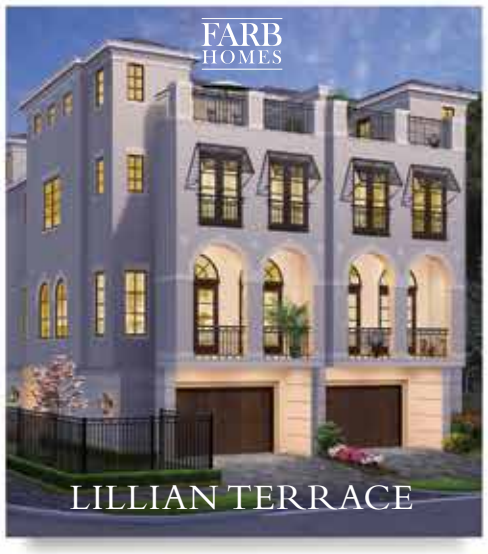
TMC PULSE

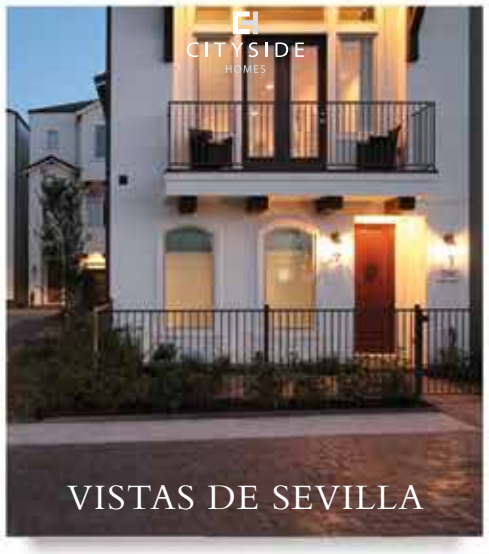
THE OFFICIAL NEWS OF THE TEXAS MEDICAL CENTER — VOL. 2 / NO. 6 — JULY 2015

Giving Paws

A look at the four-legged therapists in the Texas Medical Center



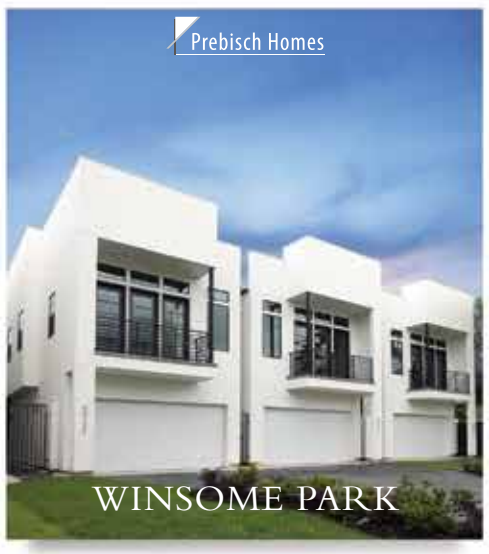
RICE MILITARY
FROM THE $640'S



RICE MILITARY
FROM THE $440'S

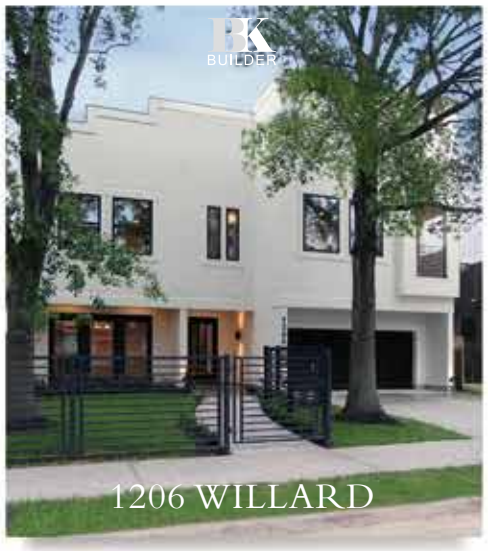
GARDEN OAKS
FROM THE $570'S

HEIGHTS
FROM THE $530'S



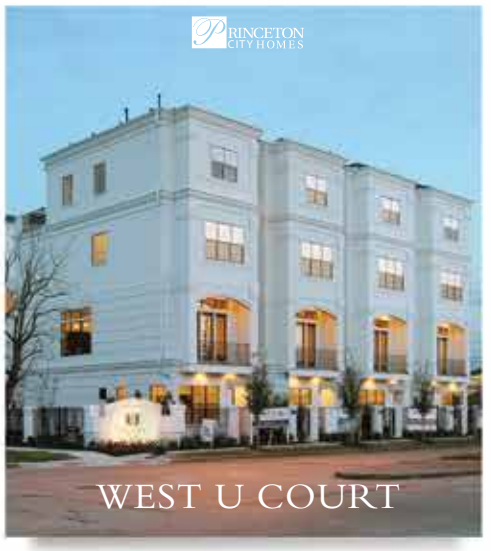
GALLERIA
FROM THE $690'S

MUSEUM DISTRICT
FROM THE $450'S



MONTROSE
$1,199,000

UNIVERSITY PLACE
FROM THE $730'S



WEST UNIVERSITY PLACE
FROM THE $670'S

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NMLS: 137773

ADA: 25 YEARS LATER // p. 5

THE AMERICANS WITH DISABILITIES ACT *WAS PASSED ON JULY 26, 1990, PROHIBITING DISCRIMINATION ON THE BASIS OF MENTAL OR PHYSICAL DISABILITY. ONE OF THE LAW'S CHIEF ARCHITECTS RECALLS HOW HE AND HIS COLLEAGUES HELPED MAKE HISTORY.*

ON THE COVER: *Nala, a Golden Retriever with the pet therapy group Caring Critters, comforts a patient at Texas Children's Hospital.*

PRESIDENT'S PERSPECTIVE

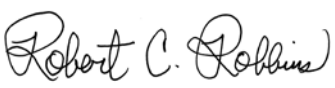
ROBERT C. ROBBINS, M.D.
President and
Chief Executive Officer,
Texas Medical Center

In this issue of Pulse, you will read about therapy animals and their role in not only helping bring joy to hospital patients of all ages, but also in rehabilitation and physical therapy. This campus is home to some incredible rehabilitation programs, and each day there are teams of professionals helping individuals overcome tremendous obstacles. These folks understand that while exceptional treatment and care are paramount, patients facing temporary or lifelong disabilities will encounter entirely new challenges once they return to their lives outside of the medical center.

