

TMC | PULSE

THE OFFICIAL NEWS OF THE TEXAS MEDICAL CENTER — VOL. 2 / NO. 8 — SEPTEMBER 2015

The Genomics Revolution

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*Is the code for medical breakthroughs
written in our DNA?*

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YEAR END INCENTIVES

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Explorers of the Heart

Since 1954, the Texas Children's Hospital Heart Center has blazed new trails in pediatric heart surgery. The center's founding surgeons reflect on 60 years of history.

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The Genomics Revolution

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The president of the Houston Texans recalls how a lifelong passion for sports landed him with one of the city's most beloved teams.



MD ANDERSON'S CAMP A.O.K. // p. 6

EACH YEAR IN MAGNOLIA, TEXAS, TEEN PATIENTS AT MD ANDERSON CHILDREN'S CANCER HOSPITAL TAKE UP RESIDENCE AT A FIVE-DAY OVERNIGHT SUMMER CAMP TO FORGE NEW FRIENDSHIPS AND MAKE UP FOR MISSED MILESTONES.

ON THE COVER: An autoradiograph (X-ray) sheet showing DNA sequences. The black bands represent the position of the four base pairs in the DNA molecule.
Credit: Colin Cuthbert/Getty Images

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Collaborating to Cure

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PRESIDENT'S PERSPECTIVE



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

Researchers have long imagined the potential of decoding DNA to unlock the mysteries of human disease and ultimately, create new treatments for those diseases. The field has already seen incredible progress since the mid 1970s, when Frederick Sanger developed early techniques for sequencing DNA, earning him a Nobel Prize. This paved the way for the eventual completion of the Human Genome Project, an international collaborative research project with the goal of mapping and understanding all of the genes in the human body to gain a comprehensive understanding of the structure, order and function of our genes.

It is one thing to study the human genome and learn about diseases, but to then also translate that knowledge and those findings into care and treatment—that is where the field of genomics is headed in the Texas Medical Center. Physicians and researchers here in the medical center continue to explore ways to use genomics to bring advanced diagnostic and potentially groundbreaking new therapies to the bedside.

As you will read in this issue of Pulse, our member institutions have the potential to transform the future of medicine by harnessing our DNA for diagnostics, therapies, and personalized care. This campus has a proven history in genomics: Baylor was responsible for technology that allowed for faster and cheaper mapping of an individual's genome, MD Anderson is working on groundbreaking research in the complicated field of cancer genetics, and Texas Children's Hospital is studying genetic factors in children with tumors while also setting up the infrastructure needed to fully integrate genomic testing into the clinical setting.

It is an exciting time for our city to be leading in medicine, and we are looking forward to welcoming, for the first time in the United States, the Human Genome Organization's (HUGO) annual Human Genome Meeting in 2016. The event will take place here in Houston, February 28-March 2, and will bring together experts from around the world to explore the latest strategies and technologies for utilizing genomics in diagnosis and treatment.

Beyond this, we are anticipating the establishment of the future Texas Medical Center Genomics Institute, an initiative born from a multi-institutional commitment to collaboration and built into our strategic plan. The Institute will draw upon this campus' foundation in clinical genomics, and aim to design solutions that will translate to patient care.

Robert C. Robbins

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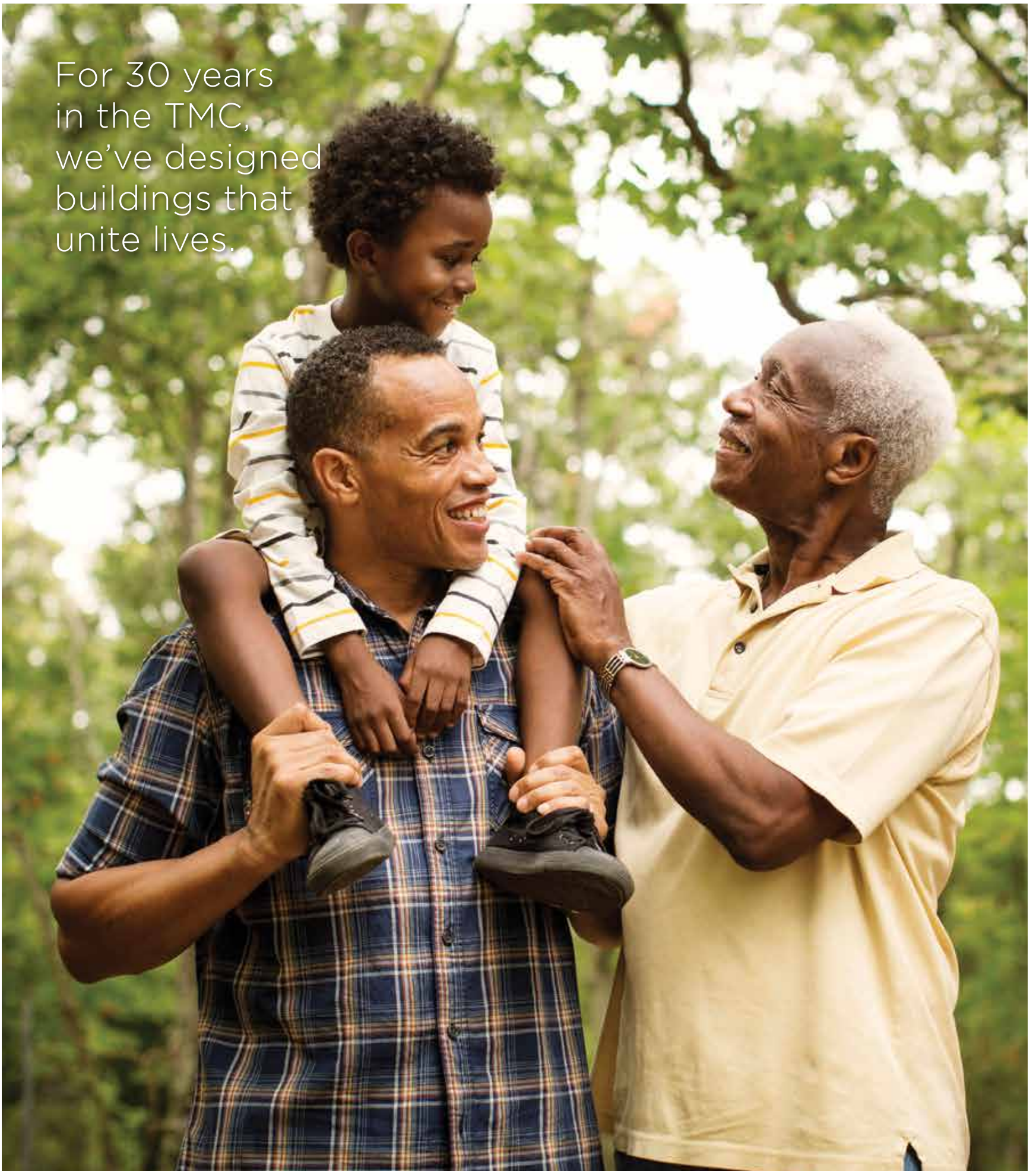
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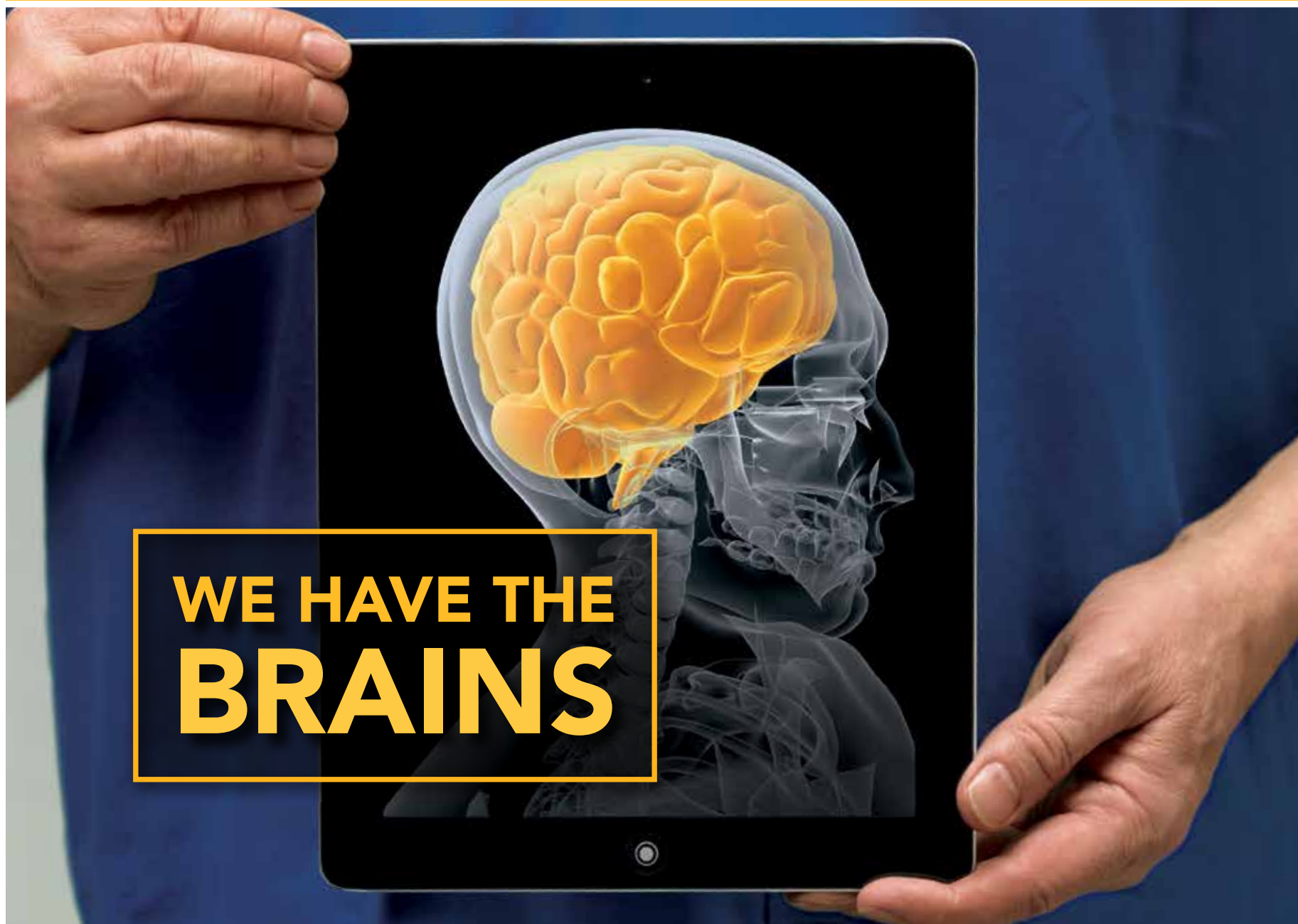
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If Eleanor isn't moving, she isn't happy. There's skiing, wakeboarding, rock climbing, and the more down to earth activities like biking to the store. When she needed surgery on her ankle, she was worried.

She came to UTMB Health and benefited from a multidisciplinary team of surgeons, doctors, nurses, and physical therapists who knew that Eleanor needed aggressive treatment to return to her active lifestyle. They kept her informed at every step. "I'm a Nurse Practitioner. I practice what I preach about staying active and healthy. When it came time for rehab, the people here made sure I stayed with the plan. You get out of it what you put in."

Today, Eleanor is back to her old tricks, which also happened to include kicking up her heels and dancing at a friend's wedding.

Whether it's working in ortho, neuro, or any aspect of the musculoskeletal system, UTMB has gifted clinicians. These are the doctors and surgeons who teach others their art, using the very latest equipment, technology and techniques.

It's about getting your life back. Your life. Whether that means gardening, hiking, fishing, playing guitar, typing on a keyboard, extreme sports or just lifting your grandkids, our team is ready to return you to the things you love to do.

If something isn't right, do what Eleanor did. **Take charge of your health and call us at 800-917-8906, or go to utmbhealth.com to work wonders for you.**



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.

*The University of Texas Medical Branch
Member, Texas Medical Center*



Working together to work wonders.



Pretty in Pink

MD Anderson Children's Cancer Hospital hosts an annual summer camp and prom night for teen patients and their siblings

BY ALEXANDRA BECKER

Every day, employees and volunteers at MD Anderson Children's Cancer Hospital wake up focused on their mission: Making Cancer History. But underlying their fight for a cure is another calling—one focused less on the disease itself and more on the patients within their hospital's walls.

"Our job is to help support these patients and their families through some of the worst times of their lives," said Lauren Shinn, program manager for the division of pediatrics at MD Anderson Children's Cancer Hospital. "I always think if I can make just one aspect of their whole treatment process a little bit better, then it's all worth it."

It's a charge the staff doesn't take lightly. In addition to coordinating celebrity appearances, an education and creative arts program, pet therapy visits, yoga classes and more, the hospital also offers annual off-site summer camps for patients as well as their siblings, an often overlooked group. This past August, a group of 48 teens were bused to a private campground outside Magnolia, Texas, to take part in Camp A.O.K.

Free to attendees through donations to the hospital and staffed by MD Anderson employees, volunteers, physicians, and nurses, A.O.K., which stands for Anderson's Older Kids, is a five-day overnight camp that offers patients ages 13 to 18 a break from the world of white coats and hospital rooms, without interrupting their treatment.

"Oftentimes, children with cancer aren't able to do normal things that their peers are able to do, like go to camps, go to school, even interact in public spaces like the mall because the treatment they receive makes them susceptible to getting sick," said Shinn. "By bringing MD Anderson to camp, we ensure their treatment stays on course, while allowing kids a chance to be kids."

Aside from the on-site health clinic and a very low counselor-to-camper ratio (35 staff to 48 campers), A.O.K. is structured just like any other camp. The teens stay in cabins with their counselors and engage in activities offered throughout the day, including canoeing, fishing, archery, horseback riding, tennis, field hockey, swimming, cooking, arts and crafts with MD Anderson's Children's Art Project, and more. Each teen is able to choose their daily schedule based on personal preferences, a deliberate move to help foster independence and autonomy, which is something a lot of teens with cancer miss experiencing due to the constraints of their treatment.

"Many of our patients spend such a large majority of their time in the hospital relying on staff or their parents," explained Michael Rytting, M.D., pediatric oncologist at MD Anderson Children's Cancer Hospital and one of

the camp physicians for over 20 years. "I think probably the most specific benefit of this camp is the independence and confidence we foster in these young patients."

In fact, one of the daily activities offered to the campers is something called "Expression Session," which focuses specifically on the dynamics of independence. Facilitated by a member of MD Anderson's Child Life team, this year's hour-long class, titled "Birds of a Feather," provided each camper the opportunity to craft a bird representative of him or herself. The birds were then placed into nests grouped by cabin, while the Child Life specialist explained how birds in the wild were not so different from the campers themselves.

"It's a really unique hands-on opportunity for the teens to grasp everything they're going through, and also what lies ahead," explained Shinn.

“Our job is to help support these patients and their families through some of the worst times of their lives. I always think if I can make just one aspect of their whole treatment process a little bit better, then it's all worth it.”

— LAUREN SHINN
Program Manager for the
Division of Pediatrics at
MD Anderson Children's
Cancer Hospital

POTS OF GOLD

During the wheel pottery class, campers worked with MD Anderson Children's Cancer Hospital Art Teacher Lisa Johnson Sitz to create special bowls on a potter's wheel. Adorned with an awareness ribbon and gold glaze, the pots will be exhibited at an event on September 29, from 11 a.m. to 2 p.m. at MD Anderson's The Park and then donated to members of the public in recognition of Childhood Cancer Awareness Month. For more information about MD Anderson Children's Cancer Hospital's September events for childhood cancer awareness, please contact kburton@mdanderson.org.



