



# TMC | PULSE

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THE OFFICIAL NEWS OF THE TEXAS MEDICAL CENTER — VOL. 2 / NO. 9 — OCTOBER 2015

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## How to Save a Life

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*Organ donation in the heart of Houston*

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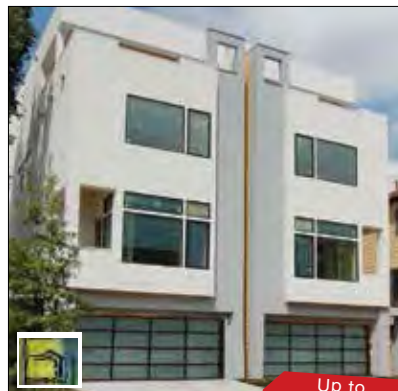
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## REMEMBERING RED // p. 12

**FROM THE THOUSANDS OF PATIENTS THAT HE CARED FOR AS A RENOWNED TRAUMA SURGEON, TO HIS ROLE IN THE ESTABLISHMENT OF MEMORIAL HERMANN LIFE FLIGHT, JAMES "RED" DUKE JR., M.D., TOUCHED COUNTLESS LIVES. THOSE WHO WORKED CLOSELY WITH HIM REFLECT ON THE LASTING LEGACY OF A TRUE TEXAS GENTLEMAN.**



**ON THE COVER:** A painting by local artist Jody Respondek, conceptualized by transplant surgeon Dr. A. Osama Gaber, hangs in the hall of Houston Methodist Hospital. A plaque beside the painting reads: "This painting embodies the continuation of life from one person to another through the precious gift of organ donation and transplantation."





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

I would like to begin by acknowledging that our campus recently lost two exceptional leaders—longtime Texas Medical Center Chairman David M. Underwood, and Memorial Hermann Life Flight Founder Dr. James “Red” Duke. Both left a profound and lasting impact on this campus and will be greatly missed.

This issue of TMC Pulse is an important one, as we are again touching on a topic that impacts countless lives within and beyond our medical center: organ donation. The Texas Medical Center is home to four exceptional organ transplantation programs, valuable collaborations and research efforts in disease and regenerative medicine, LifeGift—a not-for-profit organ procurement organization that helps facilitate donation and transplantation in the medical center—and Nora’s Home, a short-term housing option for transplant patients receiving care in the medical center.

Lives are changed every day thanks to organ donors, but successful transplantation relies heavily on donor registration. On any given day, an average of 22 people die waiting for an organ donation. When you consider that more than 5,000 people die of various causes each day in the United States—though not all are fit to donate vital organs—the odds are good that there could be enough suitable organ donors to help give those 22 individuals the gift of a second chance.

At last count, only 35 percent of residents of Harris County were registered organ donors. We believe our city—and our state—can do better. If you haven’t already, take five minutes and visit [DonateLifeTexas.org](http://DonateLifeTexas.org) to register or learn more about what it means to be an organ donor.

Also in this issue of Pulse, you will learn about the dedicated team behind our campus security. The Texas Medical Center is a place of great healing, and also great stress. It is our responsibility to provide a safe environment for patients and their families. Our campus police and security monitor around the clock, and work closely with all of our member institutions and their security teams to take a coordinated approach to safety. I am proud of the work that they do, and the continued efforts to anticipate and respond to the needs of the campus—staff, patients and visitors, alike.

*Robert C. Robbins*

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## THE TEXAS MEDICAL CENTER REMEMBERS

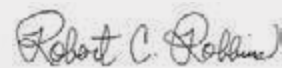
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# Chairman David M. Underwood

A multifaceted man with many dimensions, David M. Underwood's extraordinary life can never be fully summarized. Across his spectrum of accomplishments, as a celebrated philanthropist, business leader, husband, father and friend—David's passion for helping others has left a lasting imprint and his legacy will transcend generations.

His immeasurable scope of influence is evident at the Texas Medical Center. As chairman of the TMC Board of Directors for decades, David had an unrelenting vision for its future. He ushered in a new era of programmatic collaboration and innovation that will forever benefit Houstonians and the world.

We at the Texas Medical Center extend our sincerest condolences to his family and friends.



ROBERT C. ROBBINS, M.D.  
President and CEO, Texas Medical Center



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# Always at the Ready

FROM DEAD CAR BATTERIES TO CAMPUS-WIDE EMERGENCIES, THE TEXAS MEDICAL CENTER'S SECURITY SERVICES TEAM IS PREPARED TO RESPOND TO ANY CALL.

BY SHEA CONNELLY



“What affects one hospital is going to affect another. That’s how close we all are.”

— CHEYNE DAY  
Director of TMC Security Services

On a recent Thursday morning, Lieutenant Scott Meier steered into one of the Texas Medical Center’s 20 garages. He slowly drove up each level in the garage, eyes scanning cars looking for any sign of trouble or visitors in need of assistance. Meier is part of the team that tackles the monumental task of maintaining safety and order in the biggest medical center in the world.

With 56 member institutions and 42 TMC-owned garages and parking lots, the Texas Medical Center campus has a lot of ground to cover—but the TMC Security Services team is ready to handle any threat that arises, all while lending a helping hand to the millions who visit the TMC each year.

On that particular day, Meier was one of the eight to 13 security officers assigned to patrol the medical center that shift. Every day is divided into three

8.5-hour shifts, with a half-hour of overlap between shifts. Generally, two officers conduct a full campus patrol, while one to two officers are assigned to each of four districts on the campus.

“They’re trained to handle a variety of situations, they’re very customer-service oriented and they’re our face out there in the garage,” said Cheyne Day, director of TMC Security Services.

On an average day, officers take numerous motorist and customer assist calls, from jump-starting cars and retrieving keys locked in vehicles, to helping visitors navigate the parking payment system or find where their cars are parked. Calls to the security team phone number, plastered on the campus security vehicles, come in through the TMC Operations Center. All security officers also monitor the same radio channel.

**ALL SECURITY OFFICERS ARE EQUIPPED TO HANDLE VIRTUALLY ANY MOTORIST OR CUSTOMER SERVICE RELATED ISSUE. SHOULD ANY OFFICER ENCOUNTER CRIMINAL ACTIVITY, HOWEVER, THEY CONTACT THE TWO POLICE OFFICERS ASSIGNED TO EACH SHIFT.**



Not long into Meier's patrol, he receives a typical request. A hospital visitor locked her keys in the car. Within minutes, a couple of security officers have the door open. The visitor said she had been distracted after visiting a family member in the hospital, which Meier said is not unusual.

"You've got to keep in mind that many of the visitors to these hospitals have family members who are sick or injured," he said. "We can't imagine what is going through their minds, and for that reason you really need to step up your game."

The importance of having a positive attitude is a core tenet of the entire TMC Security team. Proprietary Security Officer Joyce Thompson, stationed at a garage exit, described the job as requiring "stellar customer service skills."

"We have some customers who are in a haste to see a friend or a relative for the last time," she said. "Not all customers are going to be nice, but if you give them just a little bit of a smile, they'll usually smile back. We have to have the right attitude and character for a medical environment."

In addition to patrolling by car, the TMC now has a bicycle security team—there are six security bikes and eight officers certified to ride. Weather permitting, there are generally at least two officers patrolling by bike each day. While patrolling by bicycle is certainly more rigorous than driving—a TMC security cyclist can log up to 25 to 30 miles in a day—it offers security officers a number of advantages.

"There's a lot of stuff you can see that you won't necessarily see riding around in the car," said Edward Powell, a proprietary security officer and bike program enthusiast. "We interact with the public more. We're more readily available vs. someone having to flag a car down."

All security officers are equipped to handle virtually any motorist or customer service related issue. Should any officer encounter criminal activity, however, they contact the two police officers assigned to each shift. The police officers, contracted through Harris County, are notified of crime through the radio channel they share with the security officers or through direct phone calls. Common crimes include burglary of motor vehicles, vandalism, suspicious persons and even domestic disputes in parking garages, where emotions can run high. In general, the crime rate in the medical center is low compared to the overall crime rate in the city.



“We compare our statistics with the Houston Police Department and the Harris County Sheriff’s Office, and we run about eight percent of the crime in this general area,” Day said.

Despite the relatively low crime rate, the security team takes preparation seriously. Through TMCER.org, anyone can sign up for mass notifications through email, phone and text message.

“We also have a new system called Perspective that helps us map criminal activity across the property,” Day said. “Any incident dispatch or call is logged into the program, and it helps us analyze where the most crimes occur, the most parking incidents, the most suspicious activity. Then we can reallocate our assets according to that analysis.”

TMC Security has plans in place to deal with a variety of campus-wide emergencies, from radiological releases to weather disasters to active shooters.

“You name it, we’ve done training exercises,” Day said. “We’ve done risk analyses with most of the institutions on their biggest risks. We know how to mitigate it from the outside in.”

In fact, collaboration between the TMC and its member institutions is paramount to keeping the campus safe, Day said. To that end, emergency directors and security representatives from the TMC and the surrounding area meet for quarterly Security and Emergency Preparedness Council Meetings.

“What affects one hospital is going to affect another,” Day said. “That’s how close we all are.”

If an emergency occurs on the TMC campus, the security team notifies member institution security departments and local police chiefs, and then each institution initiates its own protocol. Should an institution request security assistance, TMC is ready to oblige.

“We try to be the clearinghouse of communication across the property,” said Day. He cited the Memorial Day flooding as an example of a recent major emergency on the TMC campus.

“Our new policies and procedures instituted after Tropical Storm Allison worked very well, even though we actually took on comparable water to Allison,” Day said. “We communicated with institutions to shut their flood doors at certain levels, and we went out to help them with some. The improvements worked.”

Each day in the Security Services department comes with unique challenges, whether it’s the day-to-day tasks of helping the medical center’s many

visitors and patients or long-term emergency planning. There is one constant, however, that each member of the team emphasized: being busy.

“The garages are always full and there are always customers needing assistance,” Thompson said. “It keeps me busy, but I love talking with people. I make them laugh, they keep me laughing. This is not just customer service, it’s also healing.” ■

“Many of the visitors to these hospitals have family members who are sick or injured. We can’t imagine what is going through their minds, and for that reason you really need to step up your game.”

— LIEUTENANT SCOTT MEIER  
TMC Security Services



The TMC security and police vehicles recently received a makeover and now feature updated Texas Medical Center graphics.

# Parting Pitches

*An event six months in the making, TMCx Demo Day provides a platform for the startups in the Texas Medical Center's accelerator to pitch their solutions*

BY ALEX ORLANDO



“Many of the Texas-based companies were developed out of Texas Medical Center institutions. That’s the goal, of course—to help young students and young faculty members develop new companies that can be successful and, ultimately, stay here in Texas.”

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

First there was a grueling, two-week boot camp. Then a continuous stream of curriculum sessions in a brightly lit classroom. Interspersed throughout, introductions were made and firm handshakes exchanged. But for the startup companies that participated in the inaugural class of TMCx, the Texas Medical Center's accelerator program, there was one format they were all intimately acquainted with: the pitch. After weeks of working on slide decks and crystallizing messaging; countless hours spent rehearsing, refining, and rehearsing again; and that magnetic moment on stage, all eyes squarely directed at the front of the room, everything has to coalesce in a showcase of confidence and poise in just four minutes. And on Sept. 10, all the chips were on the table.

“I’m really proud to see this many people here today,” said Robert C. Robbins, M.D., president and chief executive officer of the Texas Medical Center, to the 400 investors, clinicians, entrepreneurs and community members gathered at TMCx. “We all want to make the Texas Medical Center better, and this is a huge part of that. This is one of the reasons why we came here, and I’m incredibly proud of this program.”

TMCx Demo Day, the culmination of the accelerator's first class and a mile-marker of progress for the entrepreneurs and the Texas Medical Center alike, was an event six months in the making. Throughout the day, attendees had the opportunity to hear the companies pitch, witness live demonstrations of their technologies and get a glimpse of their future plans.

“I’m thrilled to see the growth of all of these people, in such a short period of time,” said William F. McKeon, executive vice president and chief strategy and operating officer of the Texas Medical Center. “It was exciting helping contribute to their vision, moving them forward and connecting them with potential customers who will be the ultimate determinate of their success. Helping them realize that growth has been tremendous.”

Throughout the six-month program, the 21 companies have collectively amassed \$12 million in follow-on funding, successfully developed 35 customer engagements, including pilots and validation studies, and hired 25 new employees. There have even been four acquisition offers—the gold standard of success in the startup world.

“Our statistics from the first six months of the program demonstrate the incredible progress these startups have made,” said Lindsay Deneault, business strategist at TMCx, during her opening remarks. “Those figures and the strides they represent didn’t just materialize out of nowhere. Over the course of the program, we guided our companies through structured workshops, networking opportunities, and facilitated introductions within the medical center. We wanted to allow them time to apply the teachings we’ve put them through as they built their business.”

Throughout the curriculum, over 120 advisors, coming from both clinical and business backgrounds, lent their time and expertise in everything from the mock board meetings to one-on-one sessions. According to Deneault, fostering those relationships was





critical to the success of the program. On Demo Day, an advisor introduced each company before they plunged into their final pitch.

