdevelopment of entire sections of the heart—the list goes on. Because the condition is characterized by an inherent failure of development, it is often a significant health concern.

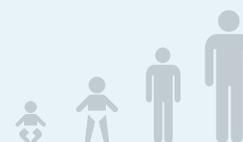
According to the Centers for Disease Control and Prevention (CDC), CHD affects nearly one percent, or about 40,000 births each year in the United States. It is the most common type of birth defect and approximately 25 percent of babies born with CHD will have a critical form, meaning they will need either surgery or some other form of treatment within the first year of their lives. Options range from monitoring and medication to catheter-based interventions, open-heart surgery and, in the most severe cases, transplantation—all of which are offered in the Texas Medical Center between the two primary pediatric heart institutions: Texas Children’s Heart Center at Texas Children’s Hospital and the Children’s Heart Program at Children’s Memorial Hermann Hospital.

Currently ranked No. 2 in the nation for pediatric heart care and heart surgery by U.S. News & World Report and the only hospital in Texas to be named an Accredited Pediatric Heart Failure Institute, Texas Children’s has been at the forefront of pediatric heart care since the beginning, and, in fact, was largely responsible for the formation of the field itself. A perfect union between some of the top pediatric specialists in the country at a time when the cardiopulmonary bypass machine made open heart surgery possible laid the foundation for Texas Children’s to perform many of the earliest, most successful lifesaving procedures over five decades ago.



As treatment options for CHDs have improved, more and more infants with CHD are

LIVING INTO ADULTHOOD.



Left: William Douglas, M.D., a pediatric cardiothoracic surgeon affiliated with Children’s Memorial Hermann Hospital, performs surgery on a young baby born with a congenital heart defect.



The creation of the

**CARDIOPULMONARY
BYPASS MACHINE**

was crucial for the development of heart surgery for both adult and pediatric patients. The machine uses a pump and oxygenator to bypass the heart and lungs, allowing surgeons to stop the heart and operate on it without impairing circulation.

Historically, CHD was discovered in newborns through a predictable litany of symptoms: labored breathing, weak pulse, poor feeding, excessive sleepiness or a bluish tint to the skin indicating that the blood is not receiving oxygen—a condition known as cyanosis or “blue baby.” In recent years, however, prenatal screening for heart malformations has become routine, meaning a majority of these conditions are caught as many as 20 weeks before birth. It’s a practice that is largely heralded as a central factor in the uptick of survival rates for babies born with CHD.

Using a sophisticated imaging technique called fetal echocardiogram ultrasound, sonographers are able to evaluate multiple views of high-quality images of a developing fetus’ heart. If a problem is suspected, the mother is referred to a fetal cardiologist for diagnosis and management.

“Getting a clearer look at the function of these babies’ hearts enables us to improve risk stratification before birth,” said Helena Gardiner, M.D., co-director of the Fetal Cardiology Program at The Fetal Center at Children’s Memorial Hermann Hospital and McGovern Medical School at UTHealth. “The most serious heart conditions will require very careful management within the first hours after a baby is born, and for that reason we recommend that these patients be delivered in the medical center so that they can be close to the experts who specialize in this kind of care. Having a baby with a heart problem should not be a surprise.”

While this innovation has afforded lifesaving

opportunities in the form of preparation, the instruments are, as they say, only as good as their operators. Through a first-of-its-kind public health campaign, the fetal cardiology team at Children’s Memorial Hermann Hospital has made it their personal mission to provide advanced training to sonographers throughout Harris County and beyond. Their goal is to teach these clinicians not only how to become proficient in the equipment itself, but to also recognize when the developing heart looks abnormal; if a sonographer suspects an anomaly, he or she will send the image to Memorial Hermann for evaluation and diagnosis—an elegant example of the telemedicine activities for which the hospital system is renowned.

“A network approach is quite important,” Gardiner explained. “We use several advances to support our network of clinicians who work more remotely from the cardiac surgical center. This begins by ensuring they have good ultrasound equipment and are familiar with the screening heart views, the five transverse views. We can then view these scans from hundreds of miles away using the Memorial Hermann System to address the sonographer’s or physician’s concerns, and we can determine whether or not the mom needs to travel here to see a specialist.”

Although ambitious in its breadth, the team does not expect to produce any overnight experts in the many variations of congenital heart disease.

“It’s important to us that the sonographers in the community know what to look for, not so much so they can make a diagnosis—that’s not

the critical component—we want them to know what normal looks like, and when it doesn't look like that, to send us the images so that we can evaluate them and determine whether or not we need to see the patient,” explained Anthony Johnson, D.O., co-director of The Fetal Center at Children’s Memorial Hermann Hospital and McGovern Medical School at UTHealth. “I’d rather see a dozen cases that might be something that turn out to be fine than have one case be missed because someone didn’t know what they were looking at.”

Texas Children’s has deployed their clinical expertise across the greater Houston community as well by creating a network of pediatric, maternal and fetal clinic locations to assist community physicians and obstetricians in the detection of fetal anomalies, including congenital heart. Over the past year, Texas Children’s Maternal and Fetal Center conducted more than 41,000 ultrasounds and fetal echocardiograms across the Houston area and beyond. The majority of these patients were evaluated and cared for in their own community, however, for the most complex cases, a higher level of care was necessary and 120 mothers with complex cardiac babies were transferred to Texas Children’s to gain the comprehensive expertise needed immediately after delivery.

Management plans for CHD depend on the type and severity of the malformation. Unfortunately, survival depends on something else entirely: location, location, location.

The importance of the *where* alongside the *what* underlies Memorial Hermann’s and Texas Children’s efforts to improve detection of fetal anomalies throughout Texas. As Gardiner pointed out, many of these conditions require careful, expert management; if an obstetrician knows his or her patient’s baby has CHD, it is often crucial that delivery takes place at a hospital that specializes in pediatric cardiology and cardiovascular surgery. Troublingly, not all of these centers are created equal.

“The most important thing is getting the patients to the right hospital at the right time,” said Charles Fraser, M.D., Texas Children’s Hospital surgeon-in-chief and chief of congenital heart surgery and professor of surgery and pediatrics at Baylor College of Medicine. “That affects more lives than all of the advancements in our field combined. There is an enormous disparity in outcomes if you compare centers in this country and that is a tragedy; despite how far we’ve come, it can still be an accident of birth—that where you happen to be born will have a direct impact on your prognosis.”

The numbers don’t lie. Although the majority of pediatric heart centers do not publicly release their mortality profiles, most confidentially report their results to the national database

managed by the Society of Thoracic Surgeons. Just last year, a composite of this data was made publicly available in a report published by CNN, which revealed that surgical death rates ranged from 1.4 to 12.1 percent, depending on the hospital. That’s an astronomical difference when it comes to life and death.

“If our society was really aware of this issue, I don’t think any of us would accept it,” Fraser said. “Your mortality profile could be 10 times worse depending on where you are born in the United States. Ten times worse. Can you imagine that? That’s not what we as a society believe in, but it’s a fact. It’s an unarguable fact.”

Fraser and colleagues from around the country are becoming increasingly vocal about this disparity in hopes of raising awareness and ultimately fostering change. To turn a mediocre center great, however, first requires an understanding of the numerous and varied components that contributed to the overall decrease in mortality rates in the first place.

“We have 21 children in our dedicated cardiovascular ICU this morning,” Fraser said. “I don’t believe there is a child in there who would have been alive when I was a baby. Not a single child. And almost every single one of these children will survive and move on from the hospital with an acceptable prognosis. In a single lifetime, we’ve gone from being unable to offer anything to approaching 100 percent survival. It’s astonishing, and you honestly couldn’t point to just one thing to explain it. It’s a concert of having a dedicated children’s hospital, focused children’s care, the development of all the subspecialties that are around us as well as general advancements in cardiology and cardio-surgery, intensive care, neonatology, anesthesia, pharmacology and physiology. On top of that, our focused surgical teams and specialists don’t work on anything else but the heart. That’s all we do, that’s all everybody in this heart center does—our anesthesia team, our ICU—we don’t do anything else.”

“In a single lifetime, we’ve gone from being unable to offer anything to approaching 100 percent survival.”

— CHARLES FRASER, M.D.

Texas Children’s Hospital’s Surgeon-in-Chief and Chief of Congenital Heart Surgery and Professor of Surgery and Pediatrics at Baylor College of Medicine



Daniel Penny, M.D., Ph.D., and Charles Fraser, M.D. (Credit: A. Kramer/Texas Children’s Hospital)

Preventative cardiology is becoming increasingly important as acquired cardiovascular disease is predicted to be the

NEXT BIG GLOBAL EPIDEMIC

in the developing world.

Add high patient volume, multiple surgeons, strategic multidisciplinary partnerships and emphasis on the importance of a continuum of care, and one begins to see what sets the Texas Children's Heart Center at Texas Children's and the Children's Heart Program at Children's Memorial Hermann Hospital apart from the pack.

"There's an increasing appreciation that it's really all part of the continuum and that there is likely a sequence of crucial times during development that are really important," explained Daniel Penny, M.D., Ph.D., chief of cardiology at Texas Children's and professor of pediatrics-cardiology at Baylor. "For that reason, we work closely with our partners at Texas Children's Pavilion for Women, Texas Children's Fetal Center,TM the Texas Heart Institute, and other pediatric specialists here at Texas Children's Hospital to make sure we're addressing every aspect that impacts the child's wellbeing. One of the big advances over the last 10 years or so is the increasing recognition that heart disease in children isn't just a disease of the heart. It's not just about funny valves and funny hearts, it's a condition that really affects the whole child, it affects the family and ultimately society."

Penny and his team at Texas Children's are directing efforts to some of the non-cardiac implications of heart disease in children, including neurodevelopment delays caused by the abnormal hemodynamics in utero common to patients with CHD as well as symptoms of post traumatic stress disorder observed in children and their families after open heart surgery. And they don't stop there. Thanks to the field's

considerable advancements in the last five decades, babies born with CHD are now growing up to be adults. Although many are healthy overall, these individuals do require periodic monitoring and care their whole lives. Rather than send them to adult cardiologists, who specialize in a completely different kind of heart disease, Texas Children's has engaged a large team of specialists to provide dedicated care for these patients.