“Birds are there in the nest to support each other, just like our campers, but birds also have to go out on their own and leave their nest for the very first time. A lot of our campers are 18 and becoming adults, and so addressing their hopes and concerns with peers dealing with similar issues is very powerful.”

Shinn noted that for teens with cancer, the challenge of gaining independence is compounded by the fact that the experience of cancer itself can be extremely isolating.

“One of the reasons MD Anderson initiated these camps over thirty years

ago was to help create opportunities for our patients to interact with other kids who are going through the same thing. It provides them a chance to be around their peers who have cancer, and to be around brothers or sisters who have brothers and sisters who have cancer. Out here, they’re not the main person who has cancer, so they don’t feel so isolated or like everybody’s looking at them. Out here, everybody’s the same.”

“I’ve made a bunch of new friends, which is awesome,” said Alyssa, a 13-year-old first-time camper. “The fact that we all have something in common

is cool, too. I have a port and sometimes it shows, but I don’t have to be embarrassed here because everyone’s just kind of used to it.”

Nurturing friendships alongside independence, the entire camp convenes for meals at the dining hall, where many of the fresh fruits and vegetables served come from an on-site garden. In the evenings after dinner, the campers participate in a group activity, which ranges from off-site bowling to a casino night to a dive-in movie in which campers enjoy swimming while classics like “The Sandlot” are projected on a screen nearby.

Predictably, the most popular of the team activities is the annual prom. Held towards the end of the week, each camper selects his or her attire from a large selection of donated tuxes and dresses on the first day of camp, so the formalwear can be shipped off-site for alterations and dry cleaning before the big event. On the day of, scheduled afternoon sessions are substituted for priming and prepping—all made possible by generous donations and local volunteers. This year, stylists from area salons The Mane House, Hair by Jada, and Vintage Park Salon Boutique provided haircuts for the boys and up-dos for the girls. Kendra Scott’s Mobile Color Bar travelled on-site to make customized jewelry, and Home Depot set up a “man cave” so the boys could complete small woodworking projects while the girls finished their makeup and nails. At 6 p.m., after at least 30 minutes of selfies and pre-dance

“Going to prom is such an important milestone for teens. Thanks to the generosity of the community, we’ve really been able to make this a special event, and you can tell our patients love it.”

— LAUREN SHINN



group photos, the campers filed into buses headed for the Woodlands Resort and Conference Center. In a ballroom decked out with balloons, streamers, and a prop-filled photo booth, the teens enjoyed a gourmet Italian buffet before hitting the dance floor for hours on end.

“Going to prom is such an important milestone for teens,” said Shinn. “Thanks to the generosity of the community, we’ve really been able to make this a special event, and you can tell our patients love it. A lot of times, teens with cancer have body changes due to their treatment, so this is a time for them to not really think about how their body might be different, but rather a time to think about how their body is still beautiful and still important and how they can still feel special.”

Like camp, it’s also a time for the patients to enjoy just being the teens that they are, because in the end, they’re still just a group of kids—

albeit undeniably special ones. Alyssa is a case in point. After undergoing over 17 months of treatment for her disease only to find out she had relapsed, Alyssa chose to build a water well in Zimbabwe when the Make-A-Wish Foundation offered to fulfill her heart’s desire.

“For her to pick something so unique that would benefit so many people, it was truly selfless,” said Shinn. “Looking from the outside in, you might think that she would be angry or frustrated with the situation she’s in. But instead, she wanted to help other people who were struggling. It’s really inspiring.”

On this Thursday evening in mid-August, with 47 other equally inspiring teens crowded into a ballroom, none of their usual challenges mattered—not their cancer, not their courage, not their endlessly positive attitudes—that evening was about



“I’ve made a bunch of new friends, which is awesome. The fact that we all have something in common is cool, too.”

— ALYSSA
MD Anderson Children’s Cancer
Hospital Patient and
First-time Camper

dancing the Cupid Shuffle and the Cha Cha Slide, about sporting temporary tattoos and photo-booth props, about feeling handsome and beautiful and silly while making memories and friends they’d never forget. That evening was all about prom. ■



Explorers of the Heart

For 60 years, the Texas Children's Hospital Heart Center has been a pioneer in improving the lives of pediatric heart patients

BY SHEA CONNELLY



“The heart has always been a fascinating organ in the body. It is one of the only organs that constantly has a visible action to it. You can feel your heart beat here, if you put your hand under your left breast. It has enjoyed sort of mystical or even romantic significance.”

— DENTON A. COOLEY, M.D.
Founder of the Texas Heart Institute

The Texas Children's Hospital Heart Center is one of the most active pediatric heart programs in the United States, setting a record with 32 heart transplants in 2014. The Heart Center consistently treats the most complex heart issues, including atrial septal defects, ventricular septal defects, tetralogy of Fallot and transposition of the great arteries. Pioneered by legendary heart surgeon Denton A. Cooley, M.D., founder of Texas Heart Institute, the program is now led by Cooley's son-in-law, Charles D. Fraser, M.D.,

Texas Children's surgeon-in-chief and professor of surgery and pediatrics at Baylor College of Medicine. Over the past 60 years, the pediatric heart program has grown from a small group of physicians navigating unknown territory, to one of the leading pediatric heart programs in the world.

When Texas Children's Hospital opened its doors in 1954, the very idea of specializing in cardiology or heart surgery in adults was a new concept, let alone operating on the hearts of children and infants.

“When Dr. Cooley was getting started, there wasn’t even such a thing as a heart surgeon. He was a surgeon,” said Fraser. “He was a surgeon who operated on the stomach, the gallbladder, the thyroid, the lung, the esophagus and, oh, by the way, also the heart.”

From the beginning of Cooley’s medical training, however, the heart piqued his interest, in part because it was largely unexplored. For most of human history, the heart had been untouchable, considered too mysterious and sacred for man to interfere.

“When I was a medical student, it was an organ that was not to be operated upon,” said Cooley. “You could operate on any other organ in the body except for the heart, the ‘touch-me-not’ organ.”

Cooley was not deterred. The attitude held towards the heart felt more like a challenge than a roadblock. As an intern at Johns Hopkins in Baltimore, Maryland, he assisted Alfred Blalock, M.D., in the first “blue baby” operation, named for the cyanotic, or blue, skin discoloration caused by a congenital heart defect. Soon they were performing numerous blue baby procedures. Doctors around the world traveled to Johns Hopkins to learn how to perform the operation, known as the Blalock-Taussig Shunt, and Cooley got his first taste of making medical history.

Just a few years later, in 1951, Cooley arrived back in his hometown of Houston. He was ready to implement the advancements he had seen at Johns Hopkins and the Royal Brompton Hospital in London, and eager to blaze new trails in heart surgery. By 1954, he was facilitating the beginnings of pediatric heart surgery at Texas Children’s. In those days, the prognosis for infants with heart defects was grim and parents had few options.

“The type of patient they were taking on during that era—they were critically ill, fragile, disabled children who didn’t have any hope of meaningful survival,” said Fraser, who just recently celebrated his 20-year anniversary leading the Heart Center. “Texas Children’s was one of the birthplaces of pediatric cardiac care under this visionary pioneering. It was just them taking on the problems and figuring out ways to fix them.”

For Cooley and his colleagues at Texas Children’s, one of the first major advances came about when they were able to open up the heart and operate inside it. Initially, heart surgeons could only operate on the surface of the heart. The development of the heart-lung machine meant surgeons could divert the blood from the heart and lungs, open up the heart and operate on the inside.

“Very soon we had a rather simple device by comparison to other institutions, which made it possible for us to do a large quantity of open heart surgeries—10 times what was done by any other institution in the country,” said Cooley. “We had the opportunity with our pump oxygenator to be like explorers. I used to compare it to the space exploration going

IN 2014, THE TEXAS CHILDREN’S HOSPITAL HEART CENTER PERFORMED A RECORD 32 HEART TRANSPLANTS. OVER 60 YEARS, IT HAS GROWN INTO ONE OF THE MOST ACTIVE PEDIATRIC HEART PROGRAMS IN THE UNITED STATES.

on in Houston at that time. We were known for our exploration of the heart.”

Soon doctors were traveling great distances, packing into operating rooms by the dozen to observe the groundbreaking work being done at Texas Children’s.

“They got started at a time when no one thought you could even do this. You couldn’t even take these problems on,” said Fraser. “People were coming here from all over the world. They couldn’t believe this was actually happening.”

Despite its rapidly growing fame, the Texas Children’s program was not without critics. Detractors said it made no sense, it was too costly to spend so much effort and so many resources on a narrow focus.

“The learned people of the era thought the idea of having a machine to support the circulation so you could operate inside the heart was craziness,” said Fraser. “People get comfortable with what they do. But it turned out it was the right thing to do.”

Those early days of tackling problems no one had dared to touch were tremendously risky for the team at Texas Children’s. There was no precedent to follow when transplanting a heart in a child, for example. How would the transplanted heart respond to the anti-rejection drugs? What effect would the drugs have on the child’s future growth? What kind of quality of life would the child have?

“It had to begin somewhere and it took a certain amount of courage to undertake those operations for the first time,” said Cooley. “I put my reputation on the line.”

The gamble paid off. The program has now performed more than 27,000 cardiac operations since its inception. Building upon the discoveries made by Cooley and his early team, the Texas Children’s Heart Center continues to push boundaries. Since Fraser’s arrival in 1995, the center has focused on increasingly complex repair work, particularly in newborns and premature infants. Fraser himself performed the smallest arterial switch operation ever reported on a baby girl weighing less than two pounds.

A large part of the success of the Texas Children’s pediatric heart program, Fraser noted, is the growth and advancement of Texas Children’s Hospital as a whole. In 1954, when the hospital opened, the medical field had not even fully embraced the idea of specialty pediatric care. The hospital has now grown from just over 100 beds at its start to nearly 550, and performs between 900 and 950 pediatric heart operations per year.

“We have a tremendous breadth of expertise in pediatrics at Texas Children’s. Neonatology, nephrology, neurology, anesthesiology—all the things that go into the care of small children,” said Fraser. “The specialties have grown up around us, and I can’t ultimately be successful with a small baby without this whole focused interest on the children. That could hardly have been envisioned 60 years ago.”

Looking forward, Fraser said his team will continue to refine their techniques and focus on smaller and smaller children. Texas Children’s has now entered the realm of fetal surgery at the Texas Children’s Fetal Center, operating on fetuses inside their mothers. Fetal diagnostics have also essentially become commonplace at the hospital. Many of the patients cared for postnatally are diagnosed before even birth.

“In the realm of specific therapies, we’re working closely with Texas Heart Institute on forms of mechanical circulatory support,” said Fraser. “We’re working with them right now, as we speak, on a very small miniaturized heart pump to support the circulation of small children, much like what exists pretty routinely in adult medicine. That’s really exciting.”

Fraser and Cooley emphasized the importance of the partnership between Texas Children’s and Texas Heart Institute, which Cooley chartered in 1962. For nearly 45 years, the two institutions have worked closely as they achieved numerous successes.

“The history has been proof of concept in the larger patients and then it gradually gets refined in the smaller patients. That’s why our relationship between Texas Heart and Texas Children’s is so effective and so critical,” said Fraser. “We can’t do these things in isolation. We’re not going to recreate 60 years of history; we need to build on it. Essentially, in that heritage, we’re one and the same.”

Building on that legacy set in motion by Cooley and his colleagues 60 years ago is vital to the continued success of Texas Children’s Hospital and the Texas Heart Institute, as well as future advances in pediatric heart surgery and treatment. Cooley said he “could not have conceived” the level to which Texas Children’s has grown since 1954, and yet the growth continues.

“We got it started here, we’ve kept it going here and, working together, we can continue to move the field forward,” said Fraser. “This is a place that has had unparalleled history and has an unparalleled opportunity going forward.” ■



MARK S.F. CLARKE, PH.D., INTERIM ASSOCIATE PROVOST FOR FACULTY DEVELOPMENT AND FACULTY AFFAIRS AT THE UNIVERSITY OF HOUSTON, SAT DOWN WITH TEXAS MEDICAL CENTER EXECUTIVE VICE PRESIDENT AND CHIEF STRATEGY AND OPERATING OFFICER WILLIAM F. McKEON TO SHARE THE VISION BEHIND THE UNIVERSITY'S INNOVATION CENTER AND HOW COLLABORATION WITHIN THE TEXAS MEDICAL CENTER ENRICHES THE EXPERIENCES OF LOCAL INNOVATORS.

Q | Can you tell us about your formative years? What got you interested in science and innovation?

A | I am from a small village called Florencecourt, located about six miles away from the N. Ireland/Republic of Ireland border. My mother, a nurse, was from Ireland and my father was a City and Guilds master craftsman. They met in northern England when he was serving in the British Army and she was in training as a nurse. When she returned to N. Ireland in the early 1960s, he followed her home and set up a building contractor business. The first clue that I wanted to be a scientist was showing

a lot of interest in my mother's anatomy and physiology books, and a reputation for taking a screwdriver to anything mechanical just to see how it worked. Unfortunately for my parents, as a four year-old, putting various clocks, radios and small appliances back together was more of a challenge than taking them apart.

Q | Can you tell us about your career path and how you ended up in Houston?

A | I was lucky enough to attend a school in Ireland that has been in existence for over 400 years. Portora

Royal School in Enniskillen was founded in 1608 by royal charter and is one of only five royal schools in Ireland. It has a long academic tradition and provides an education that prepares its students primarily for entry into university (as well as rugby, cricket and rowing). One of the opportunities I had was career counseling in the medical professions, so when I met the local hospital pathologist, I was intrigued. He said that I could hang out in his lab at the hospital, and since I was about 14 or 15 at the time, it was a perfect way to get out of class. After visiting his lab, I became very interested in

medical laboratory sciences. In fact, his staff encouraged me to consider becoming a medical laboratory scientist (MLS) and suggested that I attend a new MLS degree program at the New University of Ulster. I applied and was accepted to the program. However, I decided that I needed to see more of the world and changed my mind about staying in Ireland. Instead, I was accepted as an undergraduate into a pharmacology program at Manchester Metropolitan University in northern England, ironically less than 10 miles away from where my father was born.

“Our innovation ecosystem, while being firmly anchored at UH, relies heavily on being able to draw on the wealth of expertise and experience resident at TMCx and across the Texas Medical Center.”

To be competitive for graduate school in the United Kingdom in the 1980s required that you had some previous undergraduate research. During the final year of my undergraduate degree, I was lucky enough to work with a tumor biologist at Manchester University Medical School, screening frozen tissue sections for novel tumor antigens using what was, at the time, a very new technology, namely monoclonal antibodies. This was my first taste of real research, helping with antigen injections, screening hybridoma cultures and learning immunohistochemistry. This led to an interview in the Clinical Research Labs at the Christie Hospital and Holt Radium Institute and Patterson Institute for Cancer Research in Manchester.