“My involvement as an advisor has been very fruitful,” said Alexander Izaguirre, Ph.D., director of special projects at Baylor College of Medicine and a TMCx advisor. “I take a very visionary type of approach to technology, where I’m not as interested in what people can do today as where they can go tomorrow. In working with these companies, I’ve gotten to see what some of them can do. I wouldn’t be surprised if many of them go on to succeed and develop themselves into big players in the industry.”

A distinctively diverse cohort—ranging from early to late stage in terms of growth, and hailing from Houston, San Francisco, Israel,

Germany and everywhere in between—the 68 individuals in TMCx’s first class fell into one of three categories: consumer-facing enterprises, those developing regulated medical devices and companies cultivating enterprise-level software.

“Many of the Texas-based companies were developed out of Texas Medical Center institutions,” Robbins said. “That’s the goal, of course—to help young students and young faculty members develop new companies that can be successful and, ultimately, stay here in Texas.

“One of our companies, BrainCheck, is an outgrowth of Baylor College of Medicine,” he added. “Maybe one day we’ll all have to check in with an iPad and see if we’re fit to perform surgery or operate heavy machinery. On the sports field, BrainCheck has a very clever way

to assess brain functioning.”

According to their Chief Executive Officer, Yael Katz, Ph.D., BrainCheck—a company developing a mobile, interactive test for cognitive health issues such as concussions and dementia—has already breached several target demographics. Their technology is in use in seven schools, two emergency rooms, four clinics and two senior centers. For her, the consumer market is close at hand.

“Now we actually have a product, so it’s an actual, tangible device that people can use,” said Katz. “We invested a lot in the technology, so it’s scalable, HIPAA compliant, fully secured and really nicely designed. We’ve tested about 1,000 people so far and have integrated all of that amazing feedback into the product itself.”

Similar success stories weren’t hard

to find. On Demo Day, pitches that painted a portrait of rapid progress and sustained development were common. The first company to present, Gauss Surgical, demonstrated the huge strides taken by many of the founders.

“We accept that bleeding is a function of what we do in surgery, and I think part of innovation is questioning whether or not that’s a reality,” said Alan B. Lumsden, M.D., medical director of the Houston Methodist DeBakey Heart & Vascular Center, in his advisor introduction. “Really, bleeding is either a function of disease, bad surgery or bad technology. At the end of the day, blood loss is a negotiation between the surgeon and the anesthesiologist. For somebody in my position to effect change, I have to be able to measure that.”



For the first class of TMCx, composed of 21 companies from all across the globe and pictured here alongside TMCx staff, their efforts to refine their businesses and showcase their solutions all came together on Demo Day.

Enter Gauss Surgical and their unique vision to redefine real-time measurement for surgical blood loss using tablet technology.

“Along comes this company, and they told me that they were going to hold up their iPads and detect how much blood a patient has lost using colorimetric analysis,” Lumsden said. “We were pretty skeptical. Unbeknownst to us, one of our surgeons took 24 ccs of blood, squirted it into a receptacle and checked it against Gauss’ technology. It registered 24 ccs. We were stunned.

“At the same time, none of this stuff is going to work if it doesn’t integrate into our workflow and is easy for our nurses to utilize,” he added. “You can have a great idea, but it has to be usable on a daily basis. We’re delighted to have Gauss Surgical here with TMCx, and I’m very excited about the opportunity to work with them. It’s a privilege to be involved.”

“That’s the reason we actually came to Houston from California,” said Milton B. McColl, M.D., chief executive officer of Gauss Surgical. “We wanted to work with people like Alan and

Methodist who are at the cutting edge of technology and can help us develop those technologies as we move forward.”

For Redox, a company making it easier to interoperate with electronic health records, their current ambitions offer a marked contrast to their status six months prior. Their centralized interface engine enables users, from health systems to app developers, to easily exchange health data. In lowering the barriers of entry for new software applications to enter the health IT market, Redox is paving the way for users to make a potentially groundbreaking impact on patient care.

“If you had seen Redox in March, we would have been actively developing new data models and fielding a lot of new requests,” said Devin Soelberg, chief customer officer at Redox. “Fast forward to now, and the platform and service offerings we have available are much more robust. Most of what people need from us is already commercially available, which is allowing us to pivot our attention towards real growth. That’s opening up whole new avenues of interest for us.”

Setting sail into bold new markets has defined the ambitions of Medical Adhesive Revolution, a German-born biotech company seeking to establish itself in the United States—and potentially prompt a new evolution in wound closure through their next-generation surgical adhesive.

“I’ve caused a lot of bleeding in my time, and their product can put a stop to that,” deadpanned Robbins, referring to his tenure as an internationally recognized cardiac surgeon. “Be sure to watch them very closely. I think they’re going to be a successful acquisition in the field of wound care.”

“Today is the conclusion of a great, new chapter for our company. In fact, it’s the first chapter in our U.S. history,” said Alexander Schueller, president of Medical Adhesive Revolution USA. “It has been a time of charting our course, based on the feedback from our advisors and mentors, as well as the insights we gained in our work. Since the beginning of the program, we were able to zero in on a cardiovascular indication for our internal product that will allow us to bring it quickly to a market, which is large, growing and where we have a

“As an investor, I had never seen so many interesting opportunities at a single event.”

— LINDA SPAIN

Former Chief Financial Officer of  
Visualase Inc.

strong competitive edge.

“The TMCx program has been a great base to foster the relationships we have been building since we won the Rice Business Plan competition here in Houston in 2014,” he added. “Also, it has been a good outlet to develop new relationships with key stakeholders—from venture capitalists, to surgeons, to potential partners.”

As the day drew to a close, setting the stage for valuable networking opportunities, it became clear that the attendees shared the entrepreneurs’ enthusiasm for their products and saw the potential to send ripples throughout the future landscape of health care.

“The quality of the pitches was exceptional, not only in people’s ability to stand up and deliver, but moreover in the viability of the businesses being created,” said Linda Spain, former chief financial officer of Visualase Inc., a Houston-based company that was acquired by Medtronic last year. “A number of companies are doing important work and could be hugely successful—thanks to the bringing together of technology, team and the resources TMCx has provided. As an investor, I had never seen so many interesting opportunities at a single event.” For the companies who have pledged everything in pursuit of their passions, that’s a ringing endorsement. ■





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# Remembering RED



**JAMES H. "RED" DUKE JR., M.D.,  
FAMED SURGEON, MEDICAL EDUCATOR, AND TEXAS ICON,  
PASSES AWAY AT AGE 86**

BY ALEX ORLANDO

His iconic bottlebrush mustache became almost synonymous with his role as a trailblazer of trauma care; his military-issued, wire-rimmed glasses reflected his commitment to educating medical students, surgeons and the general public alike; and his distinctive Texan twang, cowboy hat and folksy sense of humor solidified his status as a national icon. James H. "Red" Duke Jr., M.D., the John B. Holmes Professor of Clinical Sciences at The University of Texas Health Science Center at Houston (UTHealth) and founder of Memorial Hermann Life Flight, wasn't just embedded into the fabric of the Texas Medical Center and the city of Houston—he helped mold it into what it is today. On Aug. 25, 2015, surrounded by family and friends, Duke passed away at the age of 86.

"Dr. Duke was a true pioneer—a talented and tireless surgeon, a dedicated and inspiring educator, and a friend and mentor to everyone he met," said Giuseppe N. Colasurdo, M.D., president of UTHealth and dean of the UTHealth Medical School. "He never sought to be a leader, but became one naturally through his brilliance, compassion, patience and selflessness.

**“He was a friend, a colleague, and a role model and mentor to a generation of doctors who benefited immensely from his guidance. I, along with everyone at Memorial Hermann, will forever miss Dr. Duke.”**

— DAN WOLTERMAN

*President and Chief Executive Officer of Memorial Hermann*

**RED DUKE CONTINUOUSLY BLAZED NEW TRAILS. FROM THE ESTABLISHMENT OF MEMORIAL HERMANN LIFE FLIGHT, TO HIS KEY ROLE IN BRINGING LEVEL I TRAUMA CARE TO THE CITY OF HOUSTON, HIS VISIONARY LEADERSHIP ENSURED THAT THE MEDICAL CENTER WOULD NEVER BE THE SAME.**

"He was a constant presence at our university and we will miss his guidance, his wit and, most importantly, his example," he added. "From all of us at The University of Texas Health Science Center at Houston—thank you, Dr. Red Duke."

A dedicated physician known for his extraordinary patient care and efforts to train the next generation of medical practitioners, as well as inform the public about various health issues, Duke leaves behind a lasting legacy. In 1972, he joined the faculty of the newly created University of Texas Medical School at Houston. In that role, he brought Level I trauma care to the primary teaching hospital, now known as Memorial Hermann-Texas Medical Center, and the city of Houston—alongside a reputation as a compassionate surgeon, innovator and educator.

"In my opinion, Dr. Duke was one of the great icons of the Texas Medical Center. He helped build and make the Texas Medical Center what it is today," said Craig Cordola, regional president of Memorial Hermann Health System and former chief executive officer of Memorial Hermann-TMC. "Even in spite of who he was and all that he accomplished and his impact on trauma care, he was one of the most humble men I've ever met. He would often say, 'I'm just a surgeon.' He just wanted to care for people, and I think there's a lot of life lessons in leadership that can be learned just by watching how Dr. Duke handled himself."

In 1976, Duke was instrumental in developing and implementing Memorial Hermann Life Flight, the state's first air ambulance service that now transports over 3,000 patients a year. For almost four decades, he served as medical director of Life Flight, a signature component of Memorial Hermann Texas Trauma Institute, helping foster the program's local and national renown.

"Dr. Duke was one of our country's great doctors," said Dan Wolterman, president and chief executive officer of Memorial Hermann. "He was a friend, a





Credit: Memorial Hermann-Texas Medical Center

colleague, and a role model and mentor to a generation of doctors who benefited immensely from his guidance. I, along with everyone at Memorial Hermann, will forever miss Dr. Duke. As we collectively grieve, we also want to extend our sincere gratitude for his relentless and unprecedented dedication and impact on medicine, education and the medical community.”

A founding member of the American Trauma Society, Duke dedicated much of his medical career to developing an infrastructure that would provide better care for injured patients, as well as programs focused on injury prevention. He played a key role in the development of the emergency medical services (EMS) and trauma system throughout Texas. These tireless pursuits certainly didn’t go unnoticed—Duke was in serious consideration for the position of U.S. Surgeon General in 1989.

One of the most recognized personalities in his field, Duke educated millions about various health-related topics as the host of the nationally syndicated television news program Texas Health Reports. For 15 years, his Texas accent and ever-present mustache dominated the frame as he made a host of issues—from kidney stones, to injury prevention, to proper nutrition—accessible to average Americans.

“Dr. Duke was a friend, mentor and larger-than-life figure for thousands of us who were fortunate to be his students, residents or colleagues,”

said Richard Andrassy, M.D., professor and chairman of the department of surgery at UTHealth Medical School. “He has passed down the wisdom that ‘the most important part of being a doctor is being a doctor.’ His hands-on care—from applying brown sugar to wounds to sitting at the bedside and holding the hands of his patients—would be a lost art if not for Dr. Duke.”

Duke’s curriculum vitae, clocking in at more than 70 pages long, itemizes and showcases his publications, book chapters, more than 600 presentations, and numerous awards, including “Surgeon of the Year” in 1988 by the James F. Mitchell Foundation, the Boy Scouts of America’s Distinguished Eagle Scout Award, and lifetime achievement awards from both the Houston Technology Center and the Governor’s EMS and Trauma Advisory Council. In 2014, Alvin Independent School District recognized Duke’s commitment to education, math, science and innovation by dedicating Dr. James “Red” Duke Elementary in his honor.