"It is now well-known that there are more adults living with congenital heart disease than children with congenital heart disease in the U.S. today," Penny said. "So we've put a great deal of effort into developing that integration between pediatric care and adult care. It isn't something we can just take for granted—we have to plan and build processes and programs to meet the unique needs of these individuals. We need to prepare and be ahead of it and face these challenges rather than wait for other people to do it."

In keeping with this philosophy, Texas Children's offers the most advanced treatment options available, including fetal intervention procedures. Widely recognized as a nascent subspecialty only recently put into practice, fetal intervention has been documented to save fetuses with certain heart abnormalities. Currently, the risk runs high and the level of surgical specialization required is equally prohibitive, but Texas Children's has performed several procedures on these tiny developing hearts with success, in fact pioneering many of the surgical techniques currently used to correct evolving malformations before they become irreparable and fatal.

HEART DISEASE IN CHILDREN

may also be acquired after birth, with one of the most common being cardiomyopathy, in which the cardiac muscle is weak, resulting in heart failure.



(Credit: A. Kramer/Texas Children's Hospital)



(Credit: A. Kramer/Texas Children's Hospital)

“ We know that the seeds for acquired coronary artery disease in adults are actually laid down when they are children. Our goal is to identify patients with these risk factors so that we can intervene early enough and hopefully reduce their risk of developing heart disease in the future. ”

— DANIEL PENNY, M.D., PH.D.

Chief of Cardiology at Texas Children's and Professor of Pediatrics-Cardiology at Baylor

“The theory is sound, and I do believe it will play a major role in the field in the future,” Fraser said. “We know structural problems with the heart evolve as gestation progresses and that there are certain conditions that can be rescued. In other words, as the heart is developing, the condition is actually getting worse. The theory is, if you could intervene during fetal life, you might mitigate some of the subsequent consequences. We’re still in the proving stage of these theories and the techniques are evolving, so what this translates into is still continuing to unfold, but there have definitely been cases where we have intervened successfully.”

No one doubts that fetal intervention will likely play a major role in treating congenital heart disease in the future. Couple that with new mechanical assist devices tailored for small hearts but engineered to last a lifetime, biomaterial scaffolds designed to guide growth of new tissue, and a host of other technologies only now just being developed, and the field could look completely different than it does today.

“I do think some of this will be revolutionary in the next 10 to 12 years,” Douglas said. “We’re kind of at an inflection point right now with

biologically compatible materials, but when these replace the inert patches we’re using now—when we repair blood vessels and heart valves with materials that will eventually incorporate into living tissue—I predict we’ll see better long-term post-surgical outcomes that could make a substantial difference.”

Straight out of the best kind of science fiction, the future for treating congenital heart conditions is bold and innovative. Unfortunately, none of it will fix the millions of perfectly healthy hearts that will grow up and fail every year.

Heart disease—the kind you acquire from poor diet, lack of exercise, smoking and other risk factors—is the No. 1 killer in the world. According to the American Heart Association, it accounts for 17.3 million deaths each year around the globe; the CDC says that’s one in four deaths in the U.S. This number is expected to rise universally. According to Penny, it will be the next big global pandemic in developing countries as well, eclipsing even HIV.

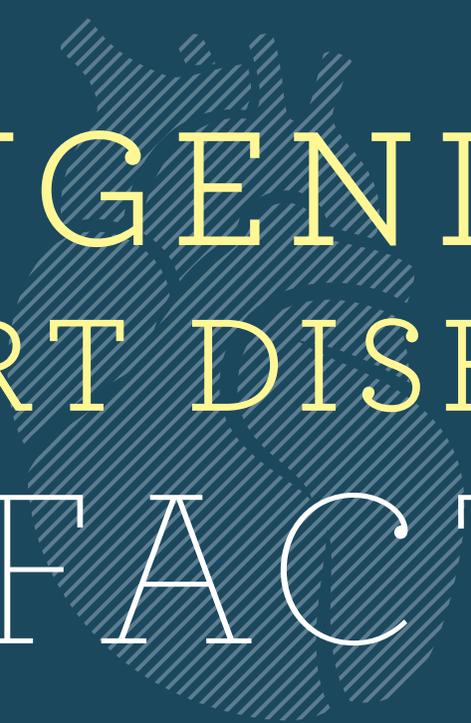
“We know that the seeds for acquired coronary artery disease in adults are actually laid down when they are children,” Penny said.

“Our goal is to identify patients with these risk factors so that we can intervene early enough and hopefully reduce their risk of developing heart disease in the future.”

Both Texas Children’s Hospital and Children’s Memorial Hermann Hospital have robust preventative cardiology programs focused on addressing the issue. It’s a move that will certainly help, but even with Texas Children’s being the largest pediatric hospital in the nation and Memorial Hermann Health System’s omnipresence in the Houston landscape, their programs will only go so far. In the end, the responsibility lays bare, ready to be picked up by parents, school districts, lobbyists, even children themselves.

“It’s pervasive and unarguable,” Fraser said. “Approximately one out of 100 children are born with congenital heart disease, but those other 99 face a lifetime risk of acquired heart disease, and we’re doing it to ourselves. There are all these things we can do preemptively to have a healthier population and we’re ignoring it. Ultimately, there’s only so much you can do with knives and medicine.” ■

CONGENITAL HEART DISEASE: *the* FACTS



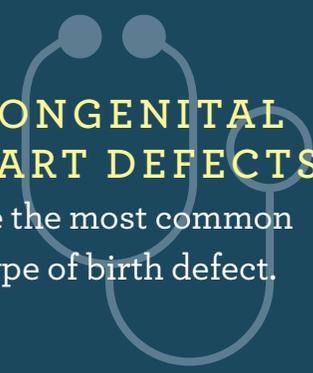
The term congenital heart disease or congenital heart defect (CHD) refers to a large number of conditions in which the heart does not develop normally before birth.

THE CAUSES OF CHDs

are generally unknown, however studies have shown that
WOMEN WHO ARE OBESE, HAVE DIABETES,
OR SMOKE DURING PREGNANCY
INCREASE THEIR CHANCES
of having a baby born with a heart defect.

CONGENITAL HEART DEFECTS

are the most common
type of birth defect.



Approximately 25% of babies with CHD have a **critical form of CHD**. These infants will need surgery or other treatment within the first year of their life.



Each year in the United States, congenital heart diseases affect nearly one percent, or nearly 40,000 births.

· It is estimated that ·
MORE THAN 2M INDIVIDUALS
 in the United States are currently living with CHD.



At least 15% of CHDs may be associated with genetic conditions.

TREATMENT FOR CHD

← can range from →
 MONITORING AND MEDICATION
 to CATHETER-BASED PROCEDURES
 OR SURGERY.

Most interventions are performed after birth, although in rare cases, prenatal catheter-based procedures may be beneficial.

DIAGNOSING CHDs:

MANY CONGENITAL HEART DEFECTS are diagnosed prenatally using fetal echocardiography.

CHDs CAN BE DIAGNOSED IN BABIES

← AFTER BIRTH →

using clinical examination and echocardiography, sometimes supplemented by cardiac catheterization or MRIs.

SYMPTOMS FOR CHDs

may include:



PROBLEMS BREATHING



WEAK PULSE



BLUISH SKIN COLOR



POOR FEEDING



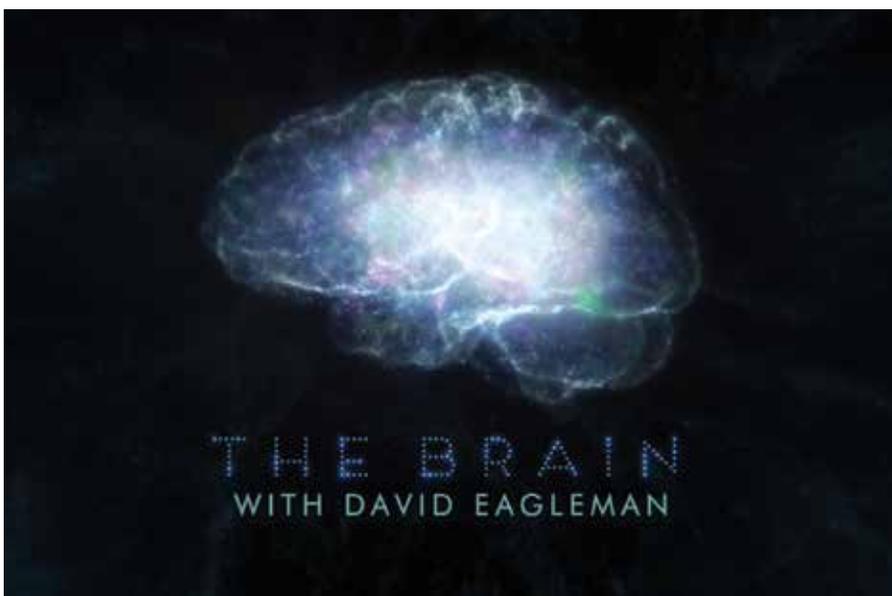
EXCESSIVE SLEEPINESS

IN ADDITION to treating CHD, pediatric hospitals in the TMC are focused on monitoring children at risk for acquired heart disease based on known factors such as family history, elevated cholesterol or high blood pressure.

Journey to the Inner Cosmos

In his six-episode PBS series, "The Brain with David Eagleman," the renowned neuroscientist takes viewers on a visually spectacular voyage that explores what it means to be human

BY ALEX ORLANDO



(Credit: Blink Films/PBS)

“The show was my opportunity to go and ask those deep questions about who we are, what reality is, and how all this is constructed by the brain.”

— DAVID EAGLEMAN, PH.D.

Director of the Laboratory for Perception and Action at Baylor College of Medicine

The shot is striking: a lone girl, clad in an orange raincoat, sways slowly on a swing in the middle of an empty park. A profound sense of loneliness permeates the frame as the normally exuberant neuroscientist David Eagleman, Ph.D., adopts a solemn tone.

“The drive to work together has helped human populations thrive across the planet and build entire civilizations...and yet, there’s a flip side to this drive to come together,” Eagleman narrates in the fifth episode of his six-hour PBS series, “The Brain with David Eagleman.” “Because for every in-group, there are outsiders. And the consequences of that can be very dark.”