My Ph.D. supervisors were Drs. Shant Kumar and David West, both interested in tumor angiogenesis and drug targeting of tumor endothelial growth as a treatment for solid tumors. My dissertation research focused on using 2D electrophoresis to identify tumor-related endothelial cell surface antigens for subsequent production of monoclonal antibody targeting agents. Both Shant Kumar and Dave West collaborated with Dr. Judah Folkman in Boston in discovering tumor angiogenic factor. Hence, it was not surprising that I found myself turning down a staff position with ICI Pharmaceuticals in their drug targeting section to take a post-doc in Boston at Harvard Medical School in the department of cell biology and anatomy. I spent the next several years working with Dr. Paul McNeil on how fibroblast growth factor, a growth factor that stimulated blood vessel growth, was released in response to mechanical load from skeletal and cardiac muscle cells. My interest in muscle hypertrophy spilled over into muscle atrophy and I was recruited to NASA-Johnson

Space Center as a National Research Council (NRC) Fellow. I spent the next eight years in the Muscle Research Lab at NASA-JSC, first as an NRC Fellow and then working for the Division of Space Life Sciences as a senior staff scientist through the Universities Space Research Association. At NASA, I worked primarily on mechanical transduction, both in skeletal and cardiac muscle as well as bone.

While at NASA, I worked with a lot of colleagues in the Texas Medical Center, Baylor College of Medicine, Rice University and the University of Houston. One of my colleagues at NASA, Dr. Chuck Layne, had left to become a faculty member at the University of Houston. He and I had worked on various projects together, including the use of dynamic foot pressure as a muscle atrophy countermeasure during bed rest, unloading and space flight. We had built a custom boot that we used in a rat hind-limb model of muscle atrophy that showed promise, and started applying the same technology in spinal cord injured patients. Around that time, the department at the University of Houston that Chuck worked in—health and human performance—had just started a new Ph.D. program in kinesiology and was expanding its faculty ranks. I joined UH in 2002 as an associate professor and spent the next eight years building the Laboratory of Integrated Physiology, a multidisciplinary research facility, as its founding director. During that time, I also developed a novel ‘coupled’ model for studying bone growth using osteoblast and osteoclasts combined together in rotational culture to form large (6mm diameter) constructs called osteospheres. Osteospheres look like and behave like trabecular bone and are osteogenic in vivo. This led to the formation of a UH spin-off company called OsteoSphere, Inc., focused on generating a range of orthobiologics

for reconstructive bone applications. In 2012, the new VP for Research at UH, Dr. Roth Bose, asked me to join him as associate VP for technology transfer in the division of research. Although it took me out of the classroom and the lab, it was a unique opportunity for me to combine my research and academic background with my interest in new technology and entrepreneurship.

Q | What was the founding vision for the Innovation Center?

A | The University of Houston has one of the largest IP portfolios in the state of Texas. It also has one of the largest IP revenue streams of any public university in the U.S., ranking first in the nation for public universities without a medical school. When I started working for Roth Bose, he already had a plan to expand the technology innovation enterprise at UH. He wanted to invest our IP revenue stream in an aggressive program designed to accelerate UH created technologies to the marketplace while creating a sustainable innovation ecosystem that bolstered UH’s overall research enterprise by building strong relationships with our outside industrial and business partners. Part of that strategy was the expansion of our innovation resources at UH’s Energy Research Park, located adjacent to the main campus.

We began with a building housing the usual bullpen office space and shared administrative and meeting spaces common in the startup world. This was quickly followed by renovation of the second floor of that building into a ‘state-of-the-art’ collaborative space as a home for nascent startups emerging from our on-campus innovation programs. These programs combine UH faculty inventors, our burgeoning entrepreneurial student workforce and external business mentors to explore pathways to market for a range of UH inventions and technologies.

The Innovation Center at UH was built as a home for the ever-increasing number of technology startups founded by UH faculty and students. It has provided a geographical location to create ‘entrepreneurial density’ on campus, and a place where our external partners can interact with our faculty and students in building the next generation of high-tech companies that will be located in Houston and the region. The Innovation Center will be joined early next year by an adjacent building housing a 30,000 sq. ft. laboratory facility where these startup companies and our industry partners can work together to further develop our technologies. This has already started to bear fruit, with UH startup companies having received at least a dozen technology development grants from sources such as the NSF I-Corps program as well as DOE and NIH SBIR grant programs in the last year or so.

Q | Who do you typically find here utilizing this space?

A | Most of the space is utilized by UH faculty and student spin-off companies founded on UH-created technologies. However, as part of wanting to create a sustainable innovation ecosystem anchored at UH, we make the Innovation Center space available to other startup companies from the Houston area, startups that are not necessarily based on UH IP but have a relationship with UH—either through a faculty researcher or founders that are UH alumni. We have several entrepreneurs-in-residence, most notably Ken Jones, who also is the director of the Wolff Center for Entrepreneurship (WCE) at UH’s Business School, as well as Jim Kane, who has been involved with the WCE program for many years.

Their presence in the Innovation Center provides wonderful synergy and continuity for the UH startup companies that move in, especially those founded by WCE students who have now graduated and are taking UH technologies to the marketplace.

Q | Can you tell us about Red Labs?

A | Red Labs was an effort that I was completely unaware of when I first took the job in Technology Transfer. It was located in the UH Business School, catered nearly exclusively to business-oriented students, and was primarily focused on information technology, apps and the like—things that lent themselves to rapid prototyping, rapid integration and that could also be explored quickly within an academic setting and calendar. However, Red Labs was an excellent opportunity to take the expertise resident in our business faculty and leverage it beyond students in our academic business

programs. Red Labs does a wonderful job of providing an immersive, entrepreneurial experience for students outside of the business school who may never have thought of technology transfer as a career option or dreamed of creating a new business.

UH's recent designation and funding as an NSF I-Corps Center has provided additional opportunities for both the nine-week Red Labs accelerator program and the academic year-long WCE program to extend its reach into our STEM colleges. As part of the UH I-Corps Center program, we recruit STEM-qualified students to be part of an academic experience that involves both Red Labs and WCE in delivering innovation and entrepreneurial curriculum based on the 'lean startup model' of technology transition. These STEM students work with very nascent technologies, faculty innovators, Red Labs and WCE faculty, along with external mentors to explore the market potential

“ **Innovation and entrepreneurship are central to the University of Houston's long-term strategic plan. [...] UH has set in motion a variety of internal programs designed to promote, foster and reward innovation on campus, while taking steps to educate and develop its own entrepreneurial workforce drawn from UH faculty and students.** ”

of new technologies and processes. Our goal is to create the next generation of innovators and entrepreneurs who not only understand the basic science behind these technologies but also have the fundamental knowledge and exposure to business concepts to start thinking about an entrepreneurial career. These students receive funding from the I-Corps Center to explore these opportunities while the UH innovation ecosystem and the wider community reaps the benefits of creating

the next generation of 'entrepreneurial leads' right here in Houston.

Q | How does this program interface with TMCx and the medical center?

A | Our innovation ecosystem, while being firmly anchored at UH, relies heavily on being able to draw on the wealth of expertise and experience resident at TMCx and across the Texas Medical Center. While UH has an IP portfolio that covers the whole waterfront in energy, advanced materials, medical devices, pharmaceuticals, software, etc., it still needs partners to appropriately test and then transition those technologies to the market place. UH Red Labs has partnered with Rice University's OwlSpark to create a unique 'first of its kind' program combining two university technology accelerators. This program delivers some of its curriculum at TMCx,

*The University of Houston
Innovation Center*



exposing both UH and Rice students to a health care-centric innovation approach unique in the region during the now annual Bayou Showcase event. In the case of health care technologies created at UH, TMC provides a wealth of opportunities for our faculty and students to work with colleagues and mentors that are experts in the medical and health care fields. Understanding the regulatory landscape is one of those areas where the expertise housed in the TMCx will be essential for health care-based UH startups to achieve that market transition.

Q | Can you speak a bit to the collaboration across the Texas Medical Center around innovation?

A | There are a number of exciting collaborations going on in the TMC based on technologies developed at UH. These include clinical testing of various mind-machine interfaces that allow spinal cord injured patients to walk again using exoskeletons or amputees to control prosthetic limbs controlled only by their brain waves. UH scientists and their TMC colleagues have also developed advanced tracking technologies to maximize the most efficient use of surgical suites and 'smart' trochars designed to provide better patient outcomes during laparoscopic surgery. There is a new cancer drug, Phosphorin, presently in phase I clinical trials in the TMC. There are at least two other new cancer immunotherapy treatments developed at UH that are currently in animal or human testing in the TMC. All of these illustrate the value of being able to have faculty develop fundamental breakthroughs in UH laboratories while having the colleagues, clinical expertise and facilities at the TMC to test and refine those technologies to bring them to market as quickly as possible.

Q | Can you share the vision for the next five years, relative to innovation?

A | Innovation and entrepreneurship are central to the University of Houston's long-term strategic plan. Creating an innovation and entrepreneurial ecosystem that is anchored at UH but firmly embedded in the larger Houston and regional ecosystem provides unique opportunities for our faculty and students, expands the

research base of the university, while also helping UH to drive the economic prosperity of the city and region which we serve. UH has set in motion a variety of internal programs designed to promote, foster and reward innovation on campus, while taking steps to educate and develop its own entrepreneurial workforce, drawn from UH faculty and students. These programs not only help accelerate the transition of technologies to the market by UH startups and spin-offs, but in the future will also help populate and drive the regional innovation ecosystem through the next generation of 'entrepreneurial leads' created by these programs. Additional resources include access to capital for these companies through strategic partnerships with several early-stage investor groups, such as Fannin Innovation, Houston Health Ventures and our newest partner, the Texas Collegiate Regional Center, who will not only invest in UH technologies but will also build a new technology innovation facility at UH-ERP for additional startup companies. The UH Innovation Center and associated infrastructure at UH-ERP is fast becoming an epicenter for technology innovation and entrepreneurship within a much larger 'networked' ecosystem that includes TMCx and our greater Houston partners. The mission of a Research One University is not only to create new knowledge and educate the next generation of scholars, but also to combine its cutting edge research programs and human capital to create novel technologies and processes that are of benefit to all mankind. By providing a geographical location at UH ERP that fosters 'entrepreneurial density' and promotes the type of collaborative 'collisions' needed to drive true innovation, the University of Houston will continue not only to serve the people, city and region as an engine of economic prosperity, but also truly make UH 'the house that innovation built.' ■



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THE GENOMICS REVOLUTION

THROUGHOUT THE TEXAS MEDICAL CENTER, SCIENTISTS ARE
TURNING TO DNA FOR ANSWERS TO MEDICINE'S TOUGHEST QUESTIONS.

BY ALEXANDRA BECKER

First, there was Mendel and his peas. In the century-and-a-half that followed, matched pairs of chromosomes were identified, A's and T's and G's and C's were coupled off, X-ray crystallography techniques exposed the double helix structure of DNA, and the code of life was cracked wide open.

It was, of course, the Human Genome Project—the international, multi-billion dollar endeavor in which thousands of researchers spent over a decade identifying and mapping the complete set of nucleic acid sequences encoded within the DNA of humans—that ultimately catalyzed all of these scientific breakthroughs into something that could be translated into the world of health care. Today, just 12 years after its completion, some of the great minds of genomics research are bringing that science into clinics throughout the Texas Medical Center.

“Back in the 1980s, we knew that there were genetic causes for important human conditions, and we recognized the potential for understanding genetics and genes to really revolutionize the way we tackled therapy and diagnostics and prognostics, but we didn't have the genome, and the technology to get it wasn't there yet,” explained Richard Gibbs, Ph.D., director of the Human Genome Sequencing Center at Baylor College of Medicine. “Nevertheless, the visionary quest was launched to sequence the human genome so that we would have this foundation to do all of it—whatever ‘it’ turned out to be. It was a big breakthrough upon completion, and the question immediately became, ‘How do we push the genome into medicine?’ because impacting health is really what it's all about.”

The first genome cost around \$3 billion, but by 2009, advances had reduced the cost

of mapping an individual's genome to less than \$50,000. Researchers then turned to straightforward problems—diagnoses that, based on family history or other hereditary indicators, pointed towards a single genetic cause. Pediatric diseases quickly emerged as one of the most promising fields for genetic application because many of the disorders are inherited and triggered by the mutation of a single gene. The idea was to map the genome of the patient, and often his or her parents as well, to pinpoint what specific gene was missing or modified and how its expression was inherited.

“Baylor already had such a strong history of studying single-gene diseases, and we were determined to move this forward, so we worked on refining the tests,” said Gibbs. “We were able to simplify the analyses and developed some clever techniques in the lab that pulled out the genes, which are only one percent of DNA anyway, with special hybridization tools.”

Known as whole exome sequencing,

the abbreviated assay dropped the price to \$2,000 per genome. Now, Baylor routinely evaluates children with uninterpreted disorders, often providing answers where before, there were none. For individuals like Kristin Phillips, this kind of information is invaluable.

Kristin's son, Jacob, was born in May 2009, seemingly healthy as could be. For the first year of his life, he was a cheerful and active baby, reaching all of his developmental milestones effortlessly until he came down with a common virus at 13 months old, during which time he spiked a 105-degree fever and suffered a small seizure.

“After Jacob got sick, he wasn't the same,” said Phillips. “He was suddenly very colicky and fussy, and his motor skills began deteriorating drastically—within two months, he was falling over on his face and could not longer bear weight on his legs.”

Phillips and her husband rushed their son to Texas Children's Hospital, where they ran

“Without the diagnosis, there would have been no hope, no chance for his survival. At least now, through our research, there's that possibility.”

— KRISTIN PHILLIPS

*Mother of Jacob,
A Texas Children's Hospital and
Baylor College of Medicine Patient*



(Credit: Robbyn Dodd)

exhaustive state-of-the-art testing: CTs, MRIs, lumbar punctures and repeated lab workups that perpetually came back negative. For over three years they tried to identify the cause of his developmental regression, while Jacob's condition worsened. Despite brief misdiagnoses, visits with specialists from coast to coast and multiple lifestyle changes, nobody could explain what had happened. Then, in 2013, a genetic counselor at Baylor called to tell Phillips about the breakthroughs in whole exome sequencing. Jacob, she said, was a perfect candidate.

By August of that year, the Phillips family finally had a clear diagnosis: Jacob was suffering from an extremely rare genetic disorder called infantile neuroaxonal dystrophy, a neurodegenerative disease caused by a mutation in the PLA2G6 gene. Through impaired function of necessary enzymes, the mutation causes progressive neurodegeneration, explaining Jacob's lapsed motor skills and reduced mobility. The condition is so rare that in 2013, Jacob was only the 10th child in the U.S. to have been diagnosed with the disease. His case is also unique—as a rule, both parents must be carriers for the mutation to be passed on to the child, but in Jacob's case, only his mother tested positive for the recessive mutation. Geneticists believe the gene somehow mutated independently or was double-copied from her chromosome. Unfortunately, there is no known cure for the disorder, which, like other neurodegenerative diseases such as Parkinson's or Alzheimer's, continues to advance as time passes.

Jacob is now six years old and in hospice care—he is 95 percent blind, nonverbal and has lost all motor skills. Still, his parents remain hopeful. Since his diagnosis in 2013, they have raised enough funds to fully support two different research projects for the disease, one of which is exclusively focused on gene therapy, a promising new technique that harnesses genes to treat genetic disorders. While there is no guarantee that either will produce a



“We have this global mission and vision that ultimately, every person who has any health issue should have a genome sequence as part of their work-up, just as they would have an X-ray or metabolite test.”

— RICHARD GIBBS, PH.D.

Director of the Human Genome Sequencing Center at Baylor College of Medicine

treatment or cure, the value of the diagnosis itself cannot be underestimated.