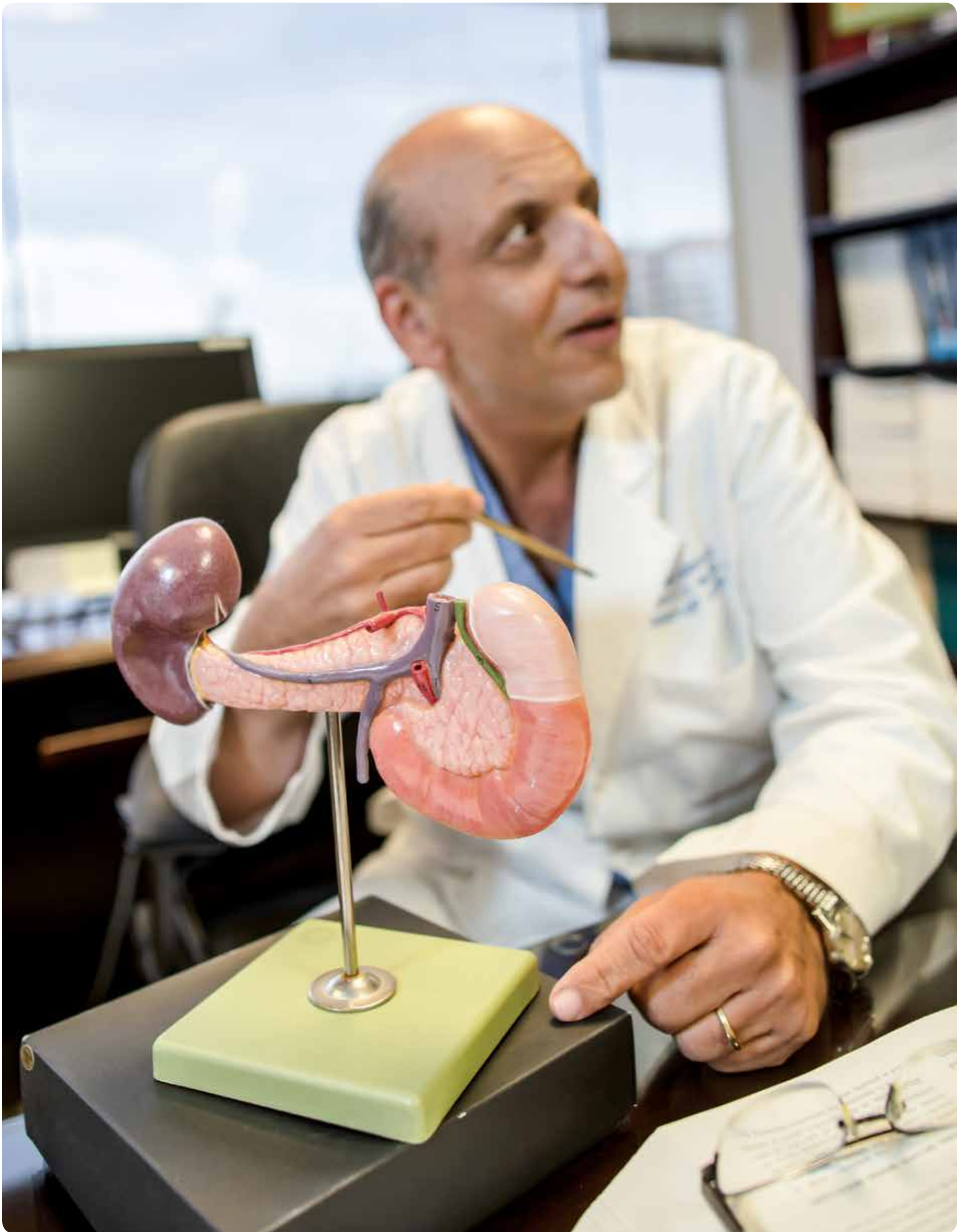
In recent years, Duke—who served for two years as an Army tank commander in Germany during the Korean War—was especially committed to his ongoing work with the U.S. military to enhance medical technology on the battlefield, as well as surgical techniques to support the needs of our military personnel. As a co-founder of the Texas Medical Center’s “Hiring Red, White & You” initiative, he was equally

“Dr. Duke was one of the great icons of the Texas Medical Center. He helped build and make the Texas Medical Center what it is today.”

— CRAIG CORDOLA  
Regional President of  
Memorial Hermann Health System

dedicated to finding employment opportunities for military veterans who wanted to transition into the civilian workforce.

“I don’t think we’ll fully appreciate his legacy for some time,” said Cordola. “He made that big of an impact, to the extent that there are thousands of people that he trained; a world-class trauma system that he set up for the state of Texas; and even the evolution of Memorial Hermann Life Flight between 1976 and today. Dr. Duke’s footprint is really large, and as a result of that his legacy is hard to determine, because he made such a big impact. This isn’t a physician that made a difference at a single hospital—this is a physician that made a difference in thousands of people’s lives throughout the community and the country. I’m hopeful I will be here when his legacy is fully known.” ■





# HOW TO Save a Life

## THE PAST, PRESENT AND FUTURE OF ORGAN TRANSPLANTATION IN THE TEXAS MEDICAL CENTER

BY ALEXANDRA BECKER

In an oblong mass of over 1,000 acres, nestled between some of Houston's most cherished landmarks—the museum district, the Houston Zoo and NRG stadium, to name a few—sits the beating heart of the city itself: the Texas Medical Center. Pulsing with clinical expertise, cutting-edge research and medical breakthroughs 24 hours a day, each and every day, it's no surprise that the TMC is also home to some of the most robust organ and tissue transplantation centers in the nation, providing a rare second chance at life to those who need it most. Together, the centers offer the full spectrum of transplantation services, including heart, lung, liver, kidneys, pancreas and islet, tissue, nerves, multi-organ procedures, ventricular assist device (VAD) implantation, intestinal failure treatment and advanced organ failure management. While each program is now differentiated by its particular strengths, all were built upon a rich history of achievements in the field, including many of the nation's firsts.

Leading the charge early on was Denton A. Cooley and the Texas Heart Institute (THI), successfully transplanting a human heart in 1968 and, just a year later, laying claim to the world's first total artificial heart transplant. Now part of CHI St. Luke's Health-Baylor St. Luke's Medical Center, THI has been named among the nation's best for cardiology and heart surgery for 25 consecutive years—a well-deserved title for a program that has implanted more than 1,000 VADs to date, more than any other program in the nation. Memorial

Hermann-Texas Medical Center, in partnership with The University of Texas Health Science Center at Houston (UTHealth), pioneered the use of the anti-rejection medications cyclosporine and rapamycin, delivering revolutionary applications in immunosuppression therapies after transplantation. Texas Children's Hospital, which has expanded into the largest pediatric heart transplant center in the country and one of the only pediatric lung transplant programs, performed the first successful heart transplant on an infant in 1984 and the first pediatric lung-kidney transplant in the nation. Meanwhile, the Houston Methodist J.C. Walter Jr. Transplant Center, starting from the first left ventricular assist device, achieved numerous firsts in heart, lung, liver, islet and multi-organ transplants while building a reputation as one of the largest and best organ failure management centers in the U.S.

To this day, the programs continue to grow in both volume and clinical outcomes. In fact, combined, they would create the largest, most successful transplant center in the country.

“We recognize that this is a time to really leverage the rich resources we have here in the medical center. We know that we get more when we have the conglomerates of the group rather than the individual pieces of it.”

— A. OSAMA GABER, M.D.  
Director of the Houston Methodist J.C. Walter Jr. Transplant Center

.....  
 10:00:00

Every **10 MINUTES**, a new person is added to the national organ transplant **WAITING LIST**.  
.....



**“In the midst of human tragedy, our job is to offer hope—hope for individuals on the receiving end, but also hope and value for the families of donors.”**

— KEVIN MYER  
President and CEO of LifeGift

“Our outcomes in Houston are excellent,” said John Goss, M.D., professor of surgery and chief of the Division of Abdominal Transplantation at Baylor College of Medicine. Goss is also the JLN Foundation Endowed Chair in Transplant Surgery and medical director of transplant at Texas Children’s Hospital, as well as the director of liver transplantation at both St. Luke’s Medical Center and the Michael E. DeBakey Veterans Affairs Medical Center. “If you take the city of Chicago, or New York City, or LA, and you combine the survival of all of those programs and compare them to Houston, our numbers are much better,” he added.

It’s a claim that begs the question: why not unite? If the TMC is home to some of the country’s best, and if together their expertise would create a definitive transplantation superpower, why not collaborate to build one giant, comprehensive program?

“It’s an idea that’s certainly been proposed, but ultimately, I think we all agree it wouldn’t work very well,” explained J. Steve Bynon, M.D., program director for the Center for Abdominal Organ Transplantation & Regenerative Medicine at Memorial Hermann-TMC and UTHealth. Bynon was brought from the University of Alabama to Memorial Hermann-TMC four years ago to revamp their abdominal organ transplantation program, a move that has already resulted in an exponential increase in patients and above-national-average success rates. This, alongside the recently developed Center for Advanced Heart Failure at the Memorial Hermann Heart & Vascular Institute-TMC, quickly placed the institution among the heavy-hitters in the world of transplant programs.

“First, on a strictly logistical level, the Centers for Medicare and Medicaid Services designates transplants based on individual hospitals, so from a reimbursement standpoint, combining our centers is an impossible proposition,” Bynon said. “Also, the competition is good. It forces all of us to perform at a much higher level, and I would hope that our resurrection of this program has facilitated that.”

Healthy competition aside, the sheer existence of a transplant program is often credited for breeding excellence within a hospital or health care system itself—another reason institutions would like to see their individual programs stay put.

“Transplantation is leading the way in quality care, and it has for some time,” Bynon said. “When you start to look at the principles of Accountable Care Organizations, those are all factors that successful transplantation programs have been implementing for years.”

Bynon explained that because transplantation is an extremely expensive endeavor for an organization, programs that hope to be successful from both a clinical and business standpoint must offer acutely specialized, high quality, efficient care, while producing excellent outcomes.

“Transplant programs raise the level of care across the board for every service line in a hospital. There isn’t a specialty that we don’t touch every day, and we’re demanding extremely specialized care that performs at a very high level. There’s no running up the bill and there’s no room for error,” he said.

That dedication to clinical excellence is ubiquitous in the transplant centers throughout the Texas Medical Center.

“Everything comes back to the patients and doing what is best for them,” said A. Osama Gaber, M.D., professor of surgery and director of the Houston Methodist J.C. Walter Jr. Transplant Center. “That’s really one of the things that sets our program apart. Methodist is not just a transplant program. Our center is organized in such a way that it is a large organ failure management system, committed to taking care of patients throughout all phases of care across the whole spectrum: inpatient, outpatient, during organ failure and post-transplant.”

Baylor College of Medicine physicians and surgeons support the transplant programs at Texas Children’s Hospital, Baylor St. Luke’s Medical Center, and the Michael E. DeBakey VA Medical Center, emphasizing the importance of a cohesive team and consistent standard of care for a program to be successful.

“We work to provide the same care at each of our hospitals,” Goss said. “We have one team of surgeons that covers our three facilities so that our standards are consistent—and our care is excellent.”

Excellent outcomes, of course, breed growth. In 2014, the lung transplant listings at Baylor





*Credit: Houston Methodist Hospital*

St. Luke's increased by 50 percent, their liver transplant listings increased by 54 percent and heart transplants increased by 48 percent. Texas Children's Hospital, Memorial Hermann-TMC and Houston Methodist all witnessed substantial growth in their numbers as well.

As these programs continue to expand, caring for more and more patients while garnering national achievements and setting the bar for clinical excellence, the need to address other, non-clinical aspects of patient care becomes increasingly important. Nora's Home, one of the Texas Medical Center's newest member institutions, was created with this in mind.

A hospitality house designed to host and support transplant patients and their families, Nora's Home includes private family suites, a chapel, community room and education center. It is named in memory of Gaber's daughter, who tragically lost her life in an automobile accident at just seven years old; in honor of Nora's spirit of compassion and generosity, Gaber and his wife donated her organs so she could save the lives of other children. Today, Nora's Home is a welcoming place for out-of-towners who are awaiting their own lifesaving transplants, offering a community

of support as well as lodging and transportation to and from the medical center. In addition to serving patients and their families in an often-overlooked capacity, Nora's Home also provides an opportunity for the different member institutions to work in tandem, welcoming patients from the various programs throughout the TMC.

"We recognize that this is a time to really leverage the rich resources we have here in the medical center," Gaber said. "We know that we get more when we have the conglomerates of the group rather than the individual pieces of it."

Gaber sees this spirit of collaboration growing

among the various programs, and not only in the non-clinical setting.

Just this past May, Houston Methodist partnered with The University of Texas MD Anderson Cancer Center and other TMC member institutions, including LifeGift, the designated organ procurement organization (OPO) for the Texas Medical Center, to perform a complex, first-of-its-kind multi-organ transplant involving a patient's skull, scalp, kidney and pancreas—a procedure that would not have been possible without the breadth of expertise and cross-institutional collaboration available in the TMC.



**An INDIVIDUAL DONOR CAN SAVE UP TO EIGHT LIVES** through organ donation and can save countless others through tissue donation.

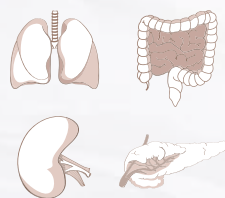


“Already we’re national leaders in our ability to perform complex, multi-organ procedures, and I think the more we act as one rather than our disparate parts, the more our patients will benefit,” Gaber said.

Gaber cited recent efforts to develop a TMC-based living donor collaborative as an excellent example of this kind of alliance.

Facilitated by LifeGift and the individual transplant centers, the living donor collaborative is a collective extension of a process that has been taking place within individual institutions for years: a patient needs a kidney, asks friends and family members until he or she finds a match, and the procedure is completed. All too often, however, patients are unable to find a living donor match within their social network, so they are put on the transplant list to wait until an organ from a deceased donor becomes available through the United Network for Organ Sharing (UNOS), the vast, standardized network in charge of the allocation of organs throughout the United States. Patients in need of a transplant are matched with organs through the UNOS network based on numerous factors, including compatibility of blood type, tissue type, degree of immune system match, the size of the organ needed and the size of the organ donated, geographical location, medical urgency, and time spent on the waiting list. Some patients wait years for an organ match, and for most organs, this is the only option available.