Presented in rapid succession, black-and-white clips from concentration camps flash across the screen as Eagleman remarks on a disturbingly familiar historical phenomenon—that of one group turning on another, more vulnerable population.

“If you were to look at my family tree, you would see that most of the branches end in the early 1940s,” Eagleman says. “That’s because most of my family is ethnically Jewish. That small social marker was enough to prompt Nazi genocide.

“Under normal circumstances, you wouldn’t find it conscionable to go murder your neighbor,” he continues. “What is it about certain situations that short circuits the normal social functioning of the brain?”

Employing his distinctive talent for repackaging intricate ideas in accessible ways, over the course of six hours, Eagleman guides viewers from within the darkness and silence of their own skulls to a not-so-remote future where human beings have found a way to upload their brains into digital space. Eschewing technobabble and white coats for exotic landscapes, innovative visual effects and compelling personal stories, “The Brain” probes the depths of our inner cosmos, exploring why we feel and think the things we do.

“The show was my opportunity to go and ask those deep questions about who we are, what reality is and how all this is constructed by the brain,” said Eagleman, a Guggenheim Fellow and New York Times bestselling author who also directs the Laboratory for Perception and Action at Baylor College of Medicine. “I was interested in how to disseminate the information I’ve been researching more publicly, in a way that everybody could get and care about. All of the pieces that I chose in the show had emotional resonance for me.”

According to Eagleman, that resonance traces all the way back to when he was eight years old, glued to his family’s sole television set and entranced by his spiritual predecessor and childhood hero—Carl Sagan.

“I watched ‘Cosmos’ when I was a kid; that was the only thing we watched in my house,” Eagleman said. “We had a television, but we never used it, because we weren’t allowed. Normal kids would get to watch television, but my father was a psychiatrist and my mother was a biology teacher, and they decided not to raise us with any television—with the exception of ‘Cosmos.’

“The interesting part is that when I first started pitching ‘The Brain’ several years ago, no one had done a show with a seriousness of purpose like that since the original ‘Cosmos,’” he added. “All of the production companies and television studios kept saying, ‘This is not something that we’re going to do unless we make it flashy and dumb it down a bit,’ and I would reply, ‘No, I want to do something like ‘Cosmos.’ I was sort of stuck in time, back in 1979 with Carl Sagan.”

In the process of talking with over 12 different production companies—many of whom envisioned the show’s host as a hybrid of mad scientist and adrenaline junkie, jumping out of airplanes on camera—Eagleman finally found a company that supported his

vision of a production with gravitas and a “seriousness of purpose.”

“Blink Films, a production company from the U.K., just matched with me fantastically,” he said. “When we started working together, them from London and me from Houston, we both flew down to D.C. to pitch the series to PBS. And shortly after, we started making the show itself. It was about two years ago that we started outlining things and pushing cards around on a table until everything came together.”

Ricocheting between London and Houston, Blink Films worked closely with Eagleman to highlight the latter’s distinctive visual flair, peppering iconic imagery of the city throughout each episode. A panorama of Houston’s recognizable skyline is the focus of an early segment on perception and motion. Minutes later, Eagleman is seen walking briskly through the brownstone arches of Rice University. Sometimes that imagery takes the form of fleeting snapshots—from the historic signage adorning River Oaks Theater to the exterior of the Houston Zoo.

“Bringing the spotlight to Houston was a conscious choice, and it was done for two reasons,” Eagleman said. “One was because Houston’s never been featured before on center stage on a show like this. The other was out of pure necessity—I’m running a lab and two startup companies in Houston, so I had to be here a lot.”

Eagleman is a living, breathing manifestation of a Walt Whitman abstraction: we each contain multitudes. Constantly tasked with reconciling the different dimensions of his ambitions—the television host, the author, the neuroscientist, the entrepreneur—he currently divides his days between the halls of TMCx+, the Texas Medical Center’s coworking space for developing companies, and the Laboratory for Perception and Action at Baylor.

“It’s really, really hard to balance all

of these things, especially running a neuroscience lab and being an entrepreneur at the same time,” he said. “The issues that matter are so completely different, and it’s something that I’m just getting my head around now. In the lab, you conduct basic science research, and you’re actively creating a body of work about particular things that interest you. As an entrepreneur, it’s just a completely different timescale. You have to raise the funds; draft a business plan; talk with potential customers; work with investors. It’s a completely different toolbox of skills.”

Lately, that timescale has been accelerating rapidly. NeoSensory, a startup that Eagleman co-founded, which uses sensory augmentation to convert sound to touch for people who are deaf or hard of hearing, just raised \$4.2 million in funding. Eagleman’s second entrepreneurial brainchild, BrainCheck—an iPad app that uses neurocognitive tests to track cognitive health—is currently in use in schools, emergency rooms and senior centers throughout Houston. Always looking to the future, Eagleman envisions the app being used by professional football players, as well as high school and college teams worldwide.

“There’s so much to learn about being an entrepreneur,” said Eagleman, the chief scientific officer for both BrainCheck and NeoSensory. “Between understanding the finances behind a company to reading thick legalese documents, every day I’m just constantly learning something new. This has been challenging and rewarding.”

Plunging headfirst into uncharted terrain is a recurring theme for Eagleman. He’s in the process of pitching two different television shows, both exploring new philosophical and creative frontiers. And what else is next for this 21st century renaissance man? As Eagleman reflects in the last moments of the series’ final episode, “we face a future of uncharted possibilities.” ■



IN HONOR OF AMERICAN HEART MONTH, YARA EL-SAYED, EXECUTIVE DIRECTOR OF THE AMERICAN HEART ASSOCIATION, AFFILIATE, SAT DOWN WITH TEXAS MEDICAL CENTER EXECUTIVE VICE PRESIDENT AND CHIEF STRATEGY AND OPERATING OFFICER WILLIAM F. McKEON TO DISCUSS THE IMPORTANCE OF HEART HEALTH, AND HOW THE AHA WORKS TO PROMOTE COMMUNITY TRAINING AND AWARENESS.

Q | Let's go back to the early days. Where were you born and raised?

A | I was born in Cairo, Egypt. I lived there until I was four, when my parents came to the United States. I was raised in the U.S. in Columbia, Missouri. It's great to have to the best of both cultures, and I'm grateful to my parents.

Q | You went to school in Missouri and pursued journalism. Was there a journalist in the family?

A | No, there wasn't a journalist in the family. Truly the news industry fascinates me and given that Mizzou is continuously ranked as a top journalism school, and it was in my backyard, I gave it a shot.

As a student, I appreciated getting hands-on experience through the school's TV affiliate. I toyed with broadcast news a bit, but the quick turnaround wasn't for me. My dad thought I would be the next Diane Sawyer. It was a great experience, though, and I can honestly say I use my degree in journalism every day.

Q | Take us through the time that you were very active with the American Heart Association (AHA) early on and then the Boys and Girls Club of America. What were some of the decisions or opportunities that shaped you to eventually take on this role?

A | It's interesting where life can take you. I feel strongly that the right people come into your life at the right time. When I joined AHA early on in 2003, I can't say I had a true connection to the mission. It was really a great opportunity. What surprised me is that soon after I started working at AHA, I was deeply touched by the work we were doing with stroke victims. Seeing what stroke does to the brain and how debilitating it can be is startling.

Being able to return to an organization that meant so much to me early on in my career is really wonderful. The impact of the work we do at AHA continues to shape me personally and professionally.

“During February, we invite people across the country to wear red on National Wear Red Day to raise awareness that heart disease is not just a man’s disease. Each year, one in three women die of heart disease and stroke, and 80 percent of cardiac events can be prevented.”

Q | When you think of the American Heart

Association, what is its primary goal and mission?

A | The AHA is a vast and complex national organization. In a nutshell and at the core, our primary focus is to help people live healthier lives. We do this in a number of ways: education through programs like Check. Change. Control. (our hypertension management program), raising awareness through cause campaigns like Go Red for Women and fighting for stronger public health policies.

The AHA is both a funding nonprofit and also one that provides a service or educates the community. We invest in communities. As an example, we fund critical research. In fact, we have around \$12 million in active research grants being funded right here in the Texas Medical Center. And anecdotally, the AHA funds more research than any U.S. organization except the federal government. Definitely something we are proud of.

Q | February is a very special month. Can you tell us why?

A | As we enter February, the AHA shines a spotlight on heart disease during American Heart Month. It’s so great to see so many partners—especially our hospital institutions in the Texas Medical Center—rally around this month to raise awareness.

During February, we invite people across the country to wear red on National Wear Red Day, to raise awareness that heart disease is not just a man’s disease. Each year, one in three women die of heart disease and stroke, and 80 percent of cardiac events can be prevented. Through our Go Red for Women campaign, and thanks to our major sponsors like Macy’s and the Texas Medical Center, we are having a tremendous impact, but there is still work to be done.

Q | Tell us more about the Go Red for Women campaign.

A | The Go Red for Women campaign started just over 12 years ago. Heart disease—historically, traditionally and medically—has always been a man’s disease. That’s how it’s been viewed in the medical and clinical world, as well as the mainstream world. When you think of the Hollywood heart attack, you think of a man clutching his heart and falling down the stairs. The reality is it’s the number one killer in women. The other piece of that is heart issues—whether that be heart disease, heart attack or stroke—have symptoms that manifest themselves very differently in women

than they do in men. The treatment of women with heart disease is and can be different than the treatment of men.

Q | What other programs are you rolling out in the community?

A | A huge focus for AHA right now is hypertension management through our program called Check. Change. Control. 78 million people in the United States have high blood pressure. It’s the silent killer and there are no symptoms, but deadly consequences. A few years ago, the American Heart Association developed a scientific study to see if a community-wide program could be effective in improving results. The answer is yes, and we now have put all of our efforts into helping people know how to check their blood pressure, how to change it and ultimately how to control it. We also have a hypertension task force led by a physician, who is the president of our board, and we engage with large employers because numbers really do matter. We want to impact as many Houstonians as possible.

We have been focused, as well, on CPR programs. In 2013, the State of Texas passed a law that mandated that all graduating seniors from high school complete a 30-minute hands-only CPR training course. We played a vital role in securing that legislation because we believe in teaching the next generation of lifesavers. In fact, we have a CPR in Schools Training Kit now that is portable and designed to train 10 to 20 students at once.