“Before the diagnosis, we thought it was everything under the sun,” said Phillips. “For so long we believed his condition had been directly caused by the virus, and although we suspect that may have been an environmental trigger for the disorder, at least now we know what we’re working with. We know what to expect and how to manage his pain, and we’re able to move forward as far as the research goes. Without the diagnosis, there would have been no hope, no

chance for his survival. At least now, through our research, there’s that possibility.”

“If you are a parent or a family in that situation, the impact of a diagnosis is huge,” said Gibbs. “When you are able to resolve this down to a genetic cause, you provide prediction, you provide a peer group, and you accentuate the pathway to therapeutics, which is the most active area of research right now. You can’t underestimate the value of diagnostics and prognostics. We’ve got to understand all the basic nuts and bolts before we can fix what’s broken.”

Nowhere is the value of collecting and understanding data—the basics of how the genes actually function—potentially more significant than in the field of cancer research. At its core, genetic diagnostics winnows down to basic discovery and understanding. A child who has a single gene defect indicates the function of that gene—if there is a mutation in the gene, the protein the gene codes for is altered or missing, and those effects tell scientists what the protein normally does. That’s genomics 101, and in cancer cells the same comparison can be made between cancer tissue and non-cancerous normal tissue.

The genomics laboratory at Baylor College of Medicine has been at the forefront of designing cutting-edge technology for quicker, more accurate, and less expensive DNA sequencing.



“One of our primary goals for the study was to set up the logistics and infrastructure to perform clinical sequencing—to take it from a research tool to something that we can actually do for our patients.”

— WILL PARSONS, M.D.

*Co-Director of the Cancer Genetics and Genomics Program
at Texas Children's Cancer and Hematology Centers*

By contrasting an individual's cancer cells with one of his or her normal cells, the changes that resulted in the malignancy become apparent. The simplicity of it is as elegant as the biology itself, but, as with most science, it also has the potential to be misleading—especially when you move towards developing therapeutics to confront the mutations.

Designing cancer treatments based on genomic evaluations is exceedingly difficult for many reasons, perhaps most of all the inherent heterogeneity of the disease, which in the simplest terms describes the complexity of the composition of cancerous tissue.

“There is a lot of intricacy in cancer cells and the process of malignancy,” explained Andrew Futreal, Ph.D., Chair Ad Interim in the department of genomic medicine at The University of Texas MD Anderson Cancer Center. Notably, MD Anderson was recently named one of two new Genome Characterization Centers funded through the National Cancer Institute. “The biggest challenge in finding clinically useful information via genomic data is comprehending heterogeneity. Not only are tumors heterogeneous from one patient to another, but there is also intra-tumor heterogeneity, wherein the same tumor accumulates different kinds of mutations over time.”

Futreal, who is known in the world of cancer research for identifying the BRCA1 and BRCA2 breast/ovarian cancer susceptibility genes, is working to mine the research by integrating datasets from patient populations and then running analyses across time to identify genomic determinants of different variables, including response, resistance, toxicity and survival. Working closely with MD Anderson's Molecular Diagnostics Laboratory and the Institute for Personalized Cancer Therapy, the hope is to move his findings into the clinic to advance general therapeutics and precision oncology therapies, an approach that emphasizes the uniqueness of an individual's disease based on his or her genome and is considered by many to be the holy grail of clinical genomics.

The key is acquiring plenty of data, which, surprisingly, may not be the easy part of the equation.

“Clinical records are famously difficult to get into research databases. Some of this is for good reason, because people don't want their health records shared indiscriminately,” said Gibbs. “But even if you have a situation where everyone is on board for sharing, we still run into challenges because there is so much variation in the way clinical data is collected and measured. Everyone wants to see clinical records become more harmonized and standardized, but of course the priority is physician care, so a scientist's version of how data should be aggregated isn't going to come before that.”

Nevertheless, the move toward collecting and analyzing troves of genetic data for patient care purposes is becoming more and more prevalent in programs throughout the Texas Medical Center. At Texas Children's Hospital, a research study called BASIC3 (Baylor Advancing Sequencing in Childhood Cancer Care) is investigating the utility of tumor and germline (familial) whole exome sequencing for children with newly diagnosed solid tumors. As the only pediatric cancer project funded by the National Human Genome Research Institute's Clinical Sequencing Exploratory Research program, the study is unique in that it is not only examining the results of the clinical testing, but also analyzing the process of gathering and

disseminating genomic data to patients and their primary oncologists.

“One of our primary goals for the study was to set up the logistics and infrastructure to perform clinical sequencing—to take it from a research tool to something that we can actually do for our patients,” said Will Parsons, M.D., co-director of the Cancer Genetics and Genomics Program at Texas Children's Cancer and Hematology Centers and co-principal investigator of the BASIC3 study. “This includes everything from how we're going to obtain informed consent from families and explain the risks and benefits of genomic testing, to how to explain the test results to oncologists, patients and families, to how to write genomic test reports—all the practical steps, from start to finish, of performing sequencing as a clinical test.”

In addition to also looking at the utility of these tests in the clinical setting and how the information can be applied to both diagnostics and therapeutics for patients and their families, the study has engaged a team of ethicists and social scientists to work with the oncologists, parents and patients to evaluate their experience and preferences for the testing process.

“Both the oncologists and families are providing feedback regarding important issues related to genomic testing, such as how we're explaining the results to them, what kind of things they want to learn and whether or not they are bothered by any of the other types of results one can get when doing this scale of testing,” said Parsons. “Both groups are longitudinally surveyed and interviewed so that we can gain a better understanding of how we can best interact with our patients and their families and provide the most useful information possible.”

Ultimately, studies like these allow institutions to begin initiating prospective clinical trials using these genomic tests, a necessary next step towards evaluating the



THE HUMAN GENOME PROJECT
WAS LAUNCHED IN 1990
— and took —
THIRTEEN YEARS
— to complete. It is the —
WORLD'S LARGEST
COLLABORATIVE BIOLOGICAL PROJECT
— to date. —

impact of personalized medicine approaches and developing therapeutics.

Unlike single-gene pediatric disorders and cancer, however, the argument for genetic testing for adult familial diseases (think cardiovascular, neurodegenerative or metabolic) has yet to catch on in the clinical world. The fact that these diseases run in families indicates that there is a clear genetic component, but because the majority of these conditions are caused by something more complex than a single-gene mutation, the challenge is determining all the genetic risk factors and other causative elements that contribute to these “traits,” or put more appropriately, predispositions for developing the conditions.

“We’re kind of at a threshold moment right now,” said Gibbs. “If you look at the value of a genomic test for a particular class of adult disorders at this time, one could argue that its value and immediate clinical impact is minimal. But, if you sequence the whole person and the whole family and you add up the value you’d get for examining any potential adult conditions, plus the value you’d get for prediction of any possible childhood problems, then in aggregate you could easily justify the test.”

The problem, explained Gibbs, is that the structure of medical care is currently centered on acute treatment rather than evaluation of whole family health as a predictor for disease. Nevertheless, he believes the universal benefit of genetic data will become apparent soon enough.

“Through this data, we’re understanding targets better, we’re understanding genetic processes, genetic chemistry and the biology better, and we’re understanding what to look for and what to test for when you screen drug compounds,” said Gibbs. “We have this global mission and vision that ultimately, every person who has any health issue should have a genome sequence as part of their

work-up, just as they would have an X-ray or metabolite test.”

As with any goal of such mammoth proportions, it will take teamwork to get there. To help facilitate the collaboration required, member institutions of the Texas Medical Center, including Baylor, are coming together to set up a TMC Genomics Institute with the objective of being the world’s most innovative genomics center for discovery and disease intervention.

“We really want to see more integration of different programs in the medical center in general, and genomics is the perfect vehicle for it,” said Gibbs. “That’s the reality. In the past, we’ve centralized the genomics activity and it’s been very expensive and has been mainly discovery-based, so it hasn’t lent itself for such integration. But as we move towards these clinical arenas, there’s more opportunity for collaboration and to synergize our expertise, whether it’s in the lab or the clinic.”

The possibilities for clinical genomics to transform the world in which we live are as vast as the potential combinations of base pairs in human DNA. And although the focus now is on treating cancer, creating therapies for incurable diseases, developing lifesaving drugs to combat deadly viruses, and helping families understand hereditary risks of reproduction, no one can really predict how it will all come together.

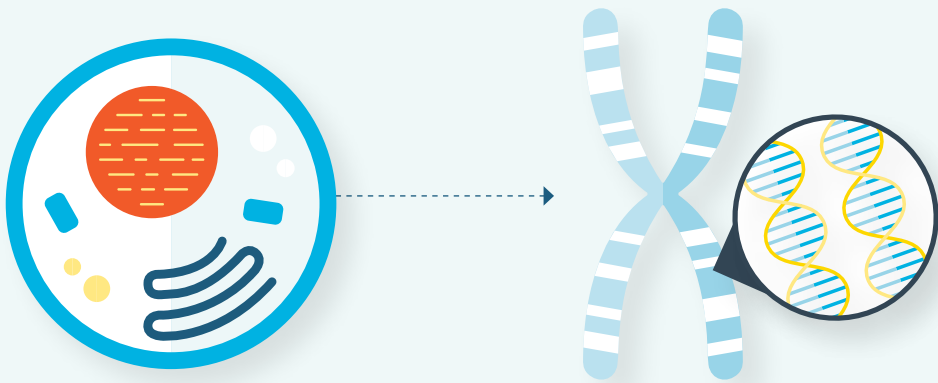
“We are all inclined to be conservative in our future projections and we invariably just make fairly modest, linear projections,” said Gibbs. “When the computer was first introduced, most people just thought about the ability to type more documents, not all of the other really innovative developments like Internet commerce and video gaming, or the fact that we now carry all of this around in our pockets. It’s the same with genetics—we don’t know where it will take us, but we have every reason to be extremely optimistic about it.” ■



BAYLOR MIRACA GENETICS LABORATORIES

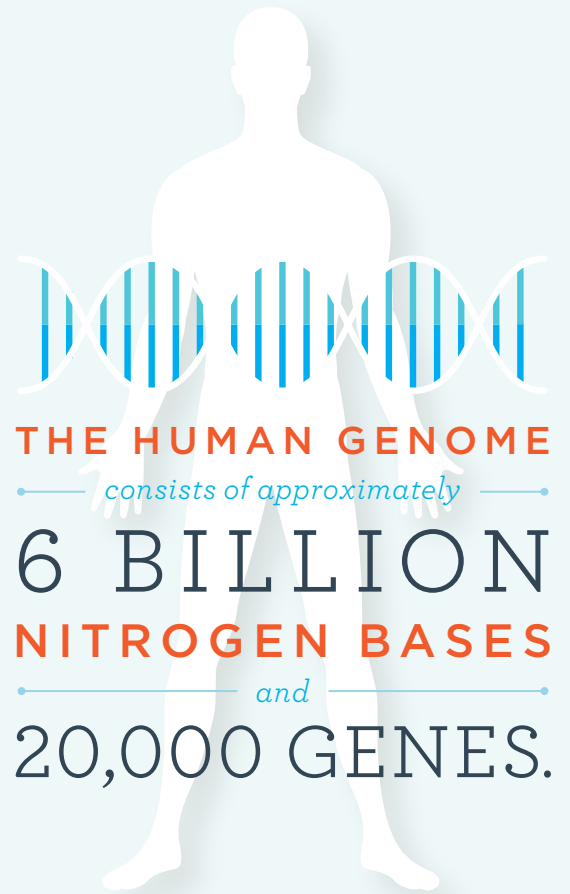
In the fall of 2014, Baylor College of Medicine and Miraca Holdings, Inc., a Japan-based international health care company focused on clinical diagnostics and laboratory tests, announced a joint venture in which the two institutions would share ownership and governance of their clinical genetics diagnostic laboratories. The Texas Medical Center-based venture, named Baylor Miraca Genetics Laboratories, allowed Baylor to continue to independently drive its genetic diagnostic research agenda while expanding their laboratory diagnostic skills into a larger commercial enterprise. Hoping to play a major role in Houston’s budding biotech industry, the marriage of Baylor’s academic expertise and Miraca’s international business acumen has already proven successful: in May, the organizations announced the launch of an enhanced clinical exome sequencing test, providing physicians the option to speed up the delivery of final results to two-to-three weeks from three months. Baylor College of Medicine pioneered the research and development of the original whole exome sequencing test, initially launching it for clinical use in 2011.

UNRAVELING THE CODE OF LIFE



WHAT IS A CHROMOSOME?

Found in the nucleus of living cells, chromosomes are strands of DNA coiled together tightly around proteins. Humans have a total of 46 chromosomes, with 23 inherited from one parent and 23 inherited from the other. Chromosomes play a crucial role in ensuring that DNA is accurately copied and evenly distributed during cell division.



THE HUMAN GENOME

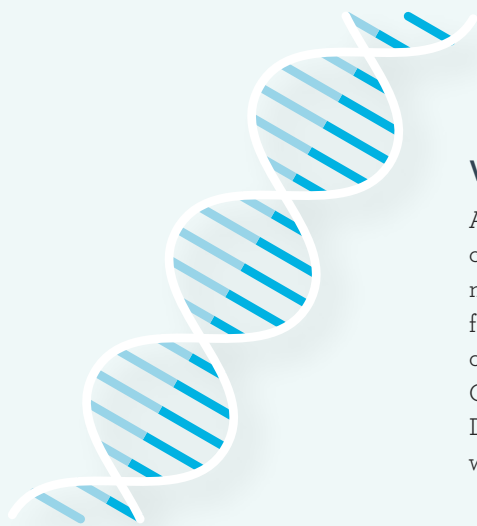
— consists of approximately —

6 BILLION

NITROGEN BASES

— and —

20,000 GENES.



WHAT IS A GENE?

A gene is a segment of DNA that instructs cells to make proteins. Proteins are complex molecules responsible for the majority of functions in the body and are necessary for an organism to develop, survive and reproduce. Genes make up only about one percent of our DNA; the remainder is involved in regulating when and how proteins are made.

WHAT IS A GENOME?

A genome is the complete set of genes or genetic material present in a cell or organism. Each genome contains all of the information needed to build and maintain that organism. The DNA in all 23 chromosome pairs make up an entire human genome, which consists of approximately six billion nitrogen bases and 20,000 genes.

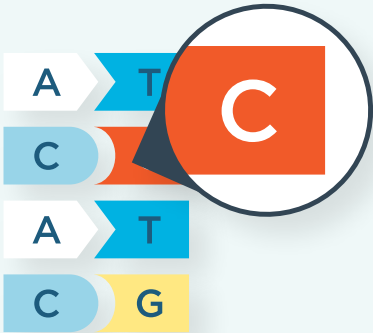
WHAT IS DNA?

Deoxyribonucleic acid, or DNA, is a molecule that carries the genetic information responsible for the development, function and reproduction of living organisms. DNA is comprised of chemical building blocks called nucleotides, which are made up of phosphate, sugar and one of four types of nitrogen bases. The nucleotides link into chains and, through nitrogen base pairing, coil around other chains of nucleotides to create a double helix.

The four types of nitrogen bases are adenine (A), thymine (T), guanine (G) and cytosine (C). The order of these bases determines what biological instructions are coded within the strand of DNA.

WHAT IS A MUTATION?