Living donation is the exception to the rule. Bone marrow, blood vessels, stem cells, umbilical-cord blood and kidneys can all be donated by individuals during their lifetime. In extremely rare cases, a lobe from a lung or portions of the liver,



A healthy person can become a **LIVING DONOR** by donating a **KIDNEY**. Also, in extremely rare cases, a segment of organs such as **LUNG, INTESTINE OR PANCREAS** can be transplanted from a living donor.

pancreas, intestine or small bowel can also be donated by a person while he or she is still alive—and it can be done outside the UNOS system. Through the developing TMC living donor collaborative, member institutions are coming together to increase living donation possibilities through donor swaps. When a potential living donor and patient do not match, the transplant teams at the various programs arrange a series of exchanges between donors and recipients until each patient has a match.

“Say you have kidney disease and you have a donor that wants to donate to you, but the blood type doesn’t work out,” explained Goss. “We can put you in a pool with someone from Memorial Hermann or Methodist who is in a similar situation, and maybe the blood type of your donor works out from someone at Methodist and maybe the Methodist donor works out with someone from Memorial Hermann and then the Memorial Hermann donor works out with you. In the end you take all these pairs of living donors that don’t work out individually, but when you combine all the resources in the medical center and share

amongst institutions, you’ve just saved three lives. It’s an excellent option to help our patients.”

Addressing the need for more organs doesn’t end there. Baylor, Methodist and Memorial Hermann-TMC are all engaged in cutting-edge research focused on alternatives to traditional organ donation and transplantation, including harnessing regenerative medicine, 3-D printing, stem cells and cellular structures to create new organs or fix those that are no longer working properly. Some researchers are even exploring xenotransplantation routes, which would modify animal organs such as pig livers, kidneys or hearts to be compatible with the human body. All of this is being performed alongside the institutions’ efforts in education and more traditional research focused on genomics, mechanical assist devices, immunotherapy, and breakthroughs in organ failure management techniques.

“I think one of the opportunities for growth in the medical center would be to team up across all the institutions to train fellows and collaborate in research. It would mean more people, more materials, and could really be the next step for all of our programs,” Goss said.

Until then, he explained, everything begins and ends with donations.

“None of this happens without the donor. In the end, you have to take care of people, and if you don’t have the organs, you can’t do that.”

“It all happens because of a ‘yes,’” said Kevin Myer, president and CEO of LifeGift. In addition to being the OPO for Houston and its surrounding areas, the organization works diligently to increase the number of Texans entering the organ, eye and tissue donor database, known as Donate Life Texas. Through community outreach and education facilitated by LifeGift in collaboration with the Department of Public Safety and the state’s two other OPOs, the registry has increased from approximately 4 million Texans in 2012 to its current 7.7 million.

“This effort is in addition to working across all the TMC hospitals to coordinate organ, eye and tissue donation, usually with local TMC transplant centers. It’s exciting and reassuring to work with expert transplant programs, and we are confident that each donor’s gifts will have the best possible chance of saving lives when transplanted.



Credit: Allen Kramer



Still, it all comes down to a person, in the worst time of their life, saying ‘yes,’” Myer reiterated. “I think that’s one of the really important lessons about what we do when we ask people or their families to donate. In the midst of human tragedy, our job is to offer hope—hope for individuals on the receiving end, but also hope and value for the families of donors.”

That hope is something Karyn Trussell holds on to every day. Trussell’s son passed away three years ago, after his donated organs went on to save the lives of five different individuals.

“His best friend had been killed in a car crash not long before he passed away, and I remember he came home and said how glad he was that his family had donated his organs,” Trussell recalled. “So when it was time for me to make that decision, I didn’t hesitate. I knew that’s what he would have wanted me to do.”

“The donors are the true heroes in all of this,” said Bynon. “For the patients who get transplanted, I can tell you there’s not a day they don’t think about their donor and his or her family. They’ve truly helped somebody at a level that very few things can touch, and hopefully it helps them make some sense out of their tragedy.”

Organ donation is, after all, the act of giving life. It is fundamentally pure and selfless, a recognition of the interconnectedness between all of us. It is also, in a way, an act of preservation—and for the extraordinarily lucky, one of second chances.

“I’ve had so many blessings because of the gift of my heart,” said Randy Creech, a heart-transplant recipient who just this year celebrated the 25th anniversary of his surgery, a rare milestone for a heart transplant patient. At 40 years old, Creech was put on the transplant list and given one year to live after a viral infection in his cardiac muscle spurred aggressive congestive heart failure. On July 6, 1990, the call came that they’d found a match—a 19-year-old from Oklahoma named Aaron, who had passed away just hours before. Sitting next to Creech on the couch as he listened to the news was his own 19-year-old son.

“It was not an abstract thing,” Creech said. “Every day I marvel at the depth of that family’s love for other people, that they were willing to donate all the organs they could to help strangers. And to think that this same heart propelled Aaron through his life for 19 years and has now carried me for 25—it’s incredible. Thanks to his gift, I’ve been able to watch both my son and daughter graduate from college, get married, and have families of their own, and I still think about Aaron every day.” ■



*Credit: Allen Kramer*

“I think one of the opportunities for growth in the medical center would be to team up across all the institutions to train fellows and collaborate in research. It would mean more people, more materials, and could really be the next step for all of our programs.”

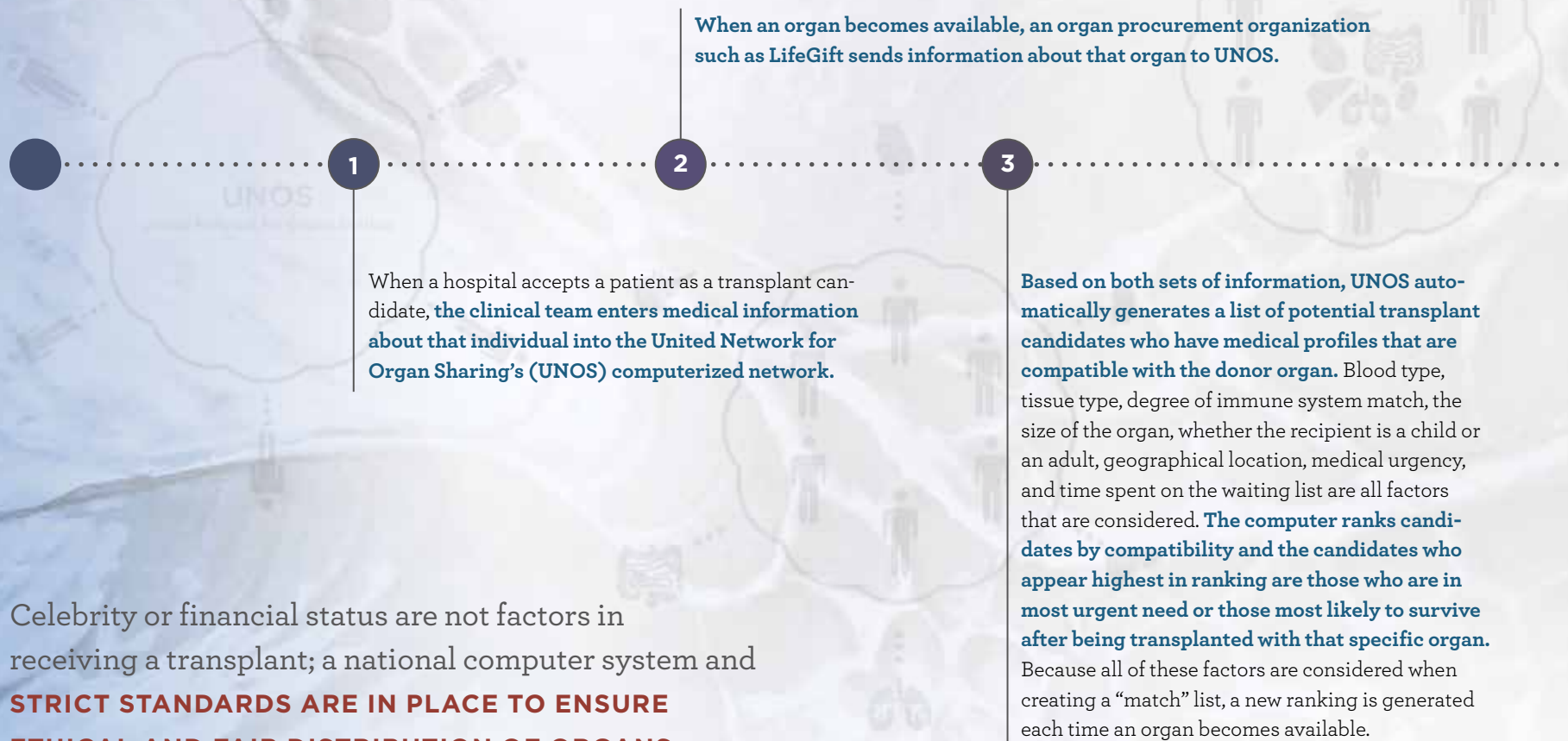
— JOHN GOSS, M.D.

*Chief of the Division of Abdominal Transplantation at Baylor College of Medicine*

# Transplantation

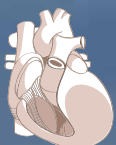
## AT A GLANCE

### How are Organs Matched?



### Transplantable Organs and Tissue

Donated organs can only remain viable for a certain amount of time and require special methods of preservation. In all cases, the sooner the organ is transplanted, the better.



HEART  
4-6 hours



LUNGS  
4-6 hours



LIVER  
8-12 hours



PANCREAS  
12-18 hours



KIDNEY  
24-36 hours



INTESTINE



## How Do You Register to Become a Donor?

- >> Go to [www.DonateLifeTexas.org](http://www.DonateLifeTexas.org)
- >> At any Department of Public Safety (DPS) office when obtaining your driver's license or ID
- >> At any Department of Motor Vehicle (DMV) office when renewing your car's registration online

Once the list is created, **LifeGift will contact the transplant center whose patient appears first on the list.**

**If the organ is declined, LifeGift will call the second patient on the list and so on, until the organ is placed.**

If the organ is accepted, LifeGift works with the donor hospital to transport the organ to the transplant center where the recipient will receive lifesaving surgery.

**The transplant team at that hospital decides whether or not that organ will be a good match for their patient** based on numerous factors, including the organ's condition, the patient's condition, potential transportation time for the organ to reach the transplant center, and other variables. **The hospital has one hour to either accept or refuse the organ.**

**13,300 PEOPLE** in Texas **ARE WAITING** for a lifesaving transplant.

Every day, **22 PEOPLE DIE WAITING** for a lifesaving transplant.



SKIN



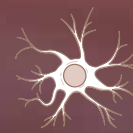
BONE



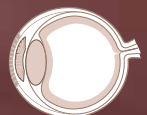
HEART VALVES &  
PERICARDIAL  
TISSUE



VEINS



NERVES



CORNEAS

Source: LifeGift and UNOS



**KLARA JELINKOVA, RICE UNIVERSITY VICE PRESIDENT FOR INFORMATION TECHNOLOGY AND CHIEF INFORMATION OFFICER, RECENTLY SAT DOWN WITH TEXAS MEDICAL CENTER EXECUTIVE VICE PRESIDENT AND CHIEF STRATEGY AND OPERATING OFFICER WILLIAM F. McKEON TO DISCUSS HOW A FOCUS ON INFORMATION TECHNOLOGY HELPS SUPPORT THE RICE MISSION.**

**Q | Can you tell us about your early years in the Czech Republic?**

**A |** I was born in Prague, Czech Republic and grew up before '89, when there was still such a thing as Iron Curtain. It was a different world. I came to the United States in '91, and I went to school at UW Madison.

My mom has a Ph.D. in mathematics and was one of the early woman pioneers in IT. Back then, all of the programming was on a Russian mainframe. My mom's work sparked my interest in computers and I learned to program when I was a kid. My first PC was a

Commodore 64. Learning these skills early became really handy later on.

**Q | Did your education lead you to technology?**

**A |** No, I ended up in IT accidentally. Having known programming already, a job at a software company was the best job I could get. So my mom's investment of her time paid off.

**Q | What brought you from Prague to Wisconsin?**

**A |** I started to work for Software Publishing Corporation (SPC).

I don't know if you remember the product called Harvard Graphics and Professional Write. Those were our best-known products. The company ultimately went out of business with the arrival of Microsoft Office as the dominant office suite.

**Q | What was your major?**

**A |** I had a dual major in Slavic language and economics.

**Q | And then what led you to Duke University?**

**A |** I put myself through college and

worked for the Division of Information Technology (DoIT) for UW Madison. There I held a number of positions. I worked on operating systems, network monitoring and system implementations.

I went to Duke first to run their systems and identity management infrastructure. The great thing about Duke was the integration between the university and the Medical Center. Shared infrastructure and common identity and access management were key to that. I became the assistant vice president of shared services



“People are becoming increasingly aware of the value distinctive education brings. They are by far more educated shoppers when it comes to education and where they send their kids. Places like Rice, with the commitment to undergraduate education, are really ideally positioned to differentiate themselves in this market.”

infrastructure and also spent two years as the chief information security officer.

**Q | What led you away from Duke to the University of Chicago?**

**A |** I took a CIO job at the University of Chicago. It was just a great opportunity. My husband is from Wisconsin, so we thought we wanted to move back to the Midwest, and then three winters later we realized we just weren't cut out for it anymore.