While there is a cost associated with these kits, we’ve been able to partner with companies to sponsor school districts to train these kids. It’s really a great initiative. As of right now, we have 27 states across the U.S. that now have CPR in Schools requirement. We’re proud that Texas is one of those.

Q | Has this been implemented in the HISD system?

A | Yes, we are working with HISD and many other school districts around Houston and the surrounding areas. It’s exciting to know that each year we are adding over one million lifesavers to the population. We are proud to be the leader in CPR training across the country. It’s something we are very passionate about especially because 70 percent of cardiac arrests occur at home. We want the entire family to know what to do in an emergency.

Q | What is the bystander rate?

A | Effective bystander CPR provided immediately after sudden cardiac arrest can double or triple a victim’s chance of survival, but only 32 percent of cardiac arrest victims get CPR from a bystander. Sadly, many Americans feel helpless to act because they either don’t know how to administer CPR or their training has significantly lapsed. This alarming statistic could hit close to home, because home is exactly where 88 percent of cardiac arrests occur.

Truly, CPR training saves lives. We actually provided CPR training for a company a few years ago, and just two weeks after the training an employee had a cardiac arrest in the parking garage. His life was saved because his coworkers knew what to do. I think that is an incredibly impactful story, and a reminder that any one of us could be called to act in an emergency.

Q | A year from now, where do you hope to see the AHA?

A | Houston is such an amazing city with the largest world class medical center and philanthropic corporations and individuals. I’m so excited that in my role, I get to play a small part in working to make a better and healthier Houston.

This time next year, I’m hopeful that we are having an even bigger impact in Houstonians’ lives, because we’ve been able to reach our fundraising goals. When we achieve our fundraising goals, we are able to educate more people, fund more research and partner with more organizations in Houston.

I see us engaging more community volunteers, who are the lifeline to our organization. People like Dr. Bobby Robbins and Denise Castillo-Rhodes, our 2016 Go Red for Women chair, are so important to the future of our organization. Without them and countless others, we could not do what we need to do. We have a strong board of directors, led by current board chair Jason Few, that live the mission of the AHA every day. I am so thankful to work with each of them. ■

Healing the Whole Patient

Carrying on the legacy of the legendary surgeon for whom it was named, UTMB's Blocker Burn Unit uses a multidisciplinary approach to treat burn victims

BY SHEA CONNELLY



Patient Joseph Adam Mason visits the Blocker Burn Unit tub room to have his wounds cleaned and examined.



emergency room,” said Jason Sheaffer, nurse manager of the Blocker Burn Unit. “For the nurses who work here, this is the only thing they do—take care of burn patients.”

Rooms in the unit are kept at a much higher temperature than normal hospital rooms to prevent hypothermia in patients, many of whom have lost significant amounts of skin, hampering their body’s ability to regulate temperature. Each room is also equipped with plumbing and drainage systems that enable patients to be washed right in the center of the room. Regular, thorough cleaning of wounds is vital for burn patients.

For patients like Mason who are admitted to the Blocker Burn Unit, wound cleaning and debridement, or the removal of dead and damaged skin, begins as soon as they arrive. New patients visit the tub room, which consists of several shallow, metal tub tables.

“They’re examined by a doctor and their treatment plan is made right here on the spot. If they require emergency procedures, we will do those right here. That would be everything from central line placement to escharotomies,” Sheaffer said. “After they’ve been here for a few days, they will start coming to the tub room daily for washing and wound care.”

Tub room treatment is provided

“It takes a great deal of trust between a nurse and a patient to get them through what is a very difficult experience. It takes a lot of training and experience and compassion to do this job.”

— JASON SHEAFFER
Nurse Manager at the
Blocker Burn Unit

In the spring of 2014, Joseph Adam Mason was working an ordinary day when the unthinkable happened: a line broke off an insulator on the power pole he was working on, hitting his wrist and sending 15,000 volts of electricity through his right arm and out his back.

“My vest melted to my back, my left arm had second degree burns,” Mason said. “My right arm and my back had third degree burns. My heart stopped for a little over a minute.”

The freak accident turned Mason into one of the 40,000 people who are admitted to hospitals for burn injuries each year. Though Mason was living in Mississippi at the time, his injuries were severe enough to send him to the Blocker Burn Unit in the John Sealy Hospital at The University of Texas Medical Branch at Galveston (UTMB),

recognized as having the highest survival rate for major burn injuries in the country.

The Blocker Burn Unit was named for Truman G. Blocker Jr., M.D., a surgeon widely renowned for treating burn victims. Blocker held numerous positions at UTMB, from professor to dean, and was the institution’s first president. After treating victims of the 1947 explosion of a freight ship in Texas City, which killed over 600 and wounded thousands, Blocker championed UTMB as a leading center for burn treatment, research and education.

Today, the Blocker Burn Unit contains a six-bed intensive care unit that is uniquely outfitted for burn victims.

“If you are burned and you come to UTMB, you’ll be sent directly here for care—there’s no waiting in the

by specialized nurses whose entire job revolves around tub room wound care.

“The bond between the tub room nurses and patients is really strong. It takes a great deal of trust between a nurse and a patient to get them through what is a very difficult experience,” Sheaffer said. “It takes a lot of training and experience and compassion to do this job.”

Training and education are central to Blocker Burn Unit operations. Most trainee nurses and physicians receive very little burn-specific experience, both in the classroom and in the field. Students at UTMB, however, benefit from being so close to a highly regarded burn treatment center. Surgical residents rotate through the unit for a month at a time. Plastic surgery residents return for additional training. The unit offers fellowships for physicians who have completed their residencies and are interested in additional specialized burn treatment training. Nurses also receive most of their training in-house.

“We have a long, six-month orientation process for new grads where they will come in and begin their training in the tub room for several weeks,” Sheaffer said. “Then they transition to the ICU where they learn ICU and burn care before moving into an independent role.”

Jong O. Lee, M.D., surgeon at the Blocker Burn Unit and Shriners Hospitals for Children-Galveston, and a professor of surgery at UTMB, began his career at UTMB in 2001 as a fellow in the unit. Lee said he did not have any exposure to burn treatment until his third year of residency, when he was sent to a burn center in Fort Wayne, Indiana.

“I really enjoyed the experience, and getting to take care of adults and kids,” Lee said. “When you take care of general surgery patients, you see them before surgery, they come in and have the surgery, and you might see them once after. Then they go home and that’s it. For burns, it’s a bit more prolonged relationship and I enjoy that.”

Lee also expressed the importance of teamwork in the unit.

“We emphasize a multidisciplinary approach to patient care,” he said. “We have doctors, nurses, physical therapists, social workers, a dietician, respiratory therapists. Everyone contributes.”

A typical day for Lee and the other physicians on the unit begins with rounds at Shriners at 7:00 a.m. The same physicians serve both Shriners, which treats pediatric burn patients, and the Blocker Burn Unit, though the nursing staff differs. During rounds at Shriners, a large team, including

“We emphasize a multidisciplinary approach to patient care. We have doctors, nurses, physical therapists, social workers, a dietician, respiratory therapists. Everyone contributes.”

— JONG O. LEE, M.D.

Surgeon at the Blocker Burn Unit and Shriners Hospitals for Children-Galveston



A skybridge connects Shriners Hospitals for Children-Galveston, which treats pediatric burn patients, to the John Sealy Hospital, where the Blocker Burn Unit is located.

attending physicians, fellows, residents, medical students and nurses, discusses each patient. Then the doctors head over to the Blocker unit to visit patients there, review what happened overnight and plan the day’s agenda. After rounds, physicians head to surgeries at Shriners or UTMB. Afternoons are generally dedicated to patient care and bedside procedures.

Generally, Lee said, patients spend at least one day in the unit per percent burned. A patient burned over 20 percent of his body, for example, might spend about 20 days in the hospital. Admission time also depends on other factors, such as the severity of the burns, whether first-, second-, or third-degree.

Unfortunately for Mason, complications have prolonged his time in the

Blocker Burn Unit. After his accident in the spring of 2014, Mason remained in the unit for about six months. Following his initial stay, he was in and out for routine checkups and additional surgeries, until his wounds became infected and he had to be readmitted.

His experience is not unusual—burn wounds are highly susceptible to infection. Despite the setbacks, Mason calls his time as a patient in the Blocker Burn Unit “a good experience.”

“The doctors are spectacular here and have done a wonderful job trying to save my arm—and we’re still trying,” he said. “They have a good crew here and they take care of me. I’ve gotten to be quite a family member here.” ■



Mason relaxes in his room at the Blocker Burn Unit, where he has been undergoing inpatient and outpatient treatment since April 2014.

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Dancing Through Cancer

Throughout her leukemia treatment, one 13-year-old Texas Children's Hospital patient finds comfort and motivation in her passion for ballet

BY BRITNI N. RILEY



Peyton, pictured with the dancing rats from the Nutcracker, after the Houston Ballet revealed her Rose Parade costume.

After a decade of practice, thirteen-year-old Peyton of Sugar Land, Texas, had just achieved one of her many dreams: to perform en pointe in the Nutcracker ballet, just as she had seen ballerinas do since she first saw the performance at age three.

"I love dance because I love performing on stage...the costumes and lights. But mostly I love making people happy through ballet," Peyton said.

A month after her performance, the once lively and bubbly Peyton had become exhausted, socially withdrawn, lost her energy for ballet (her favorite pastime) and had lost a significant amount of weight. Her mother knew something was very wrong.

"I was watching Peyton during one of her ballet classes and she stood at the back of the room the entire time and could barely lift her leg during a combination," said Carrie Richardson,

Peyton's mother. "I had never seen her act like that before."

The following day, Richardson made an appointment for Peyton with the pediatrician she had been seeing since birth. Before even running any tests, Michael Bishop, M.D., a pediatrician at Texas Children's Pediatrics Grand Parkway, suspected that Peyton had leukemia because her organs were so enlarged.

"Dr. Bishop sent us to Texas Children's Hospital to begin treatment for Peyton," Richardson said. "When we got there, I was asked what Peyton was

“I've said throughout my treatment that ballet is harder than cancer.”

— PEYTON

Patient at Texas Children's Hospital

being treated for and I said 'leukemia.' I never in my life thought I would be saying that about my daughter."