A mutation is a change in the DNA sequence, either due to a mistake during DNA replication or exposure to environmental factors such as radiation or cigarette smoke. It can be caused by the alteration of a single nucleotide or the deletion, insertion or rearrangement of larger sections of genes or chromosomes. Mutations can be acquired during a person’s life or inherited from a parent. Although some mutations are beneficial in that they provide genetic variation in a population, many are harmful; cancer, for example, is caused by mutations in cell-growth controlling genes.

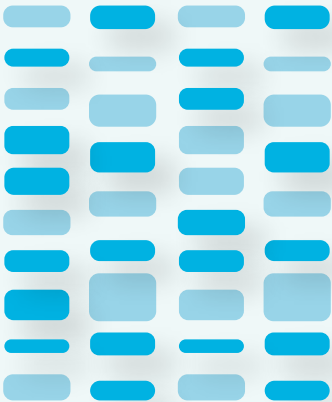


WHAT IS DNA SEQUENCING?

DNA sequencing is the process of determining the exact order of nucleotides within a molecule of DNA. This provides data about the kind of information carried in a particular segment of DNA, such as whether or not it contains genes or if there are any mutations in the sequence. The ability to map DNA is becoming increasingly useful in medicine as well as other scientific fields, such as evolutionary biology and forensics.

DNA SEQUENCING

is used to search for
GENETIC VARIATIONS & MUTATIONS
that may contribute to the
DEVELOPMENT OR PROGRESSION OF A DISEASE.
These changes could be caused by a single substitution, deletion or
addition of one base pair in DNA.



WHAT IS WHOLE EXOME SEQUENCING?

An efficient method of analyzing a patient’s DNA to discover the genetic cause of diseases or disabilities, whole exome sequencing only examines the protein-coding region of the human genome that contains functionally important sequences of DNA that direct the production of proteins essential for the body to function properly. It is known that most of the errors that occur in DNA sequences that lead to genetic disorders are located within this region. By mapping this region and comparing it to a normal reference sequence, variations in an individual’s DNA can be identified and then related back to an individual’s medical condition.

WHAT IS CLINICAL GENOMICS AND WHY IS IT IMPORTANT?

Clinical genomics can be defined as the medical application of studying the complete genetic material of a living organism. This branch of science has the potential to revolutionize health care, leading to better understanding of the biological systems that govern the human body and the development of new diagnostics and treatments.

Showcasing Student Startups

At the second annual Bayou Startup Showcase, Rice University and the University of Houston's accelerator programs come together for a joint celebration of entrepreneurship

BY ALEX ORLANDO

In the auditorium at the University of Houston's (UH) student center, Hesam Panahi, Ph.D., founder of UH's RED Labs startup accelerator, and Kerri Smith, managing director of Rice University's OwlSpark startup accelerator, embraced their roles as stewards of entrepreneurship with gusto. Wearing clean-cut blazers draped over red and blue t-shirts stamped with their programs' insignias—the unofficial uniform of the day—they effortlessly blended business professionalism and Silicon Valley chill. As they kicked off the second annual Bayou Startup Showcase, jointly hosted by the two programs to celebrate Houston's startup community and give the teams a chance to pitch their ideas, a narrative of perseverance began to unfold.

"As you can imagine, putting together a program like this takes quite a bit of time, and packaging it into a comprehensive effort takes a while," said Smith, also associate managing director of the Rice Alliance for Technology and Entrepreneurship. "For us, we started developing the curriculum for this year eight months ago, shortly after the close of last year's program. And we thought we had it all figured out... until this happened."

An image flashed on the screen at the front of the stage—a car completely submerged; tides lapping at the edges of a dumpster; forlorn looking stop signs failing to keep the rising water levels at bay. "This was launch day," Smith continued, referring to the May 26 thunderstorm that left many neighborhoods throughout Houston flooded. "Our bayous were spilling over, our streets were underwater, our phones that morning were blowing up—we had caterers lined up and speakers confirmed, and we weren't sure whether to cancel or postpone. In the end, we decided to forge ahead and launch that day. Our founders? They showed up, they plugged in, they engaged, and they helped us give a whole new meaning to a bayou startup summer."

Taking place throughout the summer, RED Labs and OwlSpark provided a twelve-week, experience-based education in entrepreneurship. Open to students at any level and studying any major—as well as faculty, researchers, and recent alumni—the two programs enabled budding company founders to form teams around technology-based business ideas that they believed would serve as the basis for a startup.

"We vet our teams through a highly selective application process that targets promising, scalable business opportunities," noted Smith. "Once our teams are selected, we then provide a curriculum based around mentorship, leadership, and educational programs. Then, we connect them with subject matter experts, mentors, advisors and coaches who can help them test the assumptions and hypotheses they've made about their business."

With 14 combined startups between the two programs, the teams this year represented a diverse cross-section of ambitious ideas from equally distinct industries, ranging from consumer products to health care. Among them were a subscription service providing board game enthusiasts with undiscovered, but professionally reviewed, games; a collapsible, high-resolution, 24-inch screen for business professionals on the go; a mobile app that provides customized meal plans for cancer patients; even an auto company crafting what they describe as "the first luxury electric car." Condensing concepts that complex into succinct, five-minute pitches was no easy feat.

"Through a series of pitch practices, our founders received advice from communication experts," explained Smith. "We wanted to help them more clearly articulate and succinctly convey the vision and value propositions they were offering. We created a community, a culture, and an environment that let our founders experience the value of working alongside like-minded thinkers and doers."

The startup founders had an impressive pool of expertise to draw from. Throughout the summer, they learned from over 75 different mentors, coaches, journalists, and other community leaders that lent their time and support.

"Our founders also came together every Tuesday for dinner and conversation; we call these, 'founders meetings,'" said Panahi, a clinical assistant professor at UH's C.T. Bauer College of Business. "At founders meetings, we share our achievements, our challenges, and our next steps. But we also do something else that's really important—we challenge and support each other. Many times throughout the course of the summer, one founder has been able to introduce another to a potential mentor, customer, or someone that can move their company forward."

"We encourage our founders to work with and learn from each other, but we're also building a community," he added. "With each cohort, our alumni web grows, creating a powerful network effect. We bring founders





Hesam Panahi, Ph.D., and Kerri Smith, kick off the second annual Bayou Startup Showcase at the University of Houston.

from previous cohorts back into the program to share their experiences and provide advice.”

Alumni companies remain heavily invested in that network. Medical Informatics, a Houston-based health IT startup, leveraged the connections they built to propel themselves forward—this June, they received FDA clearance to sell the first version of their data alert system.

“We used OwlSpark as a launching pad to help recruit our initial team of five people, as well as three interns,” said Emma Fauss, Ph.D., CEO of Medical Informatics, a company that performs real-time predictive analytics in critical care environments throughout the country. Medical Informatics currently resides in TMCx+, a shared co-working space adjacent to the TMCx accelerator. “We’ve come a long way since then, using the mentorship connections we cultivated and the wonderful advice we received to integrate into other hospitals around the country. We continue to encourage people within our companies to mentor

other people trying to voyage into entrepreneurship—it’s a difficult road, and it really takes a community.”

OwlSpark and RED Labs first collaborated last year for the inaugural Bayou Startup Showcase, which provided an opportunity for startup teams from both accelerator programs to showcase their businesses to the greater Houston community. While this year’s event was structured around that same agenda, it was nearly impossible to distinguish which teams came from which university as they took the stage.

“An interesting side effect of this collaboration between OwlSpark and Red Labs is the blurring of boundaries,” said Panahi. “Throughout the summer, we’ve had people that traditionally work with one accelerator or university crossing over and helping out teams from the other. Many of these interactions have turned into meaningful relationships that will extend far into the future.”

“We encourage our founders to work with and learn from each other, but we’re also building a community. [...] We bring founders from previous cohorts back into the program to share their experiences and provide advice.”

— HESAM PANAH, PH.D.
Founder of RED Labs



“More or less, I’ve gotten a mini-MBA this summer. I feel so much more confident with the lessons I’ve learned through OwlSpark. [...] The people they introduce you to and the lectures they hold are amazing—you can’t pay money for this kind of expertise and exposure.”

— ANDERSON TA
Founder of Open Factory

This summer, the two accelerators cozied up and shared space in TMCx, the Texas Medical Center’s 100,000-square-foot facility dedicated to supporting life science startup companies in Houston. Over the course of their 12 weeks together, it became clear that this was more than temporary lodging—it quickly became a second home.

“Were it not for the space at TMCx, this summer’s program would have been completely different,” said Smith. “This has been a privilege, and an incredible value-add to our programs, to have the TMCx serve as our headquarters. OwlSpark and Red Labs resided separately last year, and it was a lot trickier to have joint sessions and field trips together. Co-working in TMCx has allowed us to collaborate more easily together—and honestly, we had a lot of fun with it.”

“There’s something really inspiring about having a space that’s so well designed,” added Panahi. “I’ve had teams telling me that they never want to leave this space—not in terms of the program itself ending, but they are literally at TMCx all day and all night long because they just enjoy being here so much.”

As the student entrepreneurs embedded themselves in the TMCx ecosystem, they worked alongside the 22 startups in the Texas Medical Center accelerator’s first class.

“We were delighted to host OwlSpark and Red Labs in our home,” said William F. McKeon, executive vice president and chief strategy and operating officer of the Texas Medical Center. “It’s pretty powerful to have that academic mindset and mind power behind these startups, and it was important to move them into

a space where they felt supported. We’re looking to lower that barrier for entrepreneurs to actually make sustainable companies that we hope plant themselves here in our community. This place feels more like Palo Alto every day.”

After the Bayou Startup Showcase’s last pitches, the real action kicked into high gear. Standing at attention behind their booths, business cards splayed across tables and informational packets in hand, the founders were positioned to make some compelling connections—and take their ideas to the next level.

“More or less, I’ve gotten a mini-MBA this summer,” said Anderson Ta, founder of Open Factory, a company developing fabrication technologies for the current market of 3D printers. “I feel so much more confident with the lessons I’ve learned through OwlSpark. Now I can go out and execute my idea for a company and a business. The people they introduce you to and the lectures they hold are amazing—you can’t pay money for this kind of expertise and exposure.

“For me, the Bayou Startup Showcase is my one opportunity to get the attention of the Houston startup ecosystem,” he added. “This is a platform where, if you’re really interested in what you’re doing, then this is the right venue to go out and get in touch with the people that can actually help you. There’s a big, big network here, thankfully, because it’s a big world out there.” ■





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JAMEY ROOTES, PRESIDENT OF THE HOUSTON TEXANS, REMEMBERS WELL THE UNEXPECTED PHONE CALL THAT CHANGED HIS CAREER PATH AND MARKED THE EARLY DAYS OF THE NFL'S RETURN TO HOUSTON. ROOTES SAT DOWN WITH WILLIAM F. McKEON, EXECUTIVE VICE PRESIDENT AND CHIEF STRATEGY AND OPERATING OFFICER OF THE TEXAS MEDICAL CENTER, TO LOOK BACK AT THOSE EARLY DAYS, AND WHAT HE SEES TODAY AS THE TEXANS' RESPONSIBILITY TO THE FANS AND THE COMMUNITY.

Q | Let's start from your childhood. Can you tell us what it was like growing up in Stone Mountain, Georgia?

A | My dad was an accountant. My mom was a librarian. I have an older brother and an older sister. My brother, probably, was as instrumental as anyone in instilling a competitive spirit in me. He was four years older than me and I always wanted to beat him in whatever we were doing. He was a football player and then became a soccer player. My dad coached soccer. He hadn't played before. He just picked it up and said, 'I want to play. I want to coach.' He coached me for a period of time, and coached my brother for a period of time. I started playing soccer maybe in first or second grade. My brother started when he was in high school.

It was kind of like this wave of soccer came through with the North American Soccer League and the

Atlanta Chiefs. I was swept up in that wave of Pele and the Cosmos. I did play football and baseball earlier, but maybe because my dad was involved, or maybe because I was playing at school, soccer just clicked for me. It seemed like a sport that I could excel at. I played all over the field, depending on the team I played on, but I usually played as a forward or a mid-fielder.

It was interesting going from Atlanta playing as a striker to playing in the National Team pool where I was asked to play back, because of all the great players I was competing with at that level. My goal was always just to get on the field. If I played striker, that was great. If I had to play in left back or even in goal, that was fine. I just wanted to be on the field.

I played on recreational teams to begin with, and then I saw a flyer at school regarding select team tryouts. I brought it home to my mom and said, 'Hey,

they are having tryouts, would you mind driving me there on Saturday?' She did and I tried out and made the team. And it all just really progressed from there. I kept getting new opportunities.

And then as I got older, I just stair-stepped up into the more prestigious teams. Datagraphic was a premier club in Atlanta at the time. They didn't go all the way down to the under-14 level, but as soon as I could, I got on a Datagraphic team. You had your club team that you played for, your school team, and then it seemed like tryouts all the time for select teams, and then you had regional camp and national pool games. I even played for a representative team from the USA South against West Germany. We played the West German national team here in Houston. And that was really my first exposure to Houston. I was probably 17 at the time.

“It’s not just about watching a football game. [...] It’s about engaging with something that really is so meaningful to you, something that is bigger than yourself. It’s about tailgating and the bonding and family time that happen there.”

Q | Was it that exposure that led you to play soccer for Clemson?

A | Well, I was recruited by a number of different schools and had a number of options, including Clemson and South Carolina. Mark Berson and Trevor Adair were the coaches at South Carolina at the time. They saw me play in Atlanta and said, ‘Hey, we think you would be a great fit for the University of South Carolina.’ Greg Andruilis, who was the assistant coach at Clemson at the time, came down and said, ‘Yeah, I think you have a reasonable shot.’ So really, my best options came down to those two and I’m not exactly sure what caused me to pick Clemson at the end of the day. They are both great schools. I was a big University of Georgia fan growing up, but they didn’t have a soccer team. Clemson just felt like the same kind of collegiate atmosphere with a soccer program that was really elite. I mean, at the time, Clemson consistently went far in the NCAA playoffs. They hadn’t yet won an NCAA championship, but they were close a number of times.

Q | Clemson won two national championships during your time there.

A | We did. We won my freshman year and my senior year.

Q | Tell us more about Coach Ibrahim. His unique approach obviously led to a long period of success.

A | He was really an innovator at the time. Soccer was growing here in the United States and he had a tremendous passion for the game. He was a hard-nosed, no-nonsense kind of coach. I think he really had a great appreciation for the ‘beautiful game,’ and an eye for talent—the type of players, the technical abilities and tactical understanding of players that would fit into his system. And we played, for the time, a pretty attractive brand of soccer. You have teams that can be tough and effective, but it’s not that fun to watch. I think we played a good combination of tough discipline defensively, but with attacking flare. And we had a number of players who brought that creativity and excitement. Eric Eichmann played for us and was an All-American. He was a year older than me and was a very gifted player. Bruce Murray, who is one of the greatest players in National Team history, probably was our best player. We came in together as freshmen. We had a good balance of stars and role players. And I think, more than anything else, our teams had amazing chemistry and a great sense of ‘team.’ That may have been lacking in previous Clemson teams that had more talented international players.

You think about the Texans. Bill O’Brien has brought in that same ‘team-first’ philosophy. It’s about the name on the front of the jersey, not the back of the jersey. At Clemson, we had that in spades. We really worked hard and fought hard for each other, and I think that made the difference.

Q | What was your next step after Clemson?