I came to Chicago after the university conducted an IT rationalization study by McKinsey. There was just a lot of change that had to happen. Chicago was also still on the mainframe for parts of its operations. That gave us the opportunity to leapfrog and go straight from mainframe to Workday as a cloud solution for HR and payroll.

**Q | What was it that intrigued you most about the opportunity to come to Rice?**

**A |** It was the opportunity to rethink IT in support of the institution. Being the first CIO, it was an opportunity to think about what the job should look like now. Our business has shifted a lot, and I thought it would be really interesting to see, if you were going to combine the two organizations together, how would you do it now.

When you inherit a big IT organization, you are usually really heavily invested on the infrastructure and administrative side. But as everything is going either into infrastructure as a service or software as a service, there is a lot of pressure on the CIOs to be closer to the business, supporting research, supporting education, supporting the medical field a little more directly. To me this was a great opportunity to just rethink what the job should be like. That is a little harder to do when you have an existing organization, an existing mandate.

I was also interested in how my experience both at Duke and at Chicago could help Rice in broadening collaboration with the TMC. There are a lot of opportunities for us to work more closely together.

**Q | The role of the CIO has changed greatly in the last ten years. How have expectations changed?**

**A |** There is much more focus on how CIOs add value. I don't mean to overstate the point, but you really get nearly zero points for running GL. That is assumed, it is the price of admission. The focus is on what more can you bring to the table, and on understanding the business more. I think a lot of the 'cool factor' of technology is gone. I think as a CIO, you have to be able to talk from the perspective of all of the other constituents and bring solutions forward, not just technology. In many ways, you need to know more about the business than they need to know about technology.

**Q | The CIO role is new to Rice University. How did you formulate your plans?**

**A |** Rice set up this position for success by going through an 18-month self-study. And I found that incredibly compelling because rather than bringing in an external consultant, Rice decided to do a self-study and invite people from Princeton and other peer institutions to give their thoughts on different aspects of the job. This created a shared vision. When I arrived, I started with that internal study as well as with more detailed background information on the different areas on what I was bringing together.

And some of it was obvious—for example: creating a single systems group, an identity and access management team and the role of a CISO. But as you know, the devil is in the details when you restructure. How do

you bring it together? Who actually does what? Our new organization has been in place since March.

**Q | So did you feel like people were appreciative of the speed with which you made those decisions?**

**A |** I think the staff definitely was, and the university has been—the entire time I have been here—very supportive. And I think people need clarity, so sometimes you want to get buy-in, but because of the self-assessment, there was enough buy-in here. I once joked that if people were happy with the way things were, I wouldn't be here. You don't go through a national search just to continue on the way you have been.

**Q | How have your expectations of the role aligned with reality?**

**A |** What I would say is that the job is what I thought it was going to be, and that's why I came to Rice. But added to that, I think Rice—and Houston and Texas in general—is just much friendlier also. As a city-to-city comparison to Chicago, it's a much friendlier place to be.

The one surprise was how very cosmopolitan and international Houston is. It is a great place to live.

**Q | What most excites you about the future?**

**A |** A few things. Rice is part of the Texas Medical Center, and I think technology could help further our collaboration. The TMC is probably the most successful medical conglomerate in America, and just imagining what more could be done. You have computation science, medical science, clinical science, clinical research, in the different institution in the TMC. The TMC provides a very good networking fabric and different venues where people can meet and exchange information. The potential

research collaborations are really exciting. Medical research is driving research areas in America today.

The second thing is the future of education, even though it might at times seem that MOOCs are going to take over the world, I actually think that places like Rice are in a great position. People are becoming increasingly aware of the value distinctive education brings. They are by far more educated shoppers when it comes to education and where they send their kids. Places like Rice, with the commitment to undergraduate education, are really ideally positioned to differentiate themselves in this market.

So for my job, I see this great trajectory in research and always improving collaboration in the TMC, and on the education side, kind of this differentiated story, and thinking about how Rice fits in—both in the digital space and the traditional on-premise learning. And how technology can enable that. I think that's pretty exciting.

**Q | Any closing thoughts?**

**A |** I would just repeat what I said earlier, which is that I am really excited for the opportunity to work with the TMC and be part of what started as an experiment here in Houston and has become the dominant medical center in the United States, and perhaps the world. ■

# Hacking for a Cure

*Baylor Global Initiatives reinterprets a hackathon to bring innovation and excitement to health care in low resource settings*

BY BRITNI N. RILEY



“I hope that we will stimulate innovation and also leave the weekend with two or three innovative, cost effective, culturally appropriate solutions that we can help develop and implement.”

— SHARMILA  
ANANDASABAPATHY, M.D.  
Director of Baylor Global Initiatives

Baylor Global Initiatives has taken a cue from the technology sect to solve some of the challenges facing global health care today. Industry experts were brought in from around the world to mentor a group of innovative students and professionals as they hacked to find solutions for remote medical care during the first ever Baylor College of Medicine Global Health Hackathon at the TMCx accelerator.

For the past year, Baylor Global Initiatives has been working to bring the excitement and innovation of a health care hackathon to the Texas Medical Center. Hackathons began as technology events aimed at hacking software over the course of a few days in a high-energy environment. Instead of hacking software, participants in the Global Health Hackathon were presented real-world challenges by experts in the field and given 24 hours to create viable solutions.

“A hackathon is concentrated energy and concentrated problem solving with a critical group of people

in one room for 24 hours,” said Sharmila Anandasabapathy, M.D., director of Baylor Global Initiatives.

The Global Health Hackathon came about when Anandasabapathy and her team at Baylor Global Initiatives decided to tackle challenges in global health with multidisciplinary teams of experts. The Hackathon was an opportunity to impact global health on a larger scale, by utilizing the multi-disciplinary talent in Houston and beyond to attack the multi-faceted problems with a fresh perspective.

The group of over 100 hackers had backgrounds in many different fields, including engineering, health sciences, business management, technology and public health.

The judges, presenters and mentors for the hackathon also had a wide variety of experience. Not only were they from just about every professional field—health care, business, engineering, education, public health, venture capitalists and more—they also had personal experience working in each of the cases presented. They came from all over the world to help the hackers find solutions for problems impacting their lines of work.

“There is an alchemy that comes about when you bring people with different backgrounds together with some constraints,” said Seth Cochran, founder of Operation Fistula and

mentor and judge of the Hackathon. “We want to solve this problem and here is what we have to do it. And some really interesting stuff can come out of that”

The hackers were presented with five cases from industry experts. The challenges included women’s health in rural Malawi, surgical needs in The Gambia, emergency response in an Ebola hot zone, gastrointestinal care and anesthesia in The Gambia and addressing health care needs in perhaps the most remote setting of all: space. The challenges are real and experts in the field need help finding practical solutions that can be readily implemented, cost effective and viable in areas without electricity and infrastructure.

All of the cases presented a multitude of challenges for the hackers. Nearly every aspect of health care in each location is different than health care in the United States—including the lack of electricity, proper training, roads and infrastructure and communication abilities. Because of the complexity of the challenges, the ideal team incorporated members from different fields and backgrounds.

“I am interested in ideas that are very, very different and out of the box,” said Cochran. “What happens when you have people who don’t have a lot of experience is that they come up



Left: Hackers had access to the 3-D Doodle machine to make their visions a reality.  
Right: The winning prototype, the Hackascope.



“There is an alchemy that comes about when you bring people with different backgrounds together with some constraints. We want to solve this problem and here is what we have to do it in and some really interesting stuff can come out of that.”

— SETH COCHRAN  
Founder of Operation Fistula

with something that already exists, but maybe want to use it in a way that hasn't been done before. And that is where a big impact can be made.”

Once the challenges were presented, hackers had a chance to present one-minute pitches to the group in the hope to form a team around their ideas. After the pitches, 18 teams were formed and had 24 hours to come up with solutions.

“After the pitches are given, the teams form organically,” said Anandasabapathy. “If people feel they can contribute to an idea, they are encouraged to join that team.”

Hackers were provided with a “hack shop” which included a 3-D Doodle machine and MarkerBots (3-D printing machines) and had the help of mentors through the night.

The presenters have been in the field working on the exact cases that were presented to the hackers. They know what has been tried in the area and why solutions will or will not work.

“The mentors walk around and work through the ideas with the hackers, telling them what works and what doesn't,” said Sarah Michel, senior project manager at Baylor Global Initiatives. “In a normal setting, you do not have access to this much expertise in one room and because of that, we hope to find a concept to turn into a prototype that can help global health on a larger scale.”

After having a full 24 hours to hack away, teams began presenting their ideas and solutions to a panel of judges.

The judges were looking for teams and ideas that could make an impact on public health, innovation, would be an environmental and cultural fit, and would have dissemination impact. Teams were also judged on their final pitch.

Of the 18 teams participating, there were three winners chosen. Healthy Mothers Malawi won third place and \$500 with their idea to encourage health

care workers to work with traditional healers and educate them on warning signs to promote healthy pregnancies. Red Zone came in second place. Their communications prototype for transmitting patient information from the red zone of an Ebola treatment area to the green zone won them \$1,000.

Team Hackascope won first place and the grand prize of \$1,500. The team—Andy Zhang, Anuj Marathe, Suganya Karunakaran, Phil Levine, Paul Hausknecht, and Vaidehi Thanawala—chose to find a solution for procedural care in The Gambia where an alarmingly high percentage of the population suffers from Hepatitis B and liver disease. Their prototype, the Hackascope, is a banding device used to stop patients from bleeding to death from esophageal varices. The team made the prototype for under \$60, it is easy to use and repair, portable and requires a computer or smart phone for charging.

“This opportunity really spoke to me because providing high-quality, low-cost care is a goal that we all have and it has been a dream of mine to be involved in that realm of health care,” said Phil Levine a gastroenterology fellow at Baylor College of Medicine and member of Hackascope.

In the end, the Hackathon was not intended to be a one-time event. The staff at Baylor Global Initiatives hope to continue working with the teams from the Hackathon and put their ideas to real use.

“I hope that we will stimulate innovation and also leave the weekend with two or three innovative, cost effective, culturally appropriate solutions that we can help develop and implement,” said Anandasabapathy. ■



Top: Mentor Seth Cochran (red cape) advises hackers on their pitch.  
Middle: Judges watch hackers make their final presentations.  
Bottom: The Hackascope team took first place.





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Left: Nikoletta Carayannopoulos, DO, Chief, Orthopaedic Trauma Surgery  
Center Left: Kevin Murphy, MD, MCh, FRCS, Hand Surgery, Division of Plastic Surgery  
Center Right: Vinod Panchbhavi, MD, FACS, Chief, Division of Foot and Ankle Surgery  
Right: Gregory McGowen, PT, Cert MDT, AIB Certified in Vestibular Rehabilitation, Rehabilitation Services

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

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# Combating Nuclear Radiation

*Researchers from UTMB have created a peptide to increase survival rates and heal wounds after nuclear exposure*

BY BRITNI N. RILEY

The University of Texas Medical Branch at Galveston (UTMB) has helped foster innovation, creativity and entrepreneurship through their Office of Technology Transfer. The main purpose of the department is to help innovators take the first step in building their own startups. A startup from this program is now on the verge of providing life-saving solutions for the entire world.

The startup company, Chrysalis, was founded by Darrell Carney, Ph.D., UTMB adjunct professor in biochemistry and molecular biology, through the UTMB Office of Technology Transfer in 1995. Chrysalis was originally started with the intent to create a peptide that would accelerate the healing of diabetic foot ulcers. In 2004, after the peptide they created, TP508, was proven to work, the company was sold. In 2012, the company was licensed back to the university and Carney began researching the effect this drug could have on combating nuclear radiation.

People around the world encounter nuclear radiation on a daily basis. It is naturally occurring and man-made. It is in the rocks and soil at your feet and in the X-ray machine at your doctor's office. In small amounts, nuclear radiation does not cause much noticeable damage to the body. In large amounts, it is life threatening.

While some possible scenarios in which individuals would be exposed to high levels of radiation are less common—such as nuclear warfare or an accident at any one of the country's nuclear power plants—cancer patients who are receiving radiation treatment are also at risk for long-term damage from exposure.

When the human body is exposed to any level of radiation, the cells in the body stop dividing and regenerating. When exposed to small doses, the body

has time to recover and begin tissue and cell repair. In the case of a nuclear explosion, depending on how far a patient is from the blast, life-threatening injuries and death are probable.

The National Institutes of Health began looking at how they could increase rates of survival after a nuclear explosion—accidental or intentional. Research showed many deaths were not from the initial impact, but rather from injuries and burns victims sustained that were not treated in the days following.

"If you look at nuclear explosions historically, a lot of deaths that occurred were from lower levels of radiation," Carney said. "You would think most deaths occurred in the immediate vicinity of the blast, but many were people who sustained injuries and burns from the blast."

A typical nuclear explosion can affect as far as 32 miles from the impact zone in every direction. The explosion causes a thermal cloud to form over the impacted area, and can reach temperatures of 20 million degrees Fahrenheit, with winds in excess of 600 miles per hour. Survivors of the initial blast will be left with severe injuries and exposure to deadly amounts of radiation. Radiation enters the body through the thyroid and attacks the gastrointestinal track, causing extreme vomiting and diarrhea.