After receiving her diagnosis in January, Peyton's life changed completely. She was no longer able to attend Logos Preparatory Academy because her immune system could not handle being around so many people, nor could she practice ballet the way she once did.



"I had just started going to a college preparatory school where you only go three days a week," said Peyton. "Looking back, I think God was preparing me and my mom for all of the time we were about to be spending together."

By March, Peyton developed a serious complication of her leukemia treatment. After receiving a small dose of methotrexate during a routine spinal tap, Peyton was unable to move her hand. By the next day, she had suffered a series of seizures and was admitted to the Pediatric Intensive Care Unit at Texas Children's Hospital.

"She lost her ability to speak normally and the ability to move part of her body," said Zoann Dreyer, M.D., Peyton's doctor at Texas Children's Cancer Center. "Generally, patients fully recover, but it is very hard for a parent to watch. Even for me, having seen it before, it is very scary to watch someone go through it."

The methotrexate reaction left Peyton with limited mobility, meaning she could not dance the way she had before. To remedy this, her doctors recommended she begin physical therapy. David Macha, a lifelong family friend and physical therapist at Memorial Hermann Sports Medicine and Rehabilitation Center in Sugar Land, fit the bill.

"If you know Peyton, you know she is very happy and outgoing. After she had her seizures, she wasn't that Peyton anymore," Macha said. "Once we started therapy, she started getting the flexibility back in her hips and getting her strength back. She is motivated, driven and wants to keep her dream of being a ballerina. Cancer isn't going to get in her way."

Other than losing the ability to dance, Peyton's greatest fear when she learned she had cancer was losing her beautiful red hair that she loved so much. By August, her fear had become a reality.



“She is motivated, driven and wants to keep her dream of being a ballerina. Cancer isn’t going to get in her way.”

— DAVID MACHA

Physical Therapist at Memorial Hermann Sports Medicine and Rehabilitation Center in Sugar Land

“I’ve said throughout my treatment that ballet is harder than cancer,” Peyton said. “In ballet, you have a ton of things going through your head that you can’t mess up. Cancer is still hard, but if you have a positive attitude, it makes it a lot easier.”

Peyton was recently given the opportunity to share her love for dance, and her positive outlook on life, as the smiling face of the Northwestern Mutual float at the 2016 Rose Parade in Pasadena, California. She was selected from a pool of childhood cancer patients from around the country

who submitted videos showcasing their greatest adventures, with the winner’s story ultimately inspiring the company’s float design.

“We had this vision of helping people move forward with their dreams. It’s what we are all about at Northwestern Mutual,” said Jeff Reeter, managing partner at Northwestern Mutual. “We had this idea to tie our involvement with the Rose Bowl game with our passion to cure pediatric cancer.” The idea to reach out to pediatric cancer patients came from the company’s Childhood Cancer Program. Dreyer was among the physicians contacted to see if she had any patients who might like to participate.

“When I got the email, I tried to think of fun, outgoing kids and Peyton immediately came to mind because she is so outgoing, artistic and clever,” Dreyer said. “A couple of days later Peyton and her mother came back with an amazing video. It was stunning.”

When thinking of what her greatest adventure would be, Peyton admits it wasn’t as easy as she expected.

“You don’t really think every day about what you would do if you could do absolutely anything,” Peyton said.

“When I thought of my idea, I asked my mom if it was too crazy.”

“My greatest adventure is to travel the world and visit all of the greatest ballet companies and get to meet their principal dancers, dance with them and see a show,” Peyton said. “I have wanted to do this forever.”

The float was named “Dancing into Adventure” in honor of Peyton’s greatest adventure. Tchaikovsky’s Swan Lake—one of her personal favorites—served as the inspiration for the float. The Richardson family traveled to California for the 2016 Rose Parade and Rose Bowl game. While there, Peyton met the cast of the Today Show, decorated her float and rode in the parade wearing a custom ballerina costume made by the Houston Ballet.

“We chose Peyton from right here at Texas Children’s because she is such a phenomenal young lady. She has a vision and this resilient spirit that we were just taken with,” Reeter said. “Peyton’s vision of dancing through life, even with everything that she has gone through, inspired all of us to dance more and enjoy life.” ■

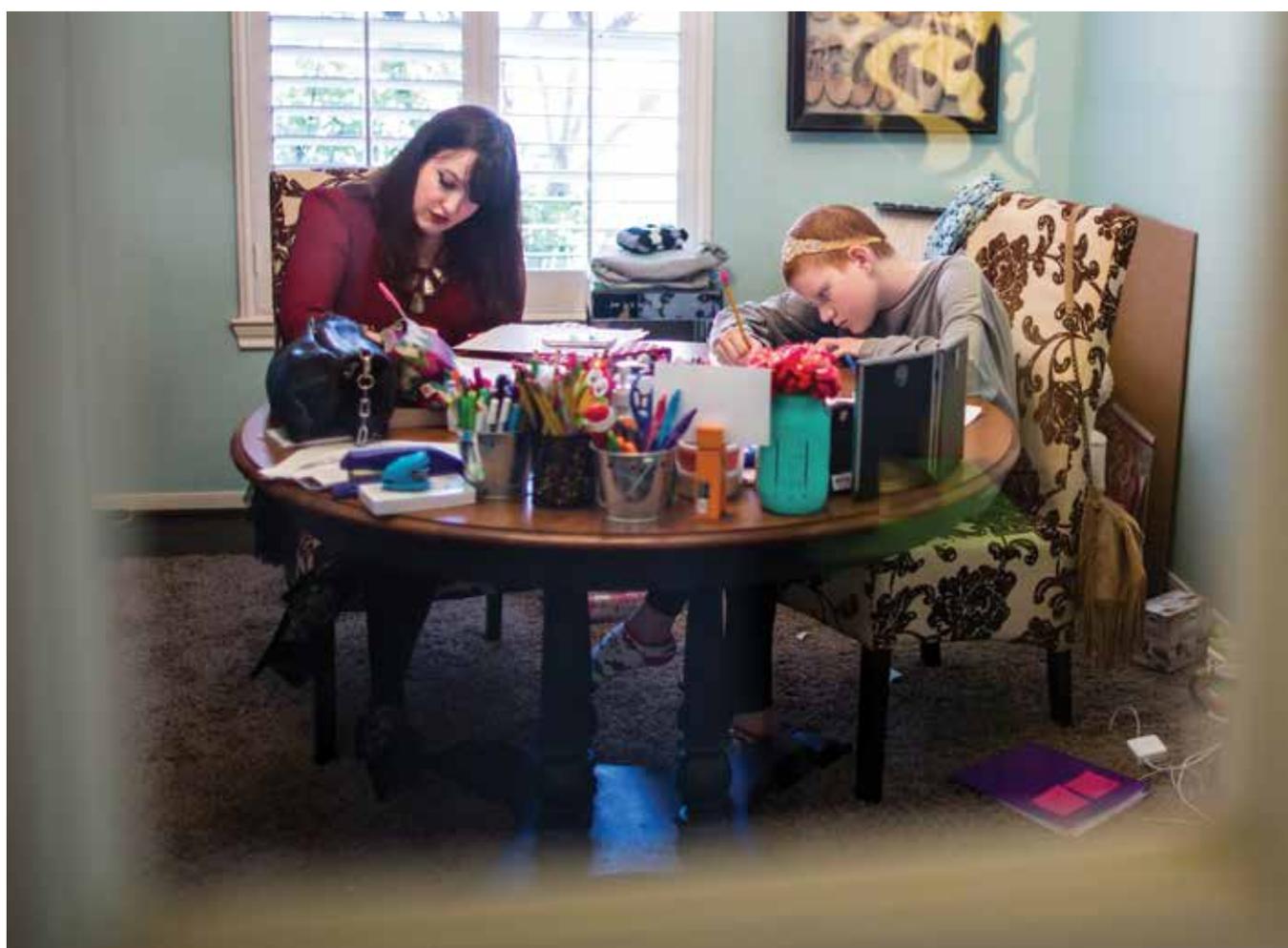
Peyton had been wearing hats when she went out in public because she did not want people to see her without hair. During a checkup, Dreyer asked Peyton if she had been growing any hair back.

“She took her cap off and she just had a whole head of fine red hair coming in and she looked so beautiful,” said Dreyer.

That evening, Peyton asked her mom to take her shopping so she could do some baking. When she came into the living room, she was wearing a headband instead of her normal hat.

“We were at H-E-B and a woman wearing a hat came right up to Peyton, took off her hat and said, ‘I didn’t know I would meet my twin tonight,’” Richardson said. “The woman told Peyton she looked so beautiful and had given her the courage to take her own hat off.”

Along with the confidence of her new hair came a turn in Peyton’s treatment. After receiving treatment for a year, Peyton recently began maintenance therapy. For her, maintenance therapy will last roughly two years and enable her to return to school and get back into her regular routine.



Top left: After a severe reaction to methotrexate, Peyton began physical therapy to regain strength and mobility. Lower left: Peyton is tutored at home while she undergoes treatment for leukemia.

“ We had this idea to tie our involvement with the Rose Bowl game with our passion to cure pediatric cancer. ”

— JEFF REETER

Managing Partner at Northwestern Mutual



The Houston Ballet hand made a costume for Peyton to wear on the Northwestern Mutual float in the 2016 Rose Parade.

(Float photo credit: Northwestern Mutual)

HOUSTON FAMILY JOINS DONATE LIFE FOR ROSE PARADE

Peyton was joined at the parade by another family from the Texas Medical Center, Monica and Marilyn Burnom. The Burnoms were on the Donate Life float. Monica, of Houston, Texas, was diagnosed with lupus and received treatment at Houston Methodist Hospital.

“I had been waiting for a kidney for five years and I got a call in January 2014 saying they had found a match. I felt very blessed,” Monica said. “At the last minute, they realized there was a tumor on that kidney and it could not be used. In March of that

year, when they called me the second time, the kidney was a match.”