A | I joined IBM right after Clemson. I worked in Greenville, South Carolina as a marketing representative for mainframe computer equipment. I had a couple of large accounts—Michelin Tire Corporation and the Greenville Hospital System. I spent roughly three years there, and the experience was great. I learned a ton. There were so many talented people there. The training that they put you through was amazing. It gave me a great chance to understand technology and its applications—at least technology at that point in time. It was a great experience, but there was something that was missing for me. I saw graduate school as an opportunity to pivot my career. I went back and visited with Bobby Robinson, who was the athletic director at Clemson. He was a great friend and somewhat of a mentor to me. We had lunch, and he said, ‘Hey, you’re talking about being a coach, wanting to be in the sports business. Which do you want to do?’ And I said, ‘Well, I want to do both.’ He said, ‘I think that’s the first thing you have to get past. You really can’t do both in today’s sports environment.’ So Indiana was a great option for me. It gave me a chance to get an MBA, work in the athletic department and coach with Indiana’s soccer program, which is one of the premier soccer programs in the country.

So the Indiana experience was really ideal because it gave me a chance to try out coaching and business. I had never been a full-time coach. I had done camps and coached youth teams. But it gave me a chance to really get in the middle of it and see what it was all about. And it gave me a chance to get the MBA degree and work in the athletic department, doing promotions and marketing and things of that nature.

Q | How important was that to your career path?

A | It was very important. I was a full-time MBA. In soccer, I think my official title was ‘manager,’ but it gave me the opportunity to be on the field working with the team on a regular basis. And it was awesome. It was so much fun. It was going back to something that was so comfortable to me, which was working with players. And I loved that part of it. I loved my two years. But, I thought about how my life would develop. I’ll be getting married at some point. I’ll be having

kids. Will this still feel the same 20 years from now? Will I be challenged? Will I have the same fire? So I decided to pursue a sports-related business role.

The opportunity in Columbus that eventually emerged was absolutely ideal. It was the perfect balance between the competitive side of the game, being involved with coaches and being involved with players and still being able to lead the development of a business.

Q | How did you transition from soccer to football?

A | I had spent four years in Columbus, launching the Columbus Crew, which was really a ‘bootstrap’ startup. Starting with a blank sheet of paper, we created a business and a way of operating. We built a stadium, we built a training facility, we built an experience for fans and we had really engaged the community in a powerful way. Then I got a call from a head hunter, and she asked, ‘Would you like to be part of the Houston NFL team?’ And I said, ‘There’s not a Houston NFL team.’ She said, ‘There’s going to be.’ So I took the chance to come down and visit with Bob McNair and a number of folks here who were leading the start of the team.

Being president and general manager of the Columbus Crew was great. It was kind of a ‘top of the mountain’ experience from a soccer perspective at the time. I could have continued to do that. But I really saw this as an opportunity to demonstrate to myself that our success in Columbus wasn’t just about a sport that was most familiar to me. It wasn’t just about being in a small market. I wanted to prove to myself that I could be successful in a sport that I haven’t played for my entire life, even though I have been a football fan my entire life. And the same principles could apply in one of the largest markets in America. It has all worked out pretty well.

Q | Why did the Texans select someone with a soccer background for their football program? Did they just decide that you were the one to take a chance on?

A | You know, it’s interesting. When I first went to Columbus and met with Lamar Hunt and Clark (his son), I was 29 years old. There were much safer bets for a general manager than me. But something just clicked. We sat down and talked and it felt like we saw the world the same way. And the same thing happened when I sat down with Bob McNair. Even though he was student body president at the University of South Carolina, and I was student body president at Clemson—that’s like oil and water. But for some reason, as we talked, I just felt like we saw the world the same way. And when you work in a sports business, you really do have to be working for somebody who shares your same values. Otherwise, you can’t be authentic. I have found over the last 15 years, I have been able to do what I think is right and almost every time, that has aligned well with Bob’s perspective.

Q | *Sports teams become part of the DNA of a city. What are some of the most important components of a successful sports franchise?*

A | There are a couple of things that I think stick out as being incredibly important, and the first is that you have got to focus exclusively on what you can control. When I first came here to Houston, they told me it was real easy: you win and the fans come, you lose and the fans don't come. That's the way it has always been in Houston. And I said, 'Well, we aren't going to accept that.' So we eventually got folks around the table that all bought in that we can consistently have capacity crowds and have a wonderful fan base, regardless of our record. We were going to just let the chips fall where they may on the field, because we could not control that.

If you take all of the sports teams of all time and put their records together, they're a combined .500, because every game has a winner and a loser. You have to mentally separate yourself from wins and losses. You are connected as an organization, but we have a job to do, regardless. Whether we win or we lose, we have a job to do. We have to create raving fans, build loyal customers and fulfill our responsibilities to our community. And whether we won or lost on Sunday, all of these things still have to happen. The challenge that some teams get into is you kind of hook your wagon to, 'When we win, we will go after it. When we lose, we won't.' And that's just not productive. We have to go after it all the time. We are always in the pursuit of championships, because people have to believe with every ounce of their being that we're here to win a championship for the city of Houston. But we also have to create memorable experiences and do great things for Houston.



It's not just about watching a football game. If it was just about watching a game, you could stay home and watch it on your TV. It's about engaging with something that really is so meaningful to you, something that is bigger than yourself. It's about tailgating and the bonding and family time that happen there. It's about rituals and traditions in the stadium that you remember for a lifetime. People say to me all the time, 'I've been a season ticket holder since the beginning,' and they go on to tell me all the wonderful things they enjoy about the Texans Experience. I get a big smile on my face because I know we've created a raving fan. And then the third piece of our purpose, which I think has been so incredibly important, is do great things for

Houston. It's not a line or a check the box for us. We're here to do great things for Houston. We have world-class athletes that are wonderful ambassadors that can inspire people. Our brand is so powerful that when we get behind something, we lead. We show people the way. We do not do it because we have to. We do it because it's an integral component of what our mission is as a franchise.

Q | *What excites you most about the Super Bowl coming to Houston?*

A | It's part of our opportunity to do great things for Houston. And that's why we were so inspired to make it happen. For us, it is an interesting opportunity for our staff to get involved with a new level of the game, but the real beneficiary is the city of Houston. To see the renaissance that's going on downtown, there's \$3 billion of capital investment going on in downtown Houston that will be completed in advance of the Super Bowl. There's a rebirth happening in the Convention District. The work that's being done to beautify the Broadway approach to Hobby Airport is so exciting. I've always thought that we need to have a more beautiful entryway into our city from Hobby airport. It's happening all over the city. What a wonderful opportunity for us to get our community ready for the world to visit. The Super Bowl brings three billion media impressions and \$500 million in economic impact. Those are all tremendous benefits and certainly we are part of a very large team that is making it happen for Houston. It fits in perfectly with the purpose of our organization. We host the Advocare Texas Kickoff, The Advocare V100 Texas Bowl, the Battle of the Piney Woods and we brought international soccer to Houston. Now we have the Dynamo and BBVA Compass Stadium. We pursued all of these things because we're here to do great things for Houston. Certainly there's a business aspect to it, because we take risks and hopefully get rewards and all that. But we got involved because doing great things for Houston is part of who we are as Texans.



(Credit: Houston Texans)



Q | JJ Watt has become a global icon. What is his impact on the Texans' brand?

A | JJ has what I call a '360 degree perspective' on what it means to be a star athlete. He recognizes what all of his opportunities and obligations are and he lives up to very high expectations. I've been around athletes for a long, long time. In terms of that 360 view, I don't think I've been around someone more exceptional than JJ. And the great thing about it for the team is as he gets exposure, they're talking about JJ Watt, but he's JJ Watt the Houston Texan. So there is certainly a halo for our brand and he sets a great example for others.

Q | Looking back on your career, what are some of the key decisions that led you to where you are today?

A | Early on, I was all about sports and competition. I wanted to play in the World Cup. I got to Clemson my freshman year and we had a very good team and we wound up being national champions, but I was having a hard time getting on the field. I'd never experienced that before. It was a shock. I'd been the top player on every team I had played on. One day during my first semester, I went to get my mail and there was this note from the dean that said I was on the dean's list. I called my mom and said, 'The dean knows who I am!' I'd never really thought outside of sports. I went to school because I had to. I started to appreciate that there's another world out there beyond sports. The challenges I faced on the field caused me to think differently, so I really started to apply myself academically and wound up as an honors student in the Calhoun Honors College. I started getting involved on campus with a number of different groups and eventually wound up being student body president. I realized that there is more to life than playing sports. When I went to IBM, I knew it wasn't right. Everyone was looking at me going, 'What are you doing leaving this job? Nobody leaves IBM.' I had so many people sit down with me and say, 'Have you really thought through this?' I just said, 'I have this calling. I want to be involved in sports in some way and I'm not getting there here.'

So I traveled across the country doing informational interviews in the sports field. I also applied to graduate schools and wound up going to Indiana. When I finally got my opportunity, I seized it. When people talk to me about wanting to get into the sports industry, I tell them to check their heart. How into it are you? Are you prepared to shove all the chips to the middle of table and just stay at it as long as you have to? If you are, it will work. It may be one month, and it may be 10 years. But you have to be all in to make it happen.

Q | Is there anything else you care to share?

A | I've been fortunate to work for two great men in the sports world. I first worked for Lamar Hunt, a member of three separate sports halls of fame. He was a mentor to me coming into this business. He was a wonderful man and a hero of mine. I have also worked for Bob McNair. I must have a lucky star because Bob McNair is cut from the same cloth as Lamar. He is a great community citizen, a committed family man and a wonderful leader. He puts us in a position to win and says, 'Go make it happen.' I can tell you from my eyewitness account, Bob McNair is one of the greatest sports owners there's ever been. He and his family are outstanding stewards of this community asset. ■



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Collaborating to Cure

MD Anderson is leading the charge in forging alliances between academic institutions and industry partners—and cultivating a new model for research along the way

BY ALEX ORLANDO



Hagop M. Kantarjian, M.D. (Credit: F. Carter Smith)

“I think cancer research in the United States has led cancer research throughout the world. [...] The only way to move forward is by shifting the current model into something similar to what’s being attempted here—one that’s research driven and patient-centric.”

— HAGOP M. KANTARJIAN, M.D.

Professor in the Department of Leukemia for the Division of Cancer Medicine at MD Anderson Cancer Center

Academia and industry are often seen in stark opposition to each other—two warring titans with fundamentally different ideologies and ambitions. In health care, the division between research institutions and pharmaceutical companies has the potential to cause the next great discovery, from life-saving drugs to new therapeutic techniques, to slip through our fingers. Can we really afford that when the prospect of ending cancer is on the line?

Fortunately, The University of Texas MD Anderson Cancer Center is confidently bridging those two worlds. Realizing the untapped potential in combining the expertise of an academic medical center with the vast pipeline of resources of pharmaceutical leaders, they have spent the past several years forging alliances with industry partners. Nature Biotechnology, a monthly publication covering the science and business of biotechnology, recently published rankings of the most active institutions in terms of alliances and collaborations. With The University of Texas coming in second place overall and bringing in a total of eight deals—seven of those from MD Anderson—the importance of cultivating those connections cannot be overstated.

“This really conveys the great strides that MD Anderson has made as an institution,” said Ferran Prat, Ph.D., J.D., vice president of strategic industry ventures for MD Anderson. “Biotech and Pharma companies have traditionally struck alliances with institutions on the West Coast or the East Coast, but now they are increasingly entering into significant deals with us. This helps to create a virtuous cycle where we conduct all types of research of different magnitudes, which will enable us to enhance these alliances.”

As the single entity with the most deals in the entire ranking, compared with institutions such as the University of California San Francisco and Massachusetts General Hospital,

MD Anderson is paving the way for research-driven discoveries that focus on benefitting individual patients.

“I’ve been a researcher for the past three decades, and the mission of what we do at MD Anderson is focused on improving patient care,” said Hagop M. Kantarjian, M.D., professor in the department of leukemia for the Division of Cancer Medicine at MD Anderson. “We believe that research is the only way to accomplish that. If we have outstanding clinical translational researchers, then we can design studies that are ahead of the game and can improve the survival of patients long before they become the standard of care.”

Kantarjian is the principal investigator in several studies stemming from one of MD Anderson’s most promising industry partnerships—a collaboration with Bristol-Myers Squibb to advance our understanding of the role of the immune system in treating leukemia.

“Bristol-Myers Squibb has an extremely powerful pipeline in immunotherapy,” said Prat. “In leukemia, there haven’t been many immunotherapy drugs that have moved forward—that’s significant. Financial resources are just an enabler to actually conduct the research that will cure the disease. With this partnership, we have access to the full pipeline with all of those resources to find out the best combinations and the best patient populations.”

Forms of cancer, such as leukemia, that affect the blood, bone marrow, and lymphatic system—also known as hematologic malignancies—have poor outcomes compared to other cancer types, especially among elderly patients and those who have suffered multiple relapses. According to the American Cancer Society, someone in the United States is diagnosed with a form of blood cancer approximately every three minutes; someone in the U.S. dies from a blood cancer every 10 minutes.

“Aggressive hematologic malignancies represent significant areas of unmet need,” said Laura Bessen, M.D., head of U.S. Medical at Bristol-Myers Squibb. “Cooperation between industry and academia offers a tremendous opportunity to strengthen our scientific and clinical understanding of the role of the immune system in treating cancer. This collaboration will provide an efficient and comprehensive landscape of the potential of immunologic approaches to evaluate treatment options for leukemia and pre-leukemic conditions.”

Launching up to 10 clinical studies to evaluate the utility of immune-based approaches, as well as identifying optimal treatment approaches, the two organizations are leveraging their own unique strengths. MD Anderson will be leading the operational aspects of the studies, while a joint development committee will oversee any collaborative efforts.

“Our partnership with Bristol-Myers Squibb involves us taking their five immune-oncology drugs—what I call checkpoint inhibitors—and we proposed to investigate them across all leukemia and not just one particular disease,” said Kantarjian. “In fact, it allows us to combine investigations in these drugs because they all come from the same pipeline. You’re looking at many more tumors rather than one, so the chance of success will be higher, and the process is much faster. It’s a win-win situation where the cancer experts develop the concepts and propose the protocols.”

The traditional methodology that companies use to test out new drugs, which involves testing each compound one at a time, is frustratingly labor

intensive and mired in bureaucracy. Driven by contract research organizations, which pharmaceutical, biotechnology, and medical device industries use to outsource their research, the opportunities to shine a light on successful therapies are slim.

“What we realized over time is that research has shifted from the experts—those at the academic and research cancer centers—to the companies,” noted Kantarjian. “It became not a partnership but a business model where people from the companies would say, ‘We have a drug, X, we want to test it out in a single cancer, Y, and that’s going to be our goal.’”

“That form of company-driven research has drawbacks,” he added. “It’s a longer process. It’s much more expensive, because they use clinical research organizations with intermediaries and a lot of bureaucracy; it shortens the patient time; and it reduces their chance of success because they’re looking at one particular tumor rather than a spectrum of tumors.”

For researchers like Kantarjian, there had to be a different way of doing things. Through their approach, MD Anderson and Bristol-Myers Squibb have created a model that brings research back into the steady hands of cancer experts.

“In this partnership, we’re the ones actually driving those studies,” said Prat. “We’re really defining the best modalities of immunotherapy for a very underserved segment of the patient population. We just started enrolling patients, but we’re conducting all 10 of our clinical trials simultaneously. This is something that under the old model would have taken us three years just to get started, much less to get clinical results.

“This really conveys the great strides that MD Anderson has made as an institution. [...] We want to create a virtuous cycle where we conduct all types of research of different magnitudes, which will enable us to have a lot more significance.”