The thrombin peptide TP508 is unique because it does synthetically what the body can normally do naturally. Thrombin molecules naturally cause blood to clot. When you cut yourself, a thrombus (blood clot) forms to prevent you from bleeding to death. In that blood clot, a fragment releases and activates the stem cells and other cells to begin tissue repair.

"The peptide we are working with just so happens to be in that part of the thrombin molecule that gets clipped



Research Assistant Stephanie Moya and Darrell Carney, UTMB adjunct professor in biochemistry and molecular biology and CEO of Chrysalis BioTherapeutics, Inc.

**PEOPLE AROUND THE WORLD ENCOUNTER  
NUCLEAR RADIATION—NATURALLY OCCURRING  
AND MAN-MADE—ON A DAILY BASIS.**

off and released to stimulate a natural healing response," Carney said.

The version of TP508 that combats nuclear radiation has been in clinical trials since 2012, and the results have proven to greatly increase survival rates after exposure to nuclear radiation. The first phase of trials tested the treatment of radiation exposure when paired with dermal injury, similar to injuries sustained after a nuclear blast. When researchers applied TP508 topically on the dermal wound, survival rates increased by 50 percent. Finally, when TP508 was injected systemically rather than topically, the results showed a 70 percent increase in survival.

Chrysalis and TP508 have been a great success story for the university and have contributed to the success of more startups in the Office of

Technology Transfer. When Chrysalis was first sold in 2004, the profit of the sale was given back to the university as an endowment and is used as a seed fund for startups that go through the office today.

"Anyone who is trying to form a company with us immediately wants to talk to Dr. Carney for entrepreneurial advice," said Sundeep Mattamamana, director of the Office of Technology Transfer. "The work he has done on our campus has created a true entrepreneurial environment and has helped many more people start something on their own." ■



**U.S. CONGRESSMAN KEVIN BRADY, A SENIOR MEMBER OF THE HOUSE WAYS AND MEANS COMMITTEE AND DEPUTY WHIP AND VICE CHAIRMAN OF THE JOINT ECONOMIC COMMITTEE, RECENTLY VISITED THE TEXAS MEDICAL CENTER TO HEAR FIRSTHAND FROM LOCAL LEADERS AND PHYSICIANS. BRADY MET WITH TMC NEWS TO DISCUSS ONE OF THE MOST PRESSING ISSUES ON HIS RADAR: MEDICARE.**

**Q | Tell us about your early days, and what lead you to this career path.**

**A |** I grew up in Rapid City, South Dakota. My family was very involved in the community and politics. A bit of a tragedy early on—my father took on a tough case for the local church and was threatened and unfortunately the man followed through, so he was killed in a courtroom shooting. I was 12. My mom raised five of us by herself; we have a remarkable mother—she just passed away. She taught us to be independent, to be optimistic, to give back to the community and to have faith in God. She was just really remarkable, very involved growing up, in school and sports—all of that. Same in college.

I chose chamber of commerce work for a profession. Which is this great job, because you are working

with the best community leaders—volunteers who are here to help small businesses build the right business climate, recruit in the community, recruit in the industry. For 18 years, I did that in Rapid City, South Dakota, and then in Beaumont, and then in The Woodlands area—I was a chamber exec for about 11½ years there. Toward the end of that, I was elected to the Texas legislature. Then when Jack Fields retired from Congress, I ran and won his seat.

I never expected to go into politics, never dreamed of being in Congress, and certainly didn't expect to be able to work my way up and be in a leadership role on the Ways and Means Committee. That's what has brought us here. For a number of years, my focus on Ways and Means was really on tax reform, as chairman of the trade subcommittee. Obviously trade is a big

driver of the Houston area. For the last two and a half years, I took over the Health Subcommittee for Ways and Means at, I think, a really critical time. One, the roll out of the ACA and all that goes with that. But more importantly, the chairman of the committee, Dave Camp, essentially said, 'Your number one priority is to help find a solution for how we pay our local doctors, Medicare, the sustainable growth ratio (SGR).'

**Q | Can you tell us a bit about your work on the Ways and Means Committee?**

**A |** The problem that has plagued us for 15 years was really becoming a looming crisis in health care. I had the opportunity to work with Republicans and Democrats in the House and Senate. Together with state, local and national physician groups, we came



“There is nothing bigger than Medicare—it is not the 800-pound gorilla, it is the 8,000-pound gorilla in our budget and delivery of health care. I think making strides and achieving progress in a bipartisan way can help build some confidence that Washington can help take on other big issues too. It is exciting. Health care is going through a dramatic change.”

together and we did find a solution. And it was a good, solid one. We worked with the speaker and other leaders to find a way to finance it. So earlier this year, the president signed it. It's important for two reasons—if there is any population that needs to see a doctor they know, and who knows them, it's our seniors in Medicare. Fewer and fewer doctors are able to see Medicare patients and that means terrible trends for the country, certainly for growing states like Texas and regions like Houston.

The importance of it may be three things. First, we are moving away from volume and how many procedures, to value and quality outcomes that are not measured by Washington, but measured by the physicians who practice, which I think is the right way to do it. Done gradually. Innovation is already occurring here at the medical center, and can ultimately be matched by that one- and two-person physician in rural Texas. You have got to bring everyone together in this country. It is the first significant reform of Medicare in some time and coupled with some other reforms we made to pay for it, will strengthen Medicare by almost \$3 trillion over the long term. It is not the final solution, but it is a huge first step.

We just celebrated the 50th anniversary of Medicare and it was worth celebrating. It is such an important program. More than 50 million Americans rely on it, and that will only grow. Financially, it is just not designed for the long haul—one, because health care costs continue to increase, and two, the demographics—more and more seniors, fewer workers. The math doesn't work. If we want to celebrate a second 50th birthday of Medicare, Republicans and Democrats are going to have to work together now to save it.

The first step, we succeeded on: fixing how we pay our doctors. The second step is improving the way we pay other health care providers in Medicare, from the testing, diagnosis and evaluation leading into the hospital, the inpatient care here, the outpatient care, and post-acute care—whether it is at the long-term acute health care facility or the school of nursing hospital facilities, or home health care. So we have already begun work on step two of health care reform, which is to address some pressing issues, like two midnight policies and the rack audits. In the bigger picture, trying to, as we have seen here at the medical center, align the incentives, get them right. Aligning them toward the patient, encouraging the innovation and saving quality care.

We have laid out a draft bill with what I call the 'demolition derby' of reimbursements between inpatient and outpatient care, as well as other bipartisan improvements that Republicans and Democrats on the Ways and Means Committee are working together on. Some of those include an idea on how we design indirect medical education reimbursement, per discharge from inpatient. More and more procedures are occurring outpatient. So how do we make sure that those who are teaching our future physicians have a consistent certainty of funding going forward?

Before I left for August, we laid out reform ideas on post-acute care, value-based purchasing and, we think, a much better approach than what CMS has proposed—it really rewards quality and excellence in the post-acute care setting. As a committee, Kenny Marchant from Texas introduced a bill to make sure that disproportionate share funding in states that didn't expand Medicaid are on a level playing field with those that did expand funding. We think that is very important for Texas, as well. What I'm hopeful for is that before Congress and this presidential election start to shut things down up there in Washington, that we can pull together a bipartisan package of hospital reforms and other improvements in health care that have been worked on for years, but have never gotten a chance because of the sustainable growth ratio. For those to see some life.

And then, step three to saving Medicare for the long-term is really creating smarter, more personalized care for seniors. Step three will really begin to take shape next year, following our hospitals and post-acute reforms. Two examples would be combining part A and B, creating an out-of-pocket cap for seniors, more co-insurance that gives them more certainty and rewards preventative behaviors on their part and engagement. Essentially, taking today what for seniors is the equivalent between part A, B, D and supplemental—the equivalent of buying five insurance policies for your car. We think you can simplify it, make it more understandable, smooth out the cost for seniors and make sure they never face catastrophic costs going forward.

The other part of step three will be more personalized Medicare. Some call it 'premium support,' but it is taking what we know has worked in Medicare Advantage and in the part D prescription drug program and giving seniors the option. They don't have to stay in traditional Medicare forever. But if they want to have Medicare more personalized for them and their family, going forward, give them that option.

Over time, if we do it right, it will help improve solvency in Medicare and make sure that we can give both quality care and affordability. We can do one or the other pretty easy. Doing them both is a trick.

Final point: How do we go about this? To save Medicare for the long-term, we can go with sort of the stale, old ideas—which is cost control out of Washington, more mandates out of health care, and a question of micro-managing every aspect of the experience—or we can look to fresher, more 21st century approaches, which mean more competition, more innovation, great freedoms to take on patient care, integrate and coordinate it, take on that risk and be rewarded for doing that. Given those choices, seeing what we know works here at the Texas Medical Center, innovation, competition, and freedom to treat and risk and coordinate works.

As we go forward, those are the sides that I hope we can get our lawmakers to go to. None of this is easy. Health care is complex. Most people believe, wrongly, that Congress won't take the necessary steps to fundamentally redesign and save Medicare for patients in the future. I am absolutely convinced we can. While we may have differences on issues like the Affordable Care Act and others, there is an awful lot of common ground going forward. Part of the reason I spend a lot of time with health care leaders in the Texas Medical Center is that the innovation you see here, the thoughtfulness, it is just a gold mine of knowledge and practice. The medical center and our organizations and leaders here are just so impressive.

**Q | You have been actively involved in addressing how physicians receive payment from Medicare. Can you talk about those efforts?**

**A |** My job as chairman of the Health Subcommittee was really to help bring lawmakers who had long interests in solving this problem together with physician groups—state, local and national—who wanted this solved. Of course, on the score-keeping side, making sure we could do all of this, fix this problem in a way we could afford Medicare, which, again, financially is just not designed for the long-term. It wasn't easy. It took a great deal of time, but we found that way forward. Part of it was it was really a 10-year transition. The first four years, we just called time-out on the drama—year-to-year potential 20 or 30 percent in cuts, it was embarrassing for everybody. So we called a time-out on that so everyone can stabilize in Medicare.

“One of my frustrations in the design of the Affordable Care Act is that when I come down here and listen to our health care leaders, virtually no one in Washington was asking their opinion on how you deliver better health care in America.”

After four years, we moved to really reimbursement based on quality measurements. Again, we spent a lot of time in our discussions making sure that CMS and Washington were not driving the quality of measurements that our local physicians are using, but our physicians are driving those standards and registries and other happenings. After year four, we really start transitioning into those quality missions. In year seven, eight and nine, we were encouraging physicians to join together and find ways to innovate. Try out new models where they may be paid on fee-for-service, but they are trying out models that work better on quality. Later in year seven, eight and nine, we really start rewarding based on quality and efficiency, and cost as well, but that is a harder target to hit. You need more time to do it. It is a major challenge for physicians in rural communities and small practices.

That is how that whole process of moving from volume to value will go. There are areas I want to keep improving. While the solution streamlined some of the penalty payments for physicians coming up in the next three years, we did not streamline the entire overhead that is coming out of Washington and landing on our physicians. I think we can do much better than what we have. The SGR is a good program, but it still needs improvement. I rely on Harris County Medical Society. It is very key in helping find a national solution as we went through the various segments of the SGR. For my office, they were very helpful in working through some of the sticking points. The final product reflects it.

**Q | You recently spent a day here visiting with Texas Medical Center leaders and physicians. What is the takeaway from your visit?**

**A |** One of my frustrations in the design of the Affordable Care Act is that when I come down here and listen to our health care leaders, virtually no one in Washington was asking their opinion on how you deliver better health care in America. I think that was a huge mistake, because we have every model in the world here. We have some of the brightest minds in the world here, and I think had those who designed that bill listened more carefully, frankly, they would have designed a better product that was working better and had better support.

Secondly, I really am impressed by [Texas Medical Center] President Robbins' idea to make this more of a national health policy source. Certain lawmakers



like me—there is so much we can learn here. Not that we apply every model here to every region in America, but they have experienced many of those challenges, so I think we can leap-frog into some of the better next models of health care delivery here. I think that is a smart move for everybody—the medical center and the country.

**Q | In an ideal world, what do you hope for the next few years?**

**A |** That Congress and this president or the next take significant steps to saving Medicare for the long term. We do that not only in a bipartisan way, but we stop clinging to the old school approach of 'Washington knows best, so let's mandate that solution.' We really focus on the innovation and competition, and really the freedom to practice and take that risk-and-reward approach. That's what I'm hopeful for in the next couple of years.

Step three of Medicare will be difficult, but here's the point: I think a lot of people here in America are discouraged by Washington, because they don't see us tackling the big issues. There is nothing bigger than Medicare—it is not the 800-pound gorilla, it is the 8,000-pound gorilla in our budget and delivery of health care. I think making strides and achieving progress in a bipartisan way can help build some confidence that Washington can help take on other big issues too. It is exciting. Health care is going through a dramatic change. In some ways, it is almost overwhelming, whether you are that physician or hospital. Part of it is that it is hard for them to incorporate all of these changes in a fairly short timetable. Again, the Texas Medical Center is a tremendous help because they are incorporating these changes more quickly and learning the lessons from it. Which helps us a lot. ■



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# Renewing Medicine

*At institutions across the Texas Medical Center, researchers are taking regenerative medicine research to the next level*

BY ALEX ORLANDO

Everything starts somewhere. An acorn is one of nature's many examples of pure potential, condensing the majesty of a towering oak tree into something that can rest comfortably in the palm of your hand. Seeds sprout into tomato plants; eggs crack open to reveal chicks; butterflies emerge dramatically from their cocoons and tadpoles transform into toads. For all living things, those origins can be traced back to stem cells, one of life's building blocks, thanks to their ability to develop into a multitude of different cell types during early life and development.