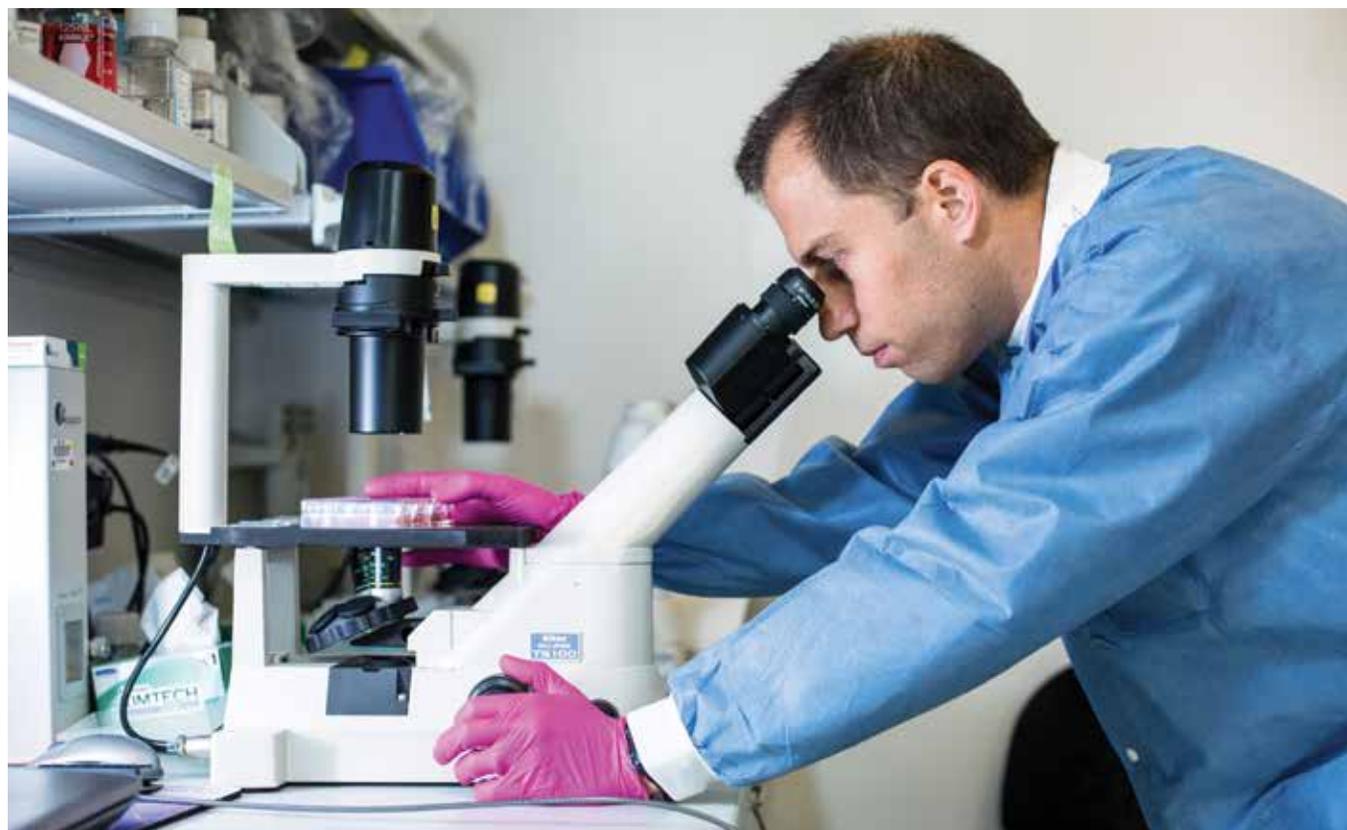
Her mother, Marilyn, had been working for the Texas Department of Public Safety (DPS) and did not realize the importance of the Donate Life Registry until her daughter was on the list. To share her daughter’s story and inform others, Marilyn urged Monica to submit her story to the DPS website. After the submission, the two were selected as delegates for the Donate Life America float at the 2016 Rose Parade. ■



Shining a Light on Neuroblastoma

A GRANT FOR MORE THAN HALF A MILLION DOLLARS IS HELPING DOCTORS PAVE THE WAY TO CURING PEDIATRIC CANCER WITHOUT THE CHEMO

BY SHANLEY CHIEN



Andras Heczey, M.D., studies neuroblastoma cell lines that he and his team are growing for further research.

The new year is looking bright for a Baylor College of Medicine pediatric oncologist as he shines a light on a rare childhood cancer in hopes of curing children affected by neuroblastoma.

Andras Heczey, M.D., assistant professor of pediatrics at Baylor College of Medicine and Texas Children's Cancer Center, received a four-year, \$583,000 Mentored Research Scholar Grant in December 2015 from the American Cancer Society (ACS) to support his research in developing an immunotherapy treatment approach for neuroblastoma.

The ACS grant, which was funded by NBC's Today Show viewers through its Shine a Light campaign, will help support Heczey and his team's endeavor to genetically engineer natural killer T lymphocytes (NKTs), a unique subset of immune cells found in the blood, to eliminate neuroblastoma.

The Shine a Light campaign was

launched by the Today Show in 2014 to help support and raise money for different causes and communities in need. Co-host Hoda Kotb chose pediatric cancer as her cause, with all charitable donations and support going toward the American Cancer Society.

"First and foremost, we are honored to work together with the ACS. When we heard that, actually, the funding is coming from the Today Show, that's an even bigger honor," Heczey said. "The reason why this is such a unique approach is because this will be the first therapeutics for children with this cell subtype in the world. I think we will be very proud of and happy to develop this together at the end."

Neuroblastoma is a rare type of cancer that develops in immature nerve cells of the sympathetic nervous system. As part of a fetus' normal development process, newly born nerve cells—called neuroblasts—gradually

“I've always been passionate about research, and I felt that seeing patients going through lengthy, toxic therapies and sometimes not being cured was not something I could accept.”

— ANDRAS HECZEY, M.D.

Assistant Professor of Pediatrics at Baylor College of Medicine and Texas Children's Cancer Center

form into mature nerve cells and fibers that function within the sympathetic nervous system. While most neuroblasts typically mature or disappear by birth, those that continue to grow and accumulate form a neuroblastoma tumor.

The cancer affects approximately 700 children—primarily those under the age of 10—in the United States each year. Though relatively rare, neuroblastoma is the third most common cause of cancer-related pediatric deaths, following acute lymphocytic leukemia

and cancers of the brain and central nervous system. Because treatment for neuroblastoma involves physically and mentally taxing procedures with severe side effects, such as surgery, chemotherapy and radiation therapy, Heczey said it's important to develop innovative treatment alternatives.

"Obviously, there's a big need to find novel treatments that are non-toxic, safe and effective," he said. "We all have some idea that chemotherapy, in general, has pretty significant side effects. We all know about hair loss, nausea and

NEUROBLASTOMA, WHICH TYPICALLY AFFECTS CHILDREN FIVE YEARS OLD OR YOUNGER, IS A RARE CANCER THAT FORMS A SOLID TUMOR FROM AN OVERGROWTH OF NEW NERVE CELLS.

vomiting, but there are more severe side effects, as well. So wouldn't it be nice to just use the patient's own blood cells to do the work for them?"

NKTs have the ability to infiltrate neuroblastoma tissue and attack non-malignant cells, called tumor-associated macrophages, that promote tumor initiation, growth and development—thereby, indirectly inhibiting the tumor's growth.

By genetically modifying NKTs to carry a chimeric antigen receptor (CAR), an immunotherapy strategy that has proven effective in treating a type of blood cancer, the engineered NKTs can locate specific antigens on tumor cells and will have the "dual specificity" Heczey said they need to deliver a one-two punch against neuroblastoma.

"What we're trying to do is genetically engineer NKT cells not just to attack the other white blood cells in the tumor," Heczey said, "but also attack the tumor directly."

Heczey said he was inspired to pursue this immunotherapy strategy while finishing his general pediatric residency at the Children's Hospital of Los Angeles between 2006 and 2009. He had read an article in *Science* magazine about the first patient who was successfully treated using genetically engineered T cells and wanted to explore different applications of that approach.

"I thought that the fact that a patient may be cured without chemo-, radio- or surgical therapy by infusing their own genetically modified cells was really cool," Heczey said. "I felt that if we can work on this approach and make it available to every cancer patient, we could make a huge

difference in what cancer treatment means right now."

Under the mentorship of Leonid Metelitsa, M.D., Ph.D., professor of pediatrics and immunology at Baylor and Texas Children's Cancer Center, and Malcolm Brenner, M.D., Ph.D., professor of molecular and human genetics and pediatrics at Baylor, Heczey and his colleagues conduct an initial round of clinical trials with children being treated for neuroblastoma at Texas Children's Cancer Center to test the safety and efficacy of the approach. With financial backing from the ACS Mentored Research Scholar Grant and a \$1.5 million award from Alex's Lemonade Stand Foundation to support the research, they plan on collecting blood samples from children, genetically modifying the NKTs in the blood with the cancer-targeting CAR.GD2 molecule and reinfusing the patients with the engineered NKTs.

"The main goal is to treat patients," Heczey said. "At the same time, we want to continue our work in the laboratory to see if we can further improve the approach by making these cells able to persist longer, proliferate better and resist the tumor microenvironment better."

Heczey said the ACS Mentored Research Scholar Grant is the fruit of his and his colleagues' labor and years of working together in "making slow, but constant, progress" towards developing the immune-based approach. But while working with pediatric cancer patients can be an emotionally challenging task for many, Heczey's passion for the research and compassion for his patients are clear driving forces in his pursuit of a cure.



Heczey and one of his mentors, Leonid Metelitsa, M.D., Ph.D., discuss recent data collected.

"I've always been passionate about research, and I felt that seeing patients going through lengthy, toxic therapies and sometimes not being cured was not something I could accept," he said.

"I think it is really rewarding to work with kids," Heczey added. "Their smile and energy is worth all the effort during treatment."

The ACS Mentored Research Scholar Grant helps support full-time junior faculty members in their cancer research and training to become independent clinician scientists, a relatively rare breed of medical doctors that integrates two dichotomous fields: clinical training and laboratory research. Because clinician scientists undergo additional training in basic science research, they are considered to be uniquely positioned to better translate scientific research to medical practice.

"The clinician scientist is a precious individual," said Bill Chambers, senior

vice president of extramural research at the ACS. "There's not a lot of them, so it's something we're extremely happy to be able to fund."