— FERRAN PRAT, PH.D.

Vice President of Strategic Industry Ventures for MD Anderson

“By setting up this alliance, we’re going to learn a tremendous amount,” he added. “It’s a process that’s over ten times faster and over a much broader scope. Because you’re really boiling the ocean, the chances that you’re going to achieve a positive response are maximized. For the study modalities that don’t work, they merely get closed and substituted within the setting of the alliance—we actually have a much better chance of finding better combinations for particular segments of patient populations.”

With the studies ongoing, Kantarjian and his colleagues have already gained valuable insights on the mechanisms of how checkpoint inhibitors kill leukemia cells. Pending the success of these trials, MD Anderson is looking to other companies with a similar partnership model in mind—an approach with the potential to reinvigorate research throughout the country.

“I think cancer research in the United States has led cancer research throughout the world,” said Kantarjian. “There’s no way that we will be ceding this leadership because we have great minds in the United States, we have great resources, we conduct high quality research, and we have a need to help patients with cancer. We have to disrupt the existing cancer research model, because it’s dying by thousands

of bureaucratic paper cuts, high costs and a low success rate. The only way to move forward is by shifting the current model into something similar to what’s being attempted here—one that’s research driven and patient-centric.”

Ranked as the nation’s leading cancer hospital for 11 of the past 14 years, MD Anderson is distinguished, in large part, by the sheer scope of their ambition. With their Moon Shots program, a celebration of the drive and dedication necessary to put a man on the moon, they are seeking a similarly lofty goal with the same level of conviction—a dramatic 50 percent reduction of mortality across several major cancers. It’s a good thing they don’t have to do it alone.

“Cancer is a very, very complex problem,” said Prat. “It would be slightly arrogant to think that we can do it all by ourselves. We need a lot of help. And we fundamentally believe that industry partnerships are not a necessary evil, but an essential part of achieving our mission. They have a lot of smart people—many of whom come from academia—a lot of resources, and our goals are aligned. At a basic level, we all want to help cure patients.” ■



Teaching From Experience

One occupational therapist at TIRR Memorial Hermann turned a devastating accident into a new career path

BY SHEA CONNELLY



On any given day, the rehabilitation gym at TIRR Memorial Hermann is full of light—from the large windows pouring sunlight into the room, to the encouragement offered by TIRR Memorial Hermann’s physical and occupational therapists. Each therapist is a tireless champion for patients, teaching them how full life can be even after a catastrophic injury or illness. But one occupational therapist in particular has intimate knowledge of the ups and downs of rehabilitation—it’s a journey she took just over a decade ago.

In 2002, Emily Potter was in the car with friends. After an evening of letting off steam, shooting fireworks at a friend’s house in the country, the car full of teenagers was speeding down a winding road.

“My friend was driving too fast, we were being young, feeling invincible,” said Potter. “There was a sharp right turn on the old country road and he missed it, lost control of the car, and hit a tree going 80 miles an hour.”

A typical teenage night, the kind that might have been forgotten by the next year, became life altering. Potter ended up with a spinal cord injury that put her in intensive care. She was 19 years old.

“I remember waking up in the ICU thinking, ‘I just got my independence by moving out on my own and starting my life,’” she said. “At that time, I didn’t know what I would be able to do. I didn’t think I’d be able to do anything.”

Soon after Potter arrived at TIRR Memorial Hermann for rehab, however, she learned her initial

“When I started the rehab experience here at TIRR, it became clear very quickly that there is life after a life-changing event.”

— EMILY POTTER

Occupational Therapist at TIRR Memorial Hermann

fears about how deeply her injury would impact her life were unfounded. Her future looked different, but it would still be fulfilling and independent.

“When I started the rehab experience here at TIRR, it became clear very quickly that there is life after a life-changing event,” said Potter. “The feeling of being here was, ‘You’re part of the family. We’re going to come alongside you and we’re going to help you and your family move down the road and get you to the highest level of independence possible.’ That attitude and that motivation they gave me inspired me.”

Potter’s own rehab experience put her on a completely different career path. Prior to her accident, she had two possible vocations in mind. On one hand, she was interested in teaching. On the other, she had volunteered at a hospital and was considering nursing or physical therapy. During rehab, Potter became acquainted with occupational therapy and realized it was a perfect match.

“Occupational therapy was a good mix of getting people strong enough to participate in everyday life activities and education, and a light bulb went off: this is what I need to do,” she said. “I went back to school and came back here for an internship. I fell in love during my internship and I’ve been here ever since.”

As an occupational therapist, Potter’s first priority is helping her patients make a plan to get back out into the community and regain their independence. That begins with learning how to do everyday activities—grooming, dressing and bathing—in a new way. These are things all occupational therapists teach, but as someone who uses a wheelchair, Potter offers her patients a different perspective.

“I can show them, ‘We might not have the same injury, but I can relate to you because I use a wheelchair every day, so let me show you how I dress myself,’” she said. “I may demo with some large pants and show them how I do it. I say, ‘You may not be able to do it just like me, but maybe you will down the road.’”

In addition to practical demonstrations, Potter said she hopes her patients will be able to initiate tough

conversations they are not comfortable having with anyone else, knowing she has personal experience.

“I feel that I can get away with saying some things to them at times, like, ‘Hey, we’ve got to get you to this next level. I’ve been there, I know how hard it is, but let me give you some advice,’” she said. “I think sometimes they listen to me on that level and I can help them a little more in some ways that maybe someone else may not be able to.”

TIRR Memorial Hermann patient Michael Bullitt knows the value of Potter’s motivation firsthand.



“It’s a lot easier to have someone who’s been there and experienced what I’ve experienced,” said Bullitt, a couple months into treatment. “You don’t want to say ‘can’t’ around here, because they’re going to make it to where you can. I’ve progressed more here than I ever thought possible.”

Six years took Potter from patient to therapist. Getting to where she is today was not always easy, and Potter admits to struggling at times. She encourages her patients to seek out a therapist to talk through any emotional issues, something she did at the beginning.

“I had a phase of two years where I felt sorry for myself and got a little bit depressed,” said Potter. “I believe in tough love, and I had to have some tough love myself, to say, ‘You have got to get yourself moving.’ Once I did that, I did better. The picture of where you are now is not what it’s going to look like in a week, two months, a year.”

That tough love is something she shares with her patients. The first task after injury, getting up out of the bed, is often the hardest, Potter said, but it leads to bigger and better things. You might be moving differently, but you’re still moving forward. Using a wheelchair will change your life, but it doesn’t define it.

“I knew I wanted to do something with my life and I knew I wanted to give back, but I don’t think I ever could have imagined I’d be as fulfilled by my job and life in general,” said Potter. “Get up out of the bed, get in a chair and do something. Then you build momentum and all of a sudden, you’re out living your life.” ■

“I can get away with saying some things to them at times, like, ‘Hey, we’ve got to get you to this next level. I’ve been there, I know how hard it is, but let me give you some advice.’”

— EMILY POTTER



More Than Forgetful

Houston hosts an award-winning play focused on the increased risk of Alzheimer's in the African-American community

BY BRITNI N. RILEY

Playwright Garrett Davis has dedicated his life to writing about problems that affect everyday people. “Forget Me Not,” his award-winning stage play, was written after the passing of his grandmother from Alzheimer’s disease. Through this play, Davis mourned the loss of his grandmother while bringing awareness to the African-American community about their increased risk for the disease. Baylor College of Medicine’s Alzheimer’s Disease and Memory Disorders Center recently teamed up with African-Americans Against Alzheimer’s and GDavis Productions to bring “Forget Me Not” to Houston.

The play is based on a family whose mother is battling cancer, and their close friends, the Bills. In the beginning, the characters are solely focused on Mrs. Kizzy’s cancer. They do not notice how strangely her husband, June, is acting—getting lost on a short trip to the country store, losing his watch and forgetting his granddaughter’s name. Whether it is denial or pride, he does not receive the help he needs.

It is not until Mrs. Kizzy dies and June asks his daughter, Rene, to leave his house so he can be alone with his wife that his daughter understands there is a serious problem. Once a doctor analyzes June, he is diagnosed with Alzheimer’s disease. His friends and family are devastated, but relieved that he will be safe and they can begin helping him. Once a proper diagnosis is given, everyone in the family

benefits because they can get the help they need to care for their loved one.

German doctor Alois Alzheimer first discovered Alzheimer’s disease in 1906. A patient he had been treating died of a “peculiar” mental illness. After her death, Alzheimer looked at her brain and found shrinkage and abnormal deposits in and around the nerve cells. In 1910, German psychiatrist Emil Kraepelin officially named the disease “Alzheimer’s Disease.”

According to the Alzheimer’s Association, Alzheimer’s disease is the most common form of dementia and is the sixth leading cause of death in the United States. It is the only disease in the top 10 causes of death that cannot be prevented, cured, or slowed. Today, there are over five million Americans living with Alzheimer’s disease.

African-Americans are twice as likely to develop Alzheimer’s disease and other forms of dementia and are less likely to be diagnosed and treated. While researchers are not certain why their risk is so much higher, they do have a solution that can improve treatment for African-Americans: research.

There is no definite reason why anyone gets Alzheimer’s disease, but researchers have identified risk factors. They include heart disease, diabetes and high cholesterol. These conditions damage the heart and blood vessels and disrupt the brain’s vital supply lines.

A major problem for families is that there are normal changes that happen as we age. Alzheimer’s disease in its early stages can be easily confused with normal aging, but it is, in fact, very different.

“We may forget where our keys are and things like that,” said Caryn Glosch, Ph.D., director of education and patient/



Playwright Garrett Davis and Stephanie Monroe, director of African-Americans Against Alzheimer’s (Credit: U.S. Against Alzheimer’s)

family services for the Alzheimer’s Disease and Memory Disorders Center at Baylor College of Medicine. “For folks who have early stages of Alzheimer’s, they have a very difficult time holding on to new information. They may forget a conversation they had with someone. They may ask questions repeatedly.”

Alzheimer’s disease is not easy to diagnose. The only absolute diagnosis can come from looking at a patient’s brain—usually after death.

Today, there are several medications on the market that, if used during the early stages of the disease, can help greatly. Another important aspect of care for the patient and family is counseling. It is important for the patient and family to understand the changes that will be occurring and how they can best deal with them.

Because Alzheimer’s disease does not have a cure, the best chance to find answers is through clinical research.

Presently, African-Americans are greatly under-represented in studies.

“We are seeing trends that show African-Americans are more susceptible to the disease. But because they are not participating in research, it is very difficult to understand why,” said Glosch.

“Forget Me Not” drew a sold-out audience. Attendees enjoyed the play and took part in a panel discussion with Glosch, Davis, Rachelle Doody, M.D., Ph.D., director of the Alzheimer’s disease and Memory Disorders Center at Baylor College of Medicine, and a current participant in an Alzheimer’s clinical research study.

“I hope that African-Americans see this as a call to arms,” said Glosch. “That, ‘We need to be involved with research because we are being hit with this disease with a greater impact than others. We need to be part of the cure.’” ■

“I hope that African-Americans see this as a call to arms. That, ‘We need to be involved with research because we are being hit with this disease with a greater impact than others. We need to be part of the cure.’”

— CARYN GLOSCH, PH.D.

Director of Education and Patient/Family Services for the Alzheimer’s Disease and Memory Disorders Center at Baylor College of Medicine



BY

ARTHUR GARSON JR., M.D., MPH

*Director of the Texas Medical Center Health Policy Institute***OBAMACARE: A PRIMER FOR UPCOMING DEBATES >> PART 1: INSURANCE COVERAGE**

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. Health policy issues can be organized by four pillars: insurance coverage, access, quality and cost. Over the next several months, I will address each of these.

“Coverage” means having health insurance. This health insurance can be either public, such as Medicare or Medicaid, the Veteran’s Administration, or commercial by a private insurance company.

Problem: The Uninsured | Before Obamacare, the United States had 42 million uninsured people. This is more than the entire population of Canada. Texas, the state with the largest percentage of uninsured, had approximately 6 million uninsured, which is more than the population of 31 of our states. Aside from the moral issues, being uninsured kills people. The uninsured die at twice the rate of the insured. Having uninsured people also affects those who have health insurance. Recent data demonstrate that the insured cross-subsidize the uninsured: the average yearly insurance premium for a family is \$1,800 higher because those who care for the uninsured are still paid by this cross subsidy.

What Obamacare Did | As of the latest count, 16 million Americans have signed up for health insurance. In Texas, the uninsured rate has fallen from 25 percent to 16 percent. Obamacare was never designed to cover 100 percent of the uninsured. Obamacare was to cover approximately 63 percent of the population. This was made up of 40 percent covered by the Exchange (covering all those with incomes greater than 138 percent of the federal poverty level—\$15,900 for an individual) and 23 percent of those with less than 138 percent of the federal poverty level through the “Medicaid expansion.” The other 37 percent of Texans were not to be covered by

Obamacare: thirteen percent were previously covered by Medicaid but never enrolled—this was largely made up of children; ten percent make too much money—more than 400 percent of the federal poverty level; and 14 percent are undocumented.

What else did it do? President Obama told us that we could keep our health insurance if we want to, and then took that back. Very little is the same health insurance: people who had terrible policies (defined as those that covered very little but cost a lot—but never used them so they never found out) should have lost them. The new policies, as we will see below, are too expensive, and may not need to cover as much as they do. However, as “catastrophic” safety net coverage, (i.e., for use in a catastrophe of medical bills) such policies may be just fine.

The Continuing Problem: Unaffordable Insurance | By and large, if people can afford health insurance, they want it. The problem is that health insurance is not affordable for a large number of people. It may surprise you to know that two-thirds of those without health insurance work.

Most of us reading this article have health insurance through a large employer. These employers pay about 75 percent of the premium, leaving for the employee a yearly premium of approximately \$1,000, a deductible of about \$1,100 with an “out of pocket maximum” (the most you have to pay) of \$3,000. However, a large number of Texans have their work through small employers; and Texas is one of the top three states in terms of the number of small businesses, with 85,000 small businesses in Houston alone. But only 50 percent of small employers provide health care coverage. For those without health insurance coverage through an employer, they must rely on the individual market. Consider the following example: imagine an individual at 200 percent of the federal poverty level making \$23,000 per year; this person

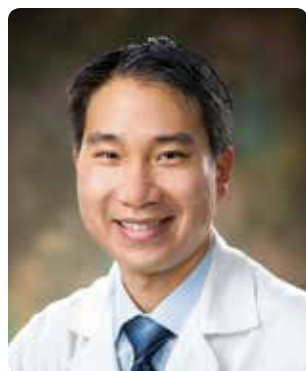
can buy a subsidized ACA Exchange/Marketplace plan with a premium of \$1,400. Unfortunately, this subsidized plan still has an out-of-pocket maximum of \$5,000. The individual, therefore, has a maximum financial exposure of \$6,400, which is 28 percent of income. Just how much income can be devoted to health care? In a recent budget analysis for an individual making \$23,000 per year, housing would be approximately \$9,000, car insurance \$540, gasoline \$2,040, groceries \$4,680, childcare \$3,600, clothing \$1,700, for a total of \$21,560. This leaves \$1,440 (6.2 percent) for everything else. This is primarily why, for individuals in this income bracket, a maximum of three to five percent of income is considered possible and “affordable” for their health care costs. Certainly, in the example in the subsidized silver plan, 28 percent is way too much.