"For me, it's easier to view things as emanating from the most fundamental element, whether you're talking about organs or organisms," said Brian R. Davis, Ph.D., director of the Center for Stem Cell and Regenerative Medicine at The University of Texas Health Science Center at Houston (UTHealth) Medical School. "Everything arises from stem cells."

At institutions across the Texas Medical Center, scientists are tapping into the many possibilities presented by stem cells, leveraging their differential capacity to fuel major advances in regenerative medicine. For Davis, also C. Harold and Lorine G. Wallace Distinguished University Chair at UTHealth Medical School and a

“Because we have institutions that are so close to each other, each of which has significant strength in stem cell and regenerative medicine, anything we can do to strengthen collaboration and interaction is a huge win for all of us.”

— BRIAN R. DAVIS, PH.D.

*Director of the Center for Stem Cell and Regenerative Medicine at UTHealth Medical School*

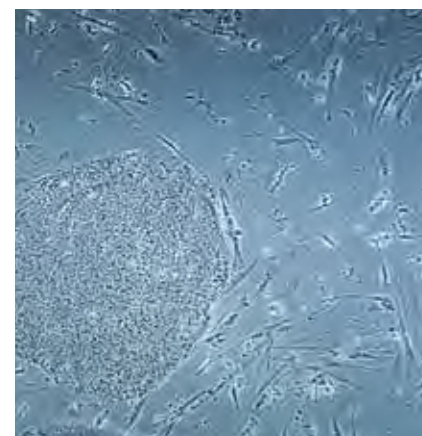
faculty member at The University of Texas Graduate School of Biomedical Sciences at Houston, his interest in regenerative medicine stems from that desire to start with the basics.

"My background is originally in theoretical physics, not in biology," he said. "My interest in physics was always trying to understand things at their most elemental level, whether it's how the Big Bang created the universe or how elementary particles form everything. In biology, from circulatory networks to organ systems, I began to realize the crucial role played by stem cells and their regenerative capacity."

While stem cells are a singular thread in the tapestry of living things, their ability to give rise to specialized cell types and renew themselves is a unique advantage. The use of embryonic stem cells—derived from embryos, as the name suggests—are rife with thorny ethical issues, but scientists have found a way to generate stem



*Davis examines induced pluripotent stem cells (iPSCs) from a healthy patient.*



cells from any individual in the comfort of their laboratories.

"Basically, we have the ability to take someone's skin or hair follicles and make a stem cell that, in principle, looks and behaves very similarly to embryonic stem cells," Davis said. "We can turn them, with the right recipe or protocol, into blood cells or lung cells right here in the laboratory. On this floor alone, we have people making neurons, cartilage, bone, muscle cells, lung cells and even blood cells."

In addition to exploring the creation of custom-made stem cells tailored for individual patients—known as induced pluripotent stem cells (iPSCs) and pioneered by Japanese Nobel Prize-winning researcher Shinya Yamanaka, M.D., Ph.D., in 2006—Davis is invested in repairing genetic mutations that arise in stem cells. He believes that both the mutant and corrected stem cells could provide scientists with new research methods for evaluating and treating disease.

"Over the last decade, there have

been tremendous advances in our ability to correct mutations in chromosomal DNA in a very site-specific way," Davis said. "In any given cell, we have six billion base pairs that give rise to DNA. Five to 10 years ago, we didn't have a way to get in and correct any abnormalities. Now, like a word processor, we can scan and find out exactly where the mutation is. Essentially, similar to using a computer mouse, we can go in and 'highlight' the area that is mutant or incorrect, and basically 'cut and replace' it with the correct sequence."

Setting out to cultivate innovative treatments for patients with hereditary diseases, Davis, along with UTHealth researchers Philipp Kramer, Ph.D., Jacquelin Bui-Griffith, Ph.D., and Ana M. Crane, Ph.D., found a way to repair, in stem cells, the genetic mutations responsible for cystic fibrosis—a life-threatening genetic disorder that clogs the lungs with mucus, leading to chronic bacterial infections that make it increasingly difficult for



*Jane Grande-Allen, Ph.D., Isabel C. Cameron Professor of Bioengineering at Rice University*





patients to breathe.

“In my lab, we combine that technology of making those patient-specific stem cells with these genetic corrections,” Davis said. “That way, we can essentially erase the defect at the source.”

By taking skin cells from patients presenting with cystic fibrosis, converting them to iPSCs, and finally correcting the defective protein in a gene called CFTR, Davis and his colleagues were able to demonstrate that the corrected cells functioned normally. Their findings appeared in *Stem Cell Reports*, the official journal of The International Society for Stem Cell Researchers.

“We hope to continue generating cells that can be used to deliver back to the patient, which aren’t rejected because they came from that individual—our immune system attacks foreign cells, but not our own cells,” Davis added. “We want to use that approach on a variety of diseases, so that we can actually deliver these cells therapeutically.”

At Rice University, scientists are capitalizing on the university’s distinct strength in bioengineering to propel regenerative medicine forward. For one rising bioengineer, her investment in regeneration was catalyzed by a particularly persuasive conversation.

“My interest in the regeneration of tissue for implantation purposes was probably first sparked by talking with Chuck Fraser,” said Jane Grande-Allen, Ph.D., Isabel C. Cameron Professor of Bioengineering at Rice University, referring to the chief of congenital heart surgery at Texas Children’s Hospital. “He knew that I had moved to town to be a young assistant professor in bioengineering—my focus area is heart valves. He asked me to meet and talk with him, and he laid out the clinical need to kick off heart valve research for regenerative medicine. I wasn’t originally interested in those areas, but after talking with him, I was completely sold on it.”

Applying engineering analysis techniques to understand and combat

heart valve disease, Grande-Allen has cultivated a sophisticated understanding of the way that different heart valve cells behave.

“Getting to know these valve cells, and trying to develop biomaterials that would help support them in a tissue engineering setting, actually translates well to a lot of other things—blood vessels for example,” she explained. “We’re studying how heart valve cells respond to mechanical stimulation using devices that we’ve built. We’re even applying some of those techniques to study lung cancer and intestinal disease.”

With a firm foundation in biomechanics, Grande-Allen’s research also focuses on using cells, organ cultures, and tissue engineering approaches to investigate valve disease from a more mechanical point of view.

“In our small intestinal models—as part of a large research grant that we received with Baylor and MD Anderson—we’re creating a framework

to study how intestinal cells become infected,” Grande-Allen said. “We don’t want to implant these [tissue models] in anybody—it’s more about studying disease. We’ll have these little tissue-engineered segments of small intestinal wall, complete with villi, and the epithelial cells in the right place.

“Our goal is, ultimately, to develop an in vitro intestinal model that can be reliably infected by viruses and bacteria—in the same way that these agents infect the human gut—so that we can send this model out to labs around the country,” she added. “That way, they can use it as a ‘lab-on-a-chip’ device and study the biology of infection themselves.”

That three-way partnership serves as a microcosm for the collaborative potential throughout the Texas Medical Center. One researcher at a collaborating institution, The University of Texas MD Anderson Cancer Center, is driving regeneration forward by studying the human body’s poster child for renewal—the liver.



*Michelle C. Barton, Ph.D., professor in the department of epigenetics and molecular carcinogenesis at MD Anderson Cancer Center*

“My work in regenerative medicine has mostly been in liver regeneration,” said Michelle C. Barton, Ph.D., professor in the Department of Epigenetics and Molecular Carcinogenesis at MD Anderson and a joint dean at The University of Texas Graduate School of Biomedical Sciences at Houston. “What fascinates me there is that the liver regenerates at all—it’s just so bizarre. The liver is the only full size organ that can completely regenerate itself when two thirds of it is cut away or injured. It’s a really cool system.”

Under the supervision of its namesake, the Barton Laboratory at MD Anderson studies basic mechanisms of gene expression during development, tissue generation, and throughout an individual’s experience with cancer. Much of their work zeroes in on a particular protein, known as p53, which is the most highly mutated gene in all human cancers.

“The big issue with cancers is that they can escape treatment, often due to a stem cell population that’s hidden away from normal therapeutics,” Barton explained. “In fact, a protein partner that we discovered for p53 is overexpressed in at least half a dozen human cancers and is of interest as a potential therapeutic target for cancers. It’s been a long journey, but what we’ve learned in liver regeneration and stem cells makes us hopeful.”

Performing more than 865 stem cell transplants for adults and children each year, MD Anderson’s Stem Cell Transplantation and Cellular Therapy Center treats a wide variety of cancers, hematologic diseases and autoimmune disorders. Across the street at Baylor College of Medicine, where scientists

are also utilizing stem cells for present day clinical applications, one researcher has her sights set on the future.

“Even when I was doing my Ph.D. thesis, I was interested in stem cell biology as a whole,” said Margaret “Peggy” Goodell, Ph.D., professor of pediatrics and molecular and human genetics at Baylor College of Medicine, where she is also director of the Stem Cells and Regenerative Medicine Center. “This was long before stem cells were popular to study, but I realized that they had enormous potential to generate many different cell types—I envisioned what that long-term potential could catalyze.”

Part of what brought Goodell to Baylor, she recalled, was the prospect of participating in their Center for Cell and Gene Therapy, where scientists work to translate novel cell and gene therapies from the laboratory to the clinic. As part of the overarching Center for Cell and Gene Therapy, Goodell Lab focuses its efforts on hematopoietic stem cells—those that form the blood. Goodell and her colleagues examine blood-based stem cells from a basic biology perspective, striving to understand how they continuously regenerate, while also addressing what happens when various diseases of the blood, from leukemia to lymphoma, emerge.

“Bone marrow transplantation, which is basically stem cell transplantation, is still used for a variety of diseases—mostly in treating blood cancers,” said Goodell. “We think if we understand the stem cell better, we can do a better job at improving bone marrow transplantation strategies, so that would help a lot of people.”

While many of the seeds for inter-institutional partnerships have already been sown, Goodell noted that even stronger collaborations are right below the surface, waiting to emerge.

“I’ve been talking to many of the investigators across the Texas Medical Center that are involved in stem cell

research for years about specific projects,” she said. “For others, I’ve either actively collaborated with them or at least interacted with them at some joint conferences. We all have a very collaborative outlook on it—I think the more that we work together and interact, the stronger we will be.”

“It’s so crucial to promote these kinds of interactions,” Davis said. “Because we have institutions that are so close to each other, each of which has significant strength in stem cell and regenerative medicine, anything we can do to strengthen collaboration and interaction is a huge win for all of us.”

That unification of disparate efforts falls in light with the Texas Medical Center’s vision for the future, where the foundations for a Regenerative Medicine Institute are currently being built. With a conference entitled, “Regenerative Medicine at the Texas Medical Center,” to be held on Oct. 15 at TMCx, in addition the two Houston-wide symposia on regenerative medicine that were led by The Gulf Coast Consortia in October 2014 and June 2015, the efforts to coalesce regenerative medicine expertise throughout the medical center have already taken hold. Hopefully, we won’t have to wait too long. ■



*Margaret “Peggy” Goodell, Ph.D., professor of pediatrics and molecular and human genetics at Baylor College of Medicine*





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# ACCOLADES



**JOANNA L. ALLAIRE, BSDH, MDH, RDH**, associate professor at UTHealth School of Dentistry, was named the 2015 Educator of the Year by the American Dental Hygienists Association (ADHA) and Crest Oral-B. Allaire joined the UTHealth faculty in 2007 after a long and varied career in private practice, including 14 years in a progressive periodontal practice. She graduated from the UTHealth School of Dentistry in 1978 with a certificate in dental hygiene and obtained her BSDH from the UTHealth School of Dentistry in 2007 and a Master of Dental Hygiene from the University of Tennessee Health Science Center in 2012.



**ANTONIOS MIKOS, PH.D.**, the Louis Calder professor of bioengineering, chemical and biomolecular engineering at Rice University, was honored with a lifetime achievement award by Tissue Engineering and Regenerative Medicine-Americas at the society's annual World Congress in Boston in September. His group at Rice's BioScience Research Collaborative specializes in the synthesis, processing and evaluation of new biomaterials for use as scaffolds for tissue engineering, as carriers for controlled drug delivery and as nonviral vectors for gene therapy.



**O.H. "BUD" FRAZIER, M.D.**, chief at the Center for Cardiac Support, director of Cardiovascular Surgery Research and co-director of the Cullen Cardiovascular Research Laboratories at Texas Heart Institute, was awarded the Distinguished Surgeon Award. Frazier is a pioneer in developing mechanical assist circulatory devices to treat severe heart failure and a leader in the fields of heart transplantation and circulatory support. He has performed more than 1,200 heart transplants and implanted more than 700 left ventricular assist devices (LVADs), more than any other surgeon in the world.