Given that approximately 70 candidates were considered for the competitive grant, which has an acceptance rate of only 12 percent, Chambers said it's very unusual for a grant to be funded the first time it is submitted, but Heczey's application made a compelling case for the ACS.

"He's really doing great stuff. He's well prepared for this and in a great environment. The project just resonated with a rigorous review panel," Chambers said. "I think he is an outstanding young investigator. He's the kind of individual that we want to make an investment in. He has a great project and there's terrific potential for this to have impact in pediatric cancer for neuroblastoma." ■

ACCOLADES



PEDRO DIAZ-MARCHAN, M.D., associate professor in the department of radiology at Baylor College of Medicine, was elected as a fellow of the American College of Radiology at the organization's annual meeting, held last year in Washington, D.C. Of approximately 40,000 board-certified radiologists, only about 100 are elected to fellowship annually. Fellows like Diaz-Marchan demonstrate a history of service to the ACR, organized radiology, teaching or research.



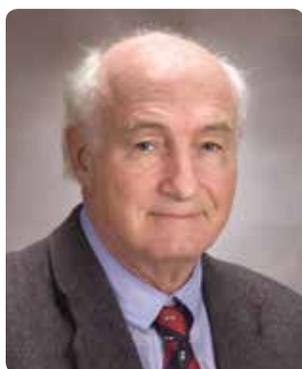
KRISTEN STARNES-OTT, PH.D., CRNA, associate clinical professor of nursing and director of the Nurse Anesthesia Division at UTHealth School of Nursing, has been appointed to the Bette P. Thomas Distinguished Professorship for Innovative Healthcare Delivery. Starnes-Ott maintains a clinical nurse anesthesia practice at The University of Texas MD Anderson Cancer Center while also teaching the next generation of Certified Registered Nurse Anesthetists (CRNAs). At UTHealth School of Nursing, she leads the Nurse Anesthesia Graduate Division and last year pioneered a nine-semester B.S.N.-D.N.P. in Nurse Anesthesia program.



ALLISON EDWARDS, DR.P.H., R.N., assistant professor at The University of Texas Health Science Center at Houston (UTHealth) School of Nursing, was appointed to the Texas Board of Nursing by Gov. Greg Abbott. The Texas Board of Nursing oversees more than 368,000 licensed nurses and 200 schools of nursing throughout the state. In addition to attending board meetings, Edwards will participate on the board's Eligibility and Disciplinary Committee on a rotating basis.



JON STEVENS, M.D., has joined The Menninger Clinic as the psychiatric hospital's first director of outpatient services. Previously, he was physician-in-charge at Henry Ford Health System's Dearborn Outpatient Clinic. Stevens is board-certified in psychiatry and specializes in a number of areas including child psychiatry, depression and bipolar disorder, among others. Stevens earned his medical degree from New York Medical College, and completed both his psychiatry residency and his fellowship in child and adolescent psychiatry at Massachusetts General Hospital.



ROBERT HUNTER JR., M.D., PH.D., distinguished chair in molecular pathology and chair of the department of pathology and laboratory medicine at The John P. and Kathrine G. McGovern Medical School, received the Harlan J. Spjut Award from the Board of Directors of the Houston Society of Clinical Pathologists. Established in 1989, the Harlan J. Spjut Award recognizes an individual who has demonstrated sustained and distinguished scholarly activities, teaching, leadership, patient care, and service to pathology.



RAJARAJAN AMIRTHALINGAM THANDAVARAYAN, PH.D., postdoctoral research scientist at Houston Methodist Research Institute's department of cardiovascular sciences, has been awarded a two-year American Heart Association (AHA) Fellowship. The fellowship will support Thandavarayan's research on macrophage mediated strategies for efficiency of cardiac regeneration and repair after injury in the context of diabetes. The clinical goal is to use this information to help develop and evaluate promising new treatment methods.



MOTHAFFAR RIMAWI, M.D., medical director of Baylor College of Medicine's Lester and Sue Smith Breast Center, was selected to receive the C. Kent Osborne Award for Medical Excellence for his outstanding contributions to breast cancer research, advocacy and patient care. The award was established by the Center's Advisory Council and is named for Dr. Kent Osborne, director of the NCI-designated Dan L. Duncan Cancer Center at Baylor, who also is Rimawi's mentor.



RENU THOMAS, PH.D., has joined The Menninger Clinic as a psychologist for the hospital's Comprehensive Psychiatric Assessment Service (CPAS). Prior to joining Menninger, Thomas received her doctorate degree from the University of Nebraska-Lincoln. She completed a forensic pre-doctoral internship with the Ohio Psychology Internship in 2013 and a postdoctoral fellowship at Baylor College of Medicine and The Menninger Clinic in 2014.

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- Take action. Contact your local American Heart Association office to see how you can get involved with Go Red For Women.
- Visit HoustonGoRed.Heart.org to find out what's going on locally.

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Researchers Discover Link Between Depression and Heart Disease

The phrase “to die of a broken heart” has often been used in the metaphorical sense, but new research shows it could be literal.

Researchers at The University of Texas Health Science Center at Houston have found a link between depression and higher levels of an inflammatory protein in the blood that can put people at risk for heart disease and stroke.

Common sense tells us that those who suffer from depression are less likely to maintain healthy eating habits, exercise regimens and social engagements. Depression-induced lethargy can set off a domino effect that leads to health issues, but the clinical explanation for the connection between depression and comorbid diseases was unclear to scientists.

“We know that stress is associated with cardiovascular disease, but it’s really unclear what translates the impact of the psychosocial stress to the body such that the body is at risk for coronary artery syndromes, including heart attack or unstable angina,” said Alan Prossin, MBBS, assistant professor in the Department of Psychiatry and Behavioral Sciences at the John P. and Kathrine G. McGovern Medical School, who led one of the studies.

Building off his mentor’s PET research that studied the opioid system’s regulation of mind-body interactions, he and his team added an immune component and quantified the levels of an inflammatory cytokine associated with cardiovascular disease

called interleukin-18. When he and his team noticed that psychosocial stress was impacting peripheral inflammatory markers, he said he went on to further test whether the stress-induced immune changes in the blood were related to the brain’s opioid system response to the same stress.

They evaluated a total of 28 people, 15 with a major depressive disorder and 13 healthy controls, all of whom completed PET scans. When researchers triggered a depressive emotional reaction by instructing test subjects to focus on a sad memory, Prossin discovered that those who suffered from depression exhibited both higher levels of opioids released in the brain and greater increase in IL-18 concentration in the blood. The increase in opioids and IL-18 were much more prominent in the depressed individuals than in the healthy controls.

“These effects were observed during sadness in both groups, but were much greater in people with major depression as compared to non-depressed, otherwise healthy people,” Prossin said.

When researchers asked depressed individuals to focus on neutral thoughts, their levels of IL-18 were reduced even after researchers triggered sad emotional reactions.

“This is potentially a new pathway associated with stress-related affective changes that could explain why treatments based on classic stress hormones may not be as effective in depressed people with stress-related mood changes,” Prossin said.

Prossin said his findings, which were published in the August 2015 issue of *Molecular Psychiatry*, are initial data that still need to be studied further. Although he and his team will need to replicate and validate his findings with larger studies to accurately see how the data translates to the general population, these initial findings could open the door to more focused studies in the future that could more definitively prove whether treating depression can reverse some of the risk for heart disease.

In a similar ongoing research project, Lorraine Frazier, Ph.D., dean of the UTHealth School of Nursing, also studied the correlation between depression and heart disease. In her nearly decade-long study, titled “Depressive Symptoms and Genetic Influences on Cardiac Outcomes,” she focuses on the impact of behavior and genetics on patients diagnosed with acute coronary syndromes. While Prossin studied concentration of IL-18, Frazier looked at those of five other proteins, including IL-6, another interleukin in the inflammatory response system, and tumor necrosis factor alpha (TNF α), a cell signaling protein involved with systemic inflammation.

“We looked to see if there could be a genetic component or mutation in [patients’] inflammatory markers that causes that spike in inflammation as it relates to depression,” Frazier said. “We don’t know the answer to that yet, but we do know that, in patients with depression, their outcomes are worse.”

Frazier said women who suffered from depression reported different depressive symptoms than men, namely somatic symptoms such as appetite and sleep disturbances. Because of the increase in those types of symptoms, Frazier said doctors should take a more holistic approach in evaluating patients by screening women for depression if they complain about symptoms such as loss of appetite or trouble sleeping—a test that could play an important role in her coronary health going forward.

“The symptoms of heart disease can be caused by many pathways and we know that it’s the clinical symptom of the heart attack that brings people to the hospital. We’re trying to understand if there is a population whose depression is really critical in their coronary outcomes, and we should look at people who have major depression,” she said.

While Frazier and Prossin continue to explore the link between depression and heart disease, one thing remains clear: A happy heart is a healthy heart.

“At this point, from a general health maintenance perspective, if people improve their overall mental health, particularly those who are depressed, then it’s much more likely they’ll exercise, start interacting with people and be able to deal with stress in a more efficient, healthy manner—all of which we believe will have an impact on reducing risk for heart disease,” Prossin said. ■

— Shanley Chien,
Texas Medical Center



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National Human Genome Research Institute Funds Baylor Centers for Common, Rare Diseases

Baylor College of Medicine centers will play major roles in newly announced National Human Genome Research Institute DNA sequencing programs designed to understand the genomics of both common and rare diseases.

Baylor College of Medicine's Human Genome Sequencing Center was named one of four Centers for Common Disease Genomics. The center, under the leadership of Richard Gibbs, Ph.D., will receive a four-year \$60 million grant to focus on the genomics of heart and blood vessel and metabolic diseases as well as neuropsychiatric disorders.

"2016 marks the 20th year since the inception of the Human Genome Sequencing Center and its continuing funding by the NHGRI," said Gibbs. "We will continue the push to translate genomic discovery into medicine."

The Human Genome Sequencing Center is co-led by Eric Boerwinkle, Ph.D., an international expert in the analysis of DNA sequence variation and the genetics of cardiovascular diseases.

"This is a real feather in the cap of Houston and the Texas Medical Center and documents benefits of close inter-institutional collaboration for continued excellence within the Texas Medical Center," said Boerwinkle, who is the Kozmetsky Family Chair of Human Genetics and dean at The University of Texas Health Science Center at Houston School of Public Health.