July marks 25 years since the Americans with Disabilities Act (ADA) was signed into law, prohibiting discrimination on the basis of mental or physical disability. It also ensures that public spaces, transportation and services are accessible to all—whether that means widening entryways and installing ramps to allow wheelchair access, or ensuring accessible parking spaces for those with limited mobility. What may seem like fixtures in public spaces today were not always so.

Beyond policy, the advancements that have been made in equipment and technology over the past 25 years are noteworthy—from wheelchairs and prosthetics to communication assistance technology and wearable monitoring devices. Imagine what can be accomplished in the next 25 years.

Here in the medical center, we see researchers, engineers and patients work together to develop equipment that can help individuals overcome various physical and medical challenges. We hope that this progress continues—whether through the inspired engineering students at Rice, collaborations between our campus' medical schools and teaching hospitals, or our very own TMC Innovation Institute.



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Accessibility For All

NEARLY 30 YEARS AFTER HE HELPED DRAFT A REPORT THAT WOULD LATER BECOME THE AMERICANS WITH DISABILITIES ACT, UTHEALTH PROFESSOR AND TIRR MEMORIAL HERMANN PROGRAM DIRECTOR LEX FRIEDEN REFLECTS ON THE CHALLENGES OVERCOME, AND THOSE STILL AHEAD.