**BARBARA MURRAY, M.D.**, director of the Division of Infectious Diseases at The University of Texas Health Science Center at Houston (UTHealth) Medical School, was recognized by the Association of Rice Alumni at its Laureates Dinner May 16. Murray, former Houston Astros slugger Lance Berkman, and three other alumni were presented 2015 Distinguished Alumni Awards for their distinctive careers. Murray holds the J. Ralph Meadows Professorship in Internal Medicine at UTHealth and has had National Institutes of Health funding for more than 20 years.



**JOSEPH JANKOVIC, M.D.**, professor of neurology and Distinguished Chair in Movement Disorders and director of the Parkinson's Disease Center and Movement Disorders Clinic at Baylor, was elected president of the International Neurotoxin Association last month. Jankovic now leads the team that will organize TOXINS2017, an international conference on the topic. The INA is an international, not-for-profit, scientific society dedicated to advancing scientific research, supporting education and fostering understanding about botulinum and other toxins.



**CINDY POLLARD**, has been appointed the new associate vice president of marketing and communication for Texas Woman's University, the nation's largest university primarily for women. Pollard has more than 30 years of experience in the public relations and marketing/communications field, nearly half of which are in higher education. Most recently, Pollard served as principal in CP & Associates, a strategic communications consultancy for higher education clients, and as an "of-counsel" member of the KPS3 full-service marketing communications and digital agency in Reno, Nevada.



**CHESTER KOH, M.D.**, pediatric urologist and director of the Pediatric Robotic Surgery Program at Texas Children's Hospital and associate professor of urology (pediatric) at Baylor College of Medicine, was appointed to serve a three-year term on the Society for Pediatric Urology Executive Council. Koh, an internationally recognized expert in robotic surgery and minimally invasive surgery in children, will serve on the governing body of the main professional organization for pediatric urologists that oversees the Society's activities (annual meetings, education and research grant funding). His term will run from 2015 to 2018.



**DAVID E. WESSON, M.D.**, associate surgeon-in-chief at Texas Children's Hospital and professor of surgery and pediatrics at Baylor College of Medicine, has been awarded the Distinguished Surgeon Award by the Texas Children's Hospital. In its second year, this award honors leaders who forged a path of innovation in surgical excellence, research and education at Texas Children's and significantly contributed to the legacy of the hospital's Department of Surgery. Wesson is well known internationally for participating in some of the earliest definitive studies on the non-operative treatment of solid organ injuries in children.





BY

ARTHUR GARSON JR., M.D., MPH

Director of the Texas Medical Center Health Policy Institute

## OBAMACARE: A PRIMER FOR UPCOMING DEBATES >> PART 2:

**ACCESS TO CARE** | Now that the Supreme Court has decided and the election season begins to boil, it seems likely that the Affordable Care Act (ACA), known as “Obamacare,” will be one of the pervasive issues.

It is worthwhile to have an understanding of what Obamacare was supposed to do, what it has done to date, the problems remaining and what could be done now—the fix. Health policy issues can be organized by four pillars: insurance coverage, access, quality and cost. In the September issue of Pulse, I discussed insurance coverage. Today is access to health care. In the coming months, I will address quality and cost.

**The Problem** | Access is defined as seeing the right person, at the right place, at the right time. In Texas, 126 out of 254 counties (51 percent) are designated as Health Professions Shortage Areas. While there has been debate recently about the magnitude of the shortage of physicians and nurses; there is no doubt that there are insufficient numbers of physicians and nurses in rural areas. Much is made of the shortage of primary care physicians, and, certainly, this is a problem. However, as reported by the Association of American Medical Colleges (AAMC), there is an equal shortage of specialists.

**What Obamacare Did** | The ACA did little for access. Remember that the federal budget for health care is about \$920 billion per year—almost \$1 trillion. Therefore, the ACA “investment” of \$11 billion over five years for community health centers to serve those who continue to be uninsured sounds

like a lot, but is only one percent; the \$1.5 billion for the National Health Service Corps to provide physicians for underserved areas is barely a drop in the bucket, and the 10 percent primary care bonus for those practitioners paid by Medicare lasted only two years—and has now lapsed.

**The Continuing Problem** | Added to the current problems of access, certainly in rural areas, is the increased demand generated by adding 3.8 million Texans who are newly covered under the ACA. The country has had some experience with coverage expansion, as the state of Massachusetts markedly increased coverage in 2006, reducing the uninsured from 10 percent to four percent of the population. As a result, a new patient seeking a visit to her primary care physician had to wait for an average of 52 days (up from 33 days) and emergency department visits increased by 2.2 percent.

**The Fix** | The AAMC has predicted a shortage of more than 100,000 physicians over the next 10 years. In a recent report, the Institute of Medicine declared that the physician shortage was seriously overestimated by the AAMC, and that the best overall way to deal with a possible physician shortage or a nursing shortage may actually be more indirectly, as discussed below, rather than markedly increasing the number of professionals. Some of these

fixes are for the health systems, but it is worthwhile for patients and potential patients to understand them as patients are central to what the system must care for.

**A View of the Future: Integrated Health Systems Workforce** | In integrated health systems, practitioners (physicians, nurses, pharmacists and other workers), hospitals, clinics and other locations all work together to improve quality and reduce cost. In many parts of the country, integrated systems are common, whereas, for example in Houston, there are few truly integrated systems.

**Paying Doctors and Hospitals** | In the most advanced systems, a certain amount is paid to the system per patient per month (capitation.) Many systems that receive capitated payments pay doctors a salary. Some of the best integrated health systems delivering the best care in the United States (e.g. Mayo Clinic, Cleveland Clinic and Kaiser Permanente) salary their physicians, some receiving additional bonuses for quality. A conservative estimate is that if salaried, physicians could save 15 percent of health care costs—with the same or better quality outcomes. Most physicians today are paid fee-for-service which stimulates more services. Imagine if the physician time associated with the overutilization of 15 percent could be turned into productive time seeing new patients, the physician shortage would be markedly reduced. Every payment method has its good and bad points. With capitation, there is also a stimulus to reduce inappropriate hospital admissions, readmissions and emergency department visits.

**New Roles in the Team** | The ideal is to begin with the patient as the central member of the team and connect the patient and family with the professional members of the team (e.g., physicians, nurses, physician assistants, pharmacists) and with people who leverage the effectiveness of the professionals, such as community health workers, and other more medically oriented Grand-Aides, who help to keep people well and at home, and therefore reduce unnecessary hospital admissions, hospital readmissions and trips to the emergency department. Thus, an important outcome of a well-functioning team is task shifting: those with capabilities lower on the food chain have tasks shifted to them, liberating

time for those in the next rung up to do what they are uniquely capable of doing. With the addition of at least 3.8 million more insured people in Texas under Obamacare, most physician practices are likely to be sufficiently busy that they should welcome NPs. What if the team functioned well: patients took better care of themselves, Grand-Aides helped nurses handle colds and similar issues, and NPs gave most of the routine care that was really needed? Primary care physicians would then mainly be involved with complex patients who required advanced, innovative decision-making. Physicians could spend greater amounts of time with these patients and develop important relationships with them.

**Technology** | Integrated health systems will be best able to make use of the real promise of EHRs, although it may take another 10 years. Hopefully, by then, practitioners will have suggestions for care personalized to each patient that propose the highest-quality and lowest-cost alternatives for management. This is not “cook-book medicine,” but rather providing the most up-to-date information that leaves the choice to the physician. Communication between practitioners and patients must become simpler—with the use of email, text, telephone and video. We have numerous barriers, chief among them are the difficulties in the use of current EHRs and the needs for data from different practitioners, hospitals and health systems requiring them to talk with each other. This issue is currently being addressed by Health Information Exchanges such as Greater Houston HealthConnect, which is working well. Although it seems a long way off, EHRs should improve physician efficiency by at least five to 10 percent, again putting a dent in the need for more physicians.

What does this mean for you? Access could be improved by minting more physicians and nurses. Not only is this expensive, it is also not practical as the schools cannot produce them. Other approaches to improving access must be taken with different ways to pay physicians, task shifting and increased use of EHRs. The next time it takes three months to get in to see a physician, think of yourself as a team member, and push for some of these advances. ■

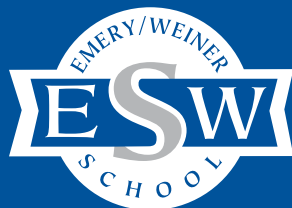


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## Researchers Find New Clue to Halting Leukemia Relapse

A protein domain once considered of little importance may be key to helping patients who are fighting acute myeloid leukemia (AML) avoid a relapse.

Researchers at Rice University, working with colleagues at Baylor College of Medicine and the University of Texas MD Anderson Cancer Center, have made a small molecule that could deliver a one-two punch to proteins that resist chemotherapy in patients with AML.

The protein, called STAT3, interferes with chemotherapy by halting the death of cancerous cells and allowing them to proliferate. The molecule discovered at Rice locates and then attacks a previously unknown binding site on STAT3, disrupting its disease-promoting effects.

The new work led by Rice chemist Zachary Ball, M.D., Baylor pediatrician Michele Redell, M.D., and MD Anderson oncologist David Tweardy, M.D., appears in the journal *Angewandte Chemie*.

The discovery and exploitation of this new drug target was made possible by an earlier discovery by Ball's lab. That finding enabled researchers to identify, on a molecular level, the target of action for drug molecules by using rhodium-based inorganic complexes that recognize specific folds in a protein chain and catalyze minute changes in those sequences, creating a "tag" for later analysis.

The STAT3 protein—it stands for "signal transducer and activator of transcription 3"—is a suspected factor in the relapse of nearly 40 percent of children with AML. The new proximity-driven rhodium(II) catalyst known as MM-206 finds and modifies an inhibitor-binding site on the protein's coiled coil—literally protein coils coiled around each other—and delivers the inhibitor, naphthalene sulfonamide, to the modified site.

"This is the confluence of two ideas we've been working on around what you can do with conjugates linked to rhodium," Ball said.

"We know that increased activity of STAT3 in AML and other cancers helps the cancer cells survive chemotherapy, so any new strategy we can develop to stop that process could mean real benefit for our patients," said Redell, who is also part of the leukemia and lymphoma teams at Texas Children's Hospital.

Ball said STAT3 has been a target for scientists trying to shut down cancer cells. "STAT fits in the broad category of what are called 'undruggable protein-protein interactions.' There's a large surface area with weak interactions for which we have typically failed to find good drugs," he said.

Previous research revolved around only one region of STAT3, its SH2 domain, with limited success. "There's no evidence people have tried to go after the coiled coil as a drug target," Ball said, though he noted one paper

suggested it might be worth a look. "But they didn't follow up on it."

"Our main advance, from a medicinal perspective, is that this compound also works in a mouse model," he said. "All the other compounds worked in cells, but in mice, they weren't potent enough or stable enough."

Follow-up studies should lead to improved versions of the complex, Ball said. "The discovery raises new questions about STAT3 biology and points the way to future anti-cancer approaches, including combination therapies of coiled-coil STAT3 inhibitors in tandem with other agents," he said.

Co-authors of the paper are Rice graduate students Matthew Minus and Farrukh Vohidov; Baylor College of Medicine postdoctoral associates Wei Liu and Xin Long, researchers Michael Krueger and Mikhail Kolosov, and Alexandra Stevens and Edward

Allan Sison, both assistant professors; and MD Anderson Assistant Professor Moses Kasembeli. Tweardy is division head of internal medicine and a professor of infectious diseases and molecular and cellular oncology at MD Anderson. Redell is an associate professor of pediatrics-oncology at Baylor. Ball is an associate professor of chemistry at Rice.

The National Institutes of Health, the Robert A. Welch Foundation, the National Science Foundation and the Virginia and L.E. Simmons Family Foundation supported the research. ■

—Mike Williams, Rice University



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MD Anderson Cancer Center  
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jessica.corkran@erdheim-chester.org  
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9 **Advances in Oncology: From Molecular Science to Personalized Care**  
Friday, 7:00 a.m. – 4:00 p.m.  
Brown Foundation Institute of Molecular Medicine  
1825 Pressler St.  
susmitha.gadde@memorialhermann.org  
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10 **Fourth Annual Global Health Education Symposium**  
Saturday, 8:00 a.m. – 5:30 p.m.  
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16-17 **19th Annual Interdisciplinary Conference on Supportive Care, Hospice and Palliative Medicine**  
Friday – Saturday, 7:15 a.m. – 4:30 p.m.  
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Robert C. Hickey Auditorium  
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Floor 11, R. Lee Clark Clinic  
egagneau@mdanderson.org  
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20 **ABCs of the FDA: How to Set Up a Preclinical Road Map**  
Tuesday, 4:00 p.m. – 6:30 p.m.  
TMCx  
2450 Holcombe Blvd., Suite X  
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23-24 **Optimizing Function in Patients with Head and Neck Cancer: The MD Anderson Cancer Center Approach**  
Friday – Saturday, 7:00 a.m. – 5:30 p.m.  
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1155 Pressler St.  
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