James R. Lupski, M.D., Ph.D., professor of molecular and human genetics and of pediatrics at Baylor, who is also with Texas Children's Hospital, will lead a Baylor College of Medicine program as one of the Genome Institute's

Centers for Mendelian Genetics to solve cases of rare diseases. The Baylor-Hopkins Center for Mendelian Genomics is a collaborative \$11.6 million, four year program together with the Johns Hopkins University and UTHealth. Since 2011, researchers in that group have worked with the Human Genome Sequencing Center to sequence more than 5,000 families with different rare Mendelian diseases and analyzed the protein-coding portions of more than 20,000 human genomes and identified over 740 genes that are the likely causes of Mendelian diseases.

"In this next phase we will work closely with the new Baylor Miraca Genetics Laboratories to analyze unsolved clinical cases of genetic disease and further apply our work on structural variation mutagenesis of the human genome," said Lupski.

Suzanne Leal, Ph.D., director of Baylor's Center for Statistical Genetics, will also contribute to the Genome Institute's Mendelian Disease program via a collaboration with scientists from the University of Washington who received a \$12 million, four-year grant. They also aim to identify and understand rare genetic diseases and will emphasize those that stem from changes in the structure of the genome.

"Building upon our prior achievements in finding the novel cause of more than 400 Mendelian conditions, the University of Washington Center for Mendelian Genomics, led by Drs. Michael Bamshad, Deborah Nickerson

and myself, will continue to apply highly successful methodologies to identify the genetic etiology of a large number of Mendelian disorders and create new approaches to share data with scientists and families, thereby fueling gene discoveries," said Leal.

Pending available funds, NHGRI will provide approximately \$240 million over four years to the four Centers for Common Disease Genomics. The National Heart, Lung, and Blood Institute (NHLBI) will provide an additional \$20 million. In addition to Baylor College of Medicine, the Centers include Washington University in St. Louis, Broad Institute of MIT and Harvard and New York Genome Center.

NHGRI, pending available funds, will provide \$40 million to support the Center for Mendelian Genomics program. In addition, NHLBI and the National Eye Institute will provide \$8 million and \$1 million in funding, respectively.

In addition to Baylor College of Medicine and collaborators, other institutions funded for the Center for Mendelian Genomics programs include Broad Institute of MIT and Harvard and Yale University. ■

— Dipali Pathak,
Baylor College of Medicine

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4 **Celebration of Innovation**
 Thursday, 9:00 a.m. – 3:30 p.m.
 Texas Heart Institute
 Denton A. Cooley Auditorium
 1101 Bates St.
 713-658-1750

6 **26th Annual Preventive Cardiology Forum**
 Saturday, 7:30 a.m. – 1:15 p.m.
 McGovern Medical School
 6431 Fannin St., Rm. 3.001
 sandra.k.vick@uth.tmc.edu
 713-500-6576

Seventh Annual UTHealth Psychiatry Update — Innovations in Trauma Research and Practice: Exploring PTSD and Related Outcomes Across the Lifespan
 Saturday, 8:00 a.m. – 5:00 p.m.
 Memorial Hermann Conference Center
 6411 Fannin St.
 mercedes.pang@uth.tmc.edu
 713-486-2705

12 **Houston Heart Failure Summit**
 Friday, 7:00 a.m. – 3:00 p.m.
 Houston Methodist Research Institute
 6670 Bertner Ave., 2nd Floor
 cme@houstonmethodist.org
 713-441-4971

17 **Jones Partners Thought Leadership Series: Creating a Globally Competitive Life Science Cluster in Houston**
 Wednesday, 6:00 p.m. – 8:30 p.m.
 McNair Hall, Rice University
 6100 Main St.
 gail.m.singer@rice.edu
 713-348-6222

18-19 **Medical Oncology and Hematology 2016: Multidisciplinary Approaches that Improve Coordination of Care**
 Thursday–Friday, 7:00 a.m. – 5:15 p.m.
 MD Anderson Cancer Center
 1155 Pressler St.
 Dan L. Duncan Building
 Floor 8, Rooms 1-8
 ambaring@mdanderson.org
 713-563-7388

25-26 **Interventional Pulmonology in Cancer Patients**
 Thursday–Friday, 7:00 a.m. – 5:30 p.m.
 MD Anderson Cancer Center
 6767 Bertner Ave.
 Onstead Auditorium
 Mitchell Building, Floor 3
 egagneau@mdanderson.org
 713-745-0080

26 **Fifth Annual: Nantz National Alzheimer Center Symposium: Frontotemporal Dementia**
 Friday, 7:00 a.m. – 5:00 p.m.
 Houston Methodist Research Institute:
 John F. Bookout Auditorium
 6670 Bertner Ave., 2nd Floor
 cme@houstonmethodist.org
 713-441-4971

28-2 **HGM 2016: Translational Genomics**
 Sunday, Feb. 28 – Wednesday, Mar. 2
 8:00 a.m. – 5:00 p.m.
 Hilton Americas Houston
 1600 Lamar St.
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**FEBRUARY:
 AMERICAN HEART MONTH**

Heart disease is the leading cause of death for both men and women, killing approximately 610,000 people in the United States each year. That means the disease is responsible for the death of one in three women and one in four men. This month, the American Heart Association (AHA) is celebrating American Heart Month to prevent cardiovascular disease and promote healthier communities. The national campaign seeks to improve heart health by raising awareness of various risk factors—such as obesity, inactivity, smoking and diabetes—and encouraging people to make the proper lifestyle changes that can help prevent heart disease.

Feb. 5 marks National Wear Red Day, a movement led by the AHA and Go Red for Women that encourages everyone to wear red in support of the fight against heart disease and stroke in women. Both American Heart Month and National Wear Red Day serve as a reminder to everyone that it's never too early to get heart healthy.

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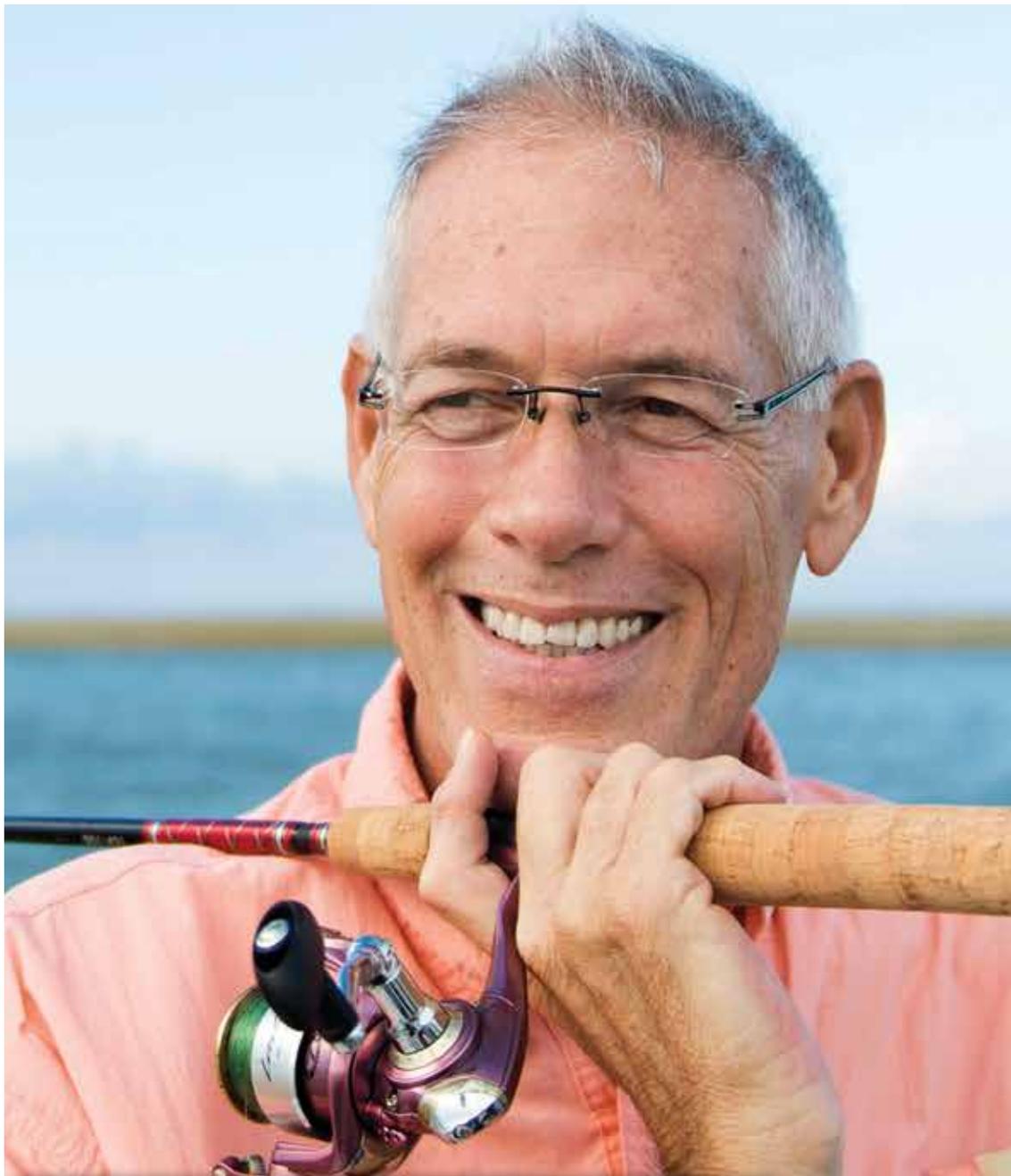
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Left: Ghannam Al-Dossari, MD, MS
*Chief, Section of Cardiovascular Surgery
Director, Heart Transplant*

Center Left: Michael Silva, Jr., MD, FACS
Chief, Division of Vascular Surgery and Endovascular Therapy

Center Right: Shreyas Modi, MD, FACC
Director, Heart Station, Cardiac Rehabilitation, Inpatient Services and CCU

Right: George Carayannopoulos, MD
Director, Heart Rhythm Center

The four clinicians featured here are representative of the whole team of specialists spanning our cardiovascular services.



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