The Fix | What can we do about this? For those making under 138 percent of the federal poverty level, we must address ways to find mechanisms for coverage. At the present time, Texas is not expanding Medicaid. However it is done, Texas must figure a way to get health insurance for these people. For those with incomes greater than 138 percent of the federal poverty level, plans must be created that are affordable, ideally three to five percent of income for those at the lower end of the income scale but at most 10 percent of income. Nonetheless, even the current “catastrophic” plan under Obamacare is far too expensive. This plan, currently only available to those under the age of 30, has a \$6,350 deductible (40 percent of income for a person making \$23,000) and a \$104 per month premium. There are no tax subsidies available for individuals choosing this plan.

The following are characteristics that must be created, in addition to limiting out of pocket costs to three to 10 percent of income: 1) High deductible health plans for catastrophic illness for everyone—not just those under 30 years old; preventive care that is proven to provide value must be available without any cost to the individual; these may require a limited choice of providers. 2) “Medical Savings Account” where an employer contributes a certain amount that the employee can use for out of pocket costs; 3) In order for patients to spend money wisely, two problems must be solved: one, there must be “transparent” pricing and quality data, and two, these data must be understandable to patients of all levels of education. It should come as no shock to anyone that half of Americans have an IQ less than 100. This is by definition, since an IQ of 100 is a median. Nonetheless, patient education materials often fail to realize this. This is not just low “health literacy,” but literacy overall. At the University of Virginia, we created a questionnaire for the public, asking exactly how the person wanted their health information. It placed each person into one of eight groups and then matched educational materials to those groups. Ideally, this type of system would be incorporated to educate the public about health plan choices.

In summary, the main focus of Obamacare has been to provide health insurance. In Texas, the uninsured rate has decreased by 36 percent—a major accomplishment. However, to cover more of the uninsured, plans must be made more affordable, and those extremely poor who would be eligible for Medicaid expansion must receive coverage in some way that is uniquely Texan. In the next parts of this series, we will see that access, quality and cost have not been as well-served by Obamacare. ■

ACCOLADES



JASON AU, M.D., pediatric urology fellow at Texas Children's Hospital and Baylor College of Medicine, was awarded the top prize at the Society for Pediatric Urology, Society of Fetal Urology and American Urological Association's Annual Meeting for his case presentation, "Urologic Considerations in the Separation of Conjoint Twins." Au was recognized for excellence and innovation in case presentation. The national meeting is the largest of its kind in the world providing unparalleled access to groundbreaking research, new guidelines and the latest advances in urologic medicine.



MARTINA GALLAGHER, PH.D., R.N., assistant professor at the UTHealth School of Nursing, was recognized by the Houston Chronicle as a Top Nurse honoree during their annual Salute to Nurses campaign. Gallagher received her B.S.N. and M.S.N. in Administration of Community and Healthcare Systems with minors in Teaching and Informatics, and a Ph.D. with an emphasis on health promotion of Hispanic families from the University of Texas Health Science Center at San Antonio.



GRANVILLE BETTON has joined Gulf Coast Regional Blood Center as the vice president of operations. Betton has 30 years of experience in operations, manufacturing, service, quality and process improvement, including 17 years with GE Plastics and GE Healthcare, where he held positions of increasing complexity and responsibility, eventually becoming general manager for global quality and environmental health and safety for GE Healthcare Services. From GE he joined Momentive Specialty Chemicals, Inc. in upstate New York, before being recruited to Houston by Nexeo Solutions. He holds a bachelor's degree in chemical engineering from Rensselaer Polytechnic Institute.



SETH LERNER, M.D., professor of urology at Baylor College of Medicine and part of the NCI-designated Dan L. Duncan Cancer Center, has been named editor-in-chief of Bladder Cancer, the first journal dedicated to the disease. The recently launched journal provides an open forum for original research in basic science, translational research and clinical medicine that will expedite fundamental understanding and improve treatment of tumors of the bladder and upper urinary tract.



L. MAXIMILIAN BUJA, M.D., professor of pathology and laboratory medicine at UTHealth Medical School, chief of cardiovascular pathology research at the Texas Heart Institute, consultant in cardiovascular pathology to the Harris County Institute of Forensic Sciences and executive director of the TMC Library, is the 2014 recipient of the President's Scholar Award for Excellence in Teaching, presented by the UTHealth Science Center at Houston. The President's Scholar Award recognizes outstanding scholarly accomplishments, published works in teaching, enthusiasm, innovation, teaching-related mentoring activities and peer and student recognition.



STEVE R. SHELTON assistant vice president, UTMB Community Outreach Programs at the University of Texas Medical Branch at Galveston, has been named the 2015 recipient of the Louis Gorin Award for Outstanding Achievement in Rural Health Care from the National Rural Health Association. Each year, the Gorin Award is presented to an outstanding individual who has dedicated time and talent to improving the health and wellbeing of rural Americans. Shelton's 25-year leadership of Texas AHEC East is at the heart of his work impacting rural health policy, legislation, healthcare and health programs.



JOHN DORMANS, M.D., has been appointed chief of orthopedics at Texas Children's Hospital. Through this appointment, Dormans will also serve as a professor of orthopedic surgery at Baylor College of Medicine. Since 1990, Dormans has been a clinician and leader at Children's Hospital of Philadelphia, serving as the hospital's chief of orthopedic surgery from 1996 to 2014 and as president of the medical staff and president of Children's Surgical Associates for four terms. He is an internationally recognized physician and scholar with accomplishments in research and teaching and numerous "best doctors" awards.



HEIDI L. TRACY has been appointed as the new vice president for advancement for Texas Woman's University, the nation's largest university primarily for women. Tracy previously served as the vice president for institutional advancement at Otterbein University, Ohio. Prior to joining Otterbein, Tracy served as vice president for individual giving at Carnegie Mellon University.

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[†]The COMPASS study found that the Corus CAD algorithm has a sensitivity of 89% and an NPV of 96% at the pre-specified threshold of 15 in the overall population of men and women referred to MPI.
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UH Undergrads Explore Solutions for Alzheimer's, Cancer and Other Challenges

Solutions for Alzheimer's, breast cancer, type 2 diabetes, migraines and lymphoma are just some of the medical challenges a group of University of Houston students have targeted this summer. Forgoing fun in the sun for some serious research, these students are part of an intensive, full-time research program—the Summer Undergraduate Research Fellowship (SURF).

Far from SURF-ing their way through what's vacation time for many, these students are just a few of this year's 74 SURF participants who delved into a number of complex projects during the course of 10 weeks under the mentorship of UH faculty members. Working on projects across a variety of disciplines, each scholar received a \$3,500 scholarship.

"It's well known that when students engage in activities such as mentored research, their likelihood of graduating is significantly increased," said Karen Weber, director of the Office of Undergraduate Research. "Over the past years, we have found that students who participate in SURF, the Provost's Undergraduate Research Scholarship program or the Senior Honors Thesis program have a greatly improved graduation rate as compared to those who did not participate."

Adelle Flores, a junior biomedical sciences major in The Honors College,

“It's well known that when students engage in activities such as mentored research, their likelihood of graduating is significantly increased.”

— KAREN WEBER

Director of the Office of Undergraduate Research at the University of Houston

said she has always been interested in Alzheimer's disease, but even more so when her grandmother died of complications from it. When she came across an opportunity to research in a lab that studies drugs to combat Alzheimer's, she had to take it. Working under the mentorship of College of Pharmacy associate professor Jason Eriksen, Flores is working on determining if a molecule released by cells lining blood vessels, called prostacyclin, is protective in Alzheimer's disease.

"In the future, my work could be used to potentially develop a drug that targets Alzheimer's disease, or at the very least could help treat some of the symptoms caused by it," Flores said. "My experience in the SURF program has been absolutely phenomenal, and it's opened up a whole new world to me about all types of research."

This year, SURF alumni have come back to speak with the current SURF students about how they continued researching and turned it into a career. In addition to her own research experiences, this has inspired Flores

to become even more dedicated to her studies, Flores said, as well as motivated her to perform well in school so that she can pursue research later as an M.D./Ph.D.

This year's SURF program wrapped up Aug. 7, and the students will present research posters on their projects at UH's 11th annual Undergraduate Research Day Oct. 22. ■

— Lisa Merkl,
University of Houston

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CHI St. Luke's Health presents

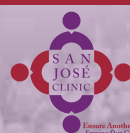
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Thursday, October 22, 2015

11:30 am - 1:00 pm at River Oaks Country Club



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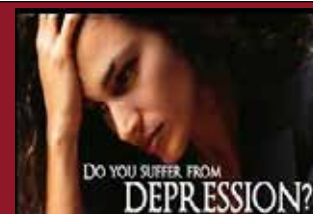


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September 2015

8 **The Commercialization Pathway: An Introduction**

Tuesday, 2:00 p.m. – 3:30 p.m.
UTHealth Medical School
Suite MSB 2.103
6431 Fannin
msresearchcommittee@uth.tmc.edu
713-500-5605

9 **Pharmaceuticals Without Borders: A Look at the Costs and Benefits of the More Expensive Drugs**

Wednesday, 8:30 a.m. – 12:30 p.m.
The University of Texas
School of Public Health
Reuel A. Stallones Building
First Floor Auditorium
1200 Pressler St.
healthlaw@uh.edu
713-743-2101

11-12 **MD Anderson Proton Therapy Center 2nd National Education Conference**

Friday – Saturday, 7:00 a.m. – 12:00 p.m.
The University of Texas
MD Anderson Cancer Center
Robert C. Hickey Auditorium, Floor 11
R. Lee Clark Clinic
1515 Holcombe Blvd.
AMBaring@mdanderson.org
713-563-7388

8th Annual Advances in Neurology
Friday – Saturday, 7:00 a.m. – 5:00 p.m.
Houston Methodist Research Institute
2nd floor
6670 Bertner Ave.

cme@houstonmethodist.org
713-441-4971

12 **11th Annual Diabetes Symposium**

Saturday, 7:30 a.m. – 4:00 p.m.
Denton A. Cooley Auditorium at
CHI St. Luke's Health, B1 Level
6770 Bertner Ave.
cme@texasheart.org
832-355-9100

14 **Prairie View A&M University College of Nursing Information Session**

Monday, 12:00 p.m. – 1:00 p.m.
Prairie View A&M University
College of Nursing Auditorium
6436 Fannin
hnursing@pvamu.edu
713-797-7031

14-19 **A Comprehensive Board Review in Hematology and Medical Oncology**

Monday – Saturday, 7:00 a.m. – 3:30 p.m.
The University of Texas
MD Anderson Cancer Center, Floor 11
R. Lee Clark Clinic
1515 Holcombe Blvd.
festelle@mdanderson.org
713-745-0083

17-18 **2015 Trauma Informed Care Conference: Transforming the Lives of Families**

Thursday – Friday, 8:30 a.m. – 4:30 p.m.
The Westin Houston Memorial City
945 Gessner
jdemasi@depelchin.org
713-802-7706

18-19 **Metastatic Breast Cancer Conference**

Friday – Saturday, 7:00 a.m. – 5:00 p.m.
The University of Texas
MD Anderson Cancer Center
Mitchell Basic Science Research
Building, Onstead Auditorium
6767 Bertner Ave.
josh@theresasresearch.org
618-580-0908

19-20 **Baylor Global Hack-A-Thon**

Saturday – Sunday, 8:00 a.m. – 6:00 p.m.
TMCx
2450 Holcombe Blvd., Suite X
global@bcm.edu
713-798-1935

26 **8th Annual Aim for the Cure Melanoma Walk and Fun Run**

Saturday, 6:00 p.m. – 9:00 p.m.
The University of Texas
MD Anderson Cancer Center
Valet Area, Mays Clinic
1180 Pressler St.
JNSager@mdanderson.org
713-419-9948

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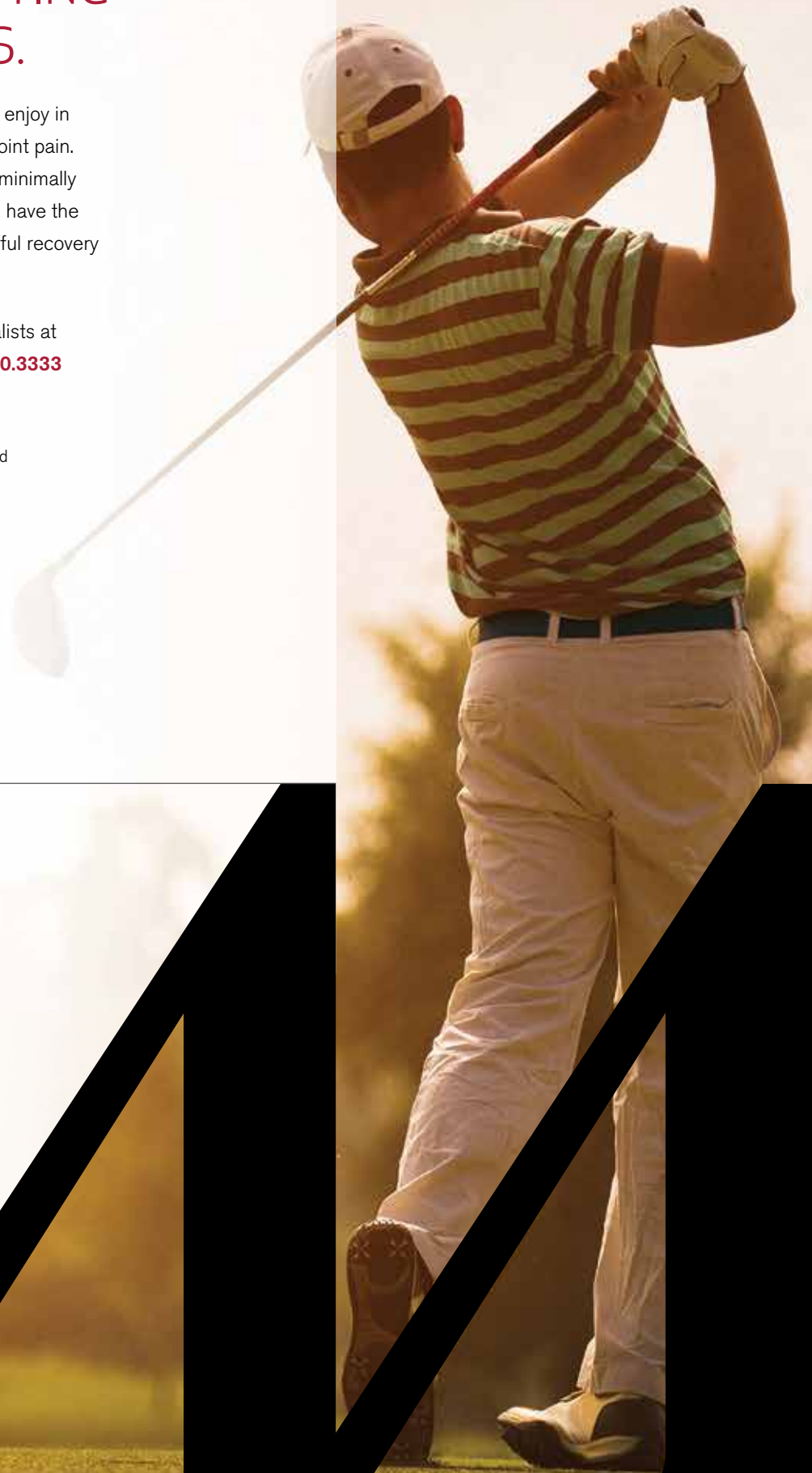
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