By Alex Orlando

"I'd like for Houston to be known worldwide as a model of full inclusion and equal opportunity for everyone, regardless of their personal circumstances."

— LEX FRIEDEN

Professor of Biomedical Informatics at The University of Texas Health Science Center at Houston

Shaded beneath the recently completed façade of the Tower of the Americas, the 750-foot observation tower that distinguished the 1968 World's Fair in San Antonio, Texas, Lex Frieden sat contentedly on the sidewalk. Waiting for his friends to arrive—a small table perched on the arms of his wheelchair supporting a lone cup of beer—21-year-old Frieden experienced a sobering moment. A gentleman walking by paused, almost absent-mindedly, before casually stuffing three dollars into the cup. "Too bad you can't get a job," he lamented.

"That attitude was representative of what was prevalent at the time," said Frieden, currently professor of biomedical informatics at The University of Texas Health Science Center at Houston (UTHealth) and director of the Independent Living Research Utilization Program (ILRU) at TIRR Memorial Hermann. "I don't think I looked like a beggar, with my high-priced wheelchair and drinking a Lone Star beer, but I guess that was his stereotypical view of what an outcast in society might appear to be."

Today, deftly navigating his motorized wheelchair, Frieden paints a vivid picture of a changed landscape. "At the time, people's real challenges were not their own disability, it was the environment; it wasn't their own attitudes, it was the attitude of other people towards them," he said. "Regardless of how well prepared a person might be through the rehabilitation process, society had certain expectations of them that were hard to overcome. A lot's changed since then."

Changes made possible—in no small part—thanks to Frieden's commitment to squelching discrimination and promoting accessibility. As a chief architect of the 1990 Americans with Disabilities Act (ADA), he helped draft legislation to protect the civil rights of the more than 56 million people with disabilities in the United States, including at least 3 million Texans.

"The ADA covers a wide range of issues," said Frieden. "It covers transportation, education, and perhaps most importantly, employment. In the day before the ADA was enacted, I could apply for a job and an employer could look at me straight and say, 'You're in a wheelchair, we don't employ people who use wheelchairs.' It was perfectly legal for private employers. All that changed on July 26, 1990."

In addition to banning discrimination based on a disability, the ADA requires that public accommodations, from restaurants to hospitals, make "reasonable modifications" to their policies and practices to ensure access for disabled members of the public.

AMERICANS *with* DISABILITIES ACT

The Americans with Disabilities Act (ADA)*—closely modeled after the Civil Rights Act of 1964—prohibits discrimination based on disability. The ADA includes both mental and physical disabilities and requires employers to provide reasonable accommodations to employees with disabilities. The Act also imposes accessibility requirements on public places like hospitals and schools.*

POPULATION

37.6 MILLION

people in the United States
have a disability[1]

SPECIFIC DISABILITIES

14.3 MILLION

people reported a cognitive disability[1]
that interferes with daily activity

ACCESSIBILITY

98 PERCENT

of transit buses have been equipped with lifts or ramps
as of 2011, which represents a 62 percent increase from 1995[2]

ON THE JOB

33.5 PERCENT

of disabled 21- to 64-year-olds
reported employment[1]

EQUIPMENT

3.6 MILLION

people age 15 and older
use a wheelchair[2]

EDUCATION

12.4 PERCENT

of disabled people age 21 and older
have a bachelor's degree or higher[1]

1: Disability Statistics from the 2012 American Community Survey

2: The United States Census Bureau

Twenty-five years later, the law marks the most sweeping disability rights legislation in history, closely modeled after the Civil Rights Act.

"I've admired Lex since I first heard about him," said Gerard Francisco, M.D., chief medical officer at TIRR Memorial Hermann and chairman of the Department of Physical Medicine and Rehabilitation at UTHealth. "I feel that what I'm doing on a daily basis to help my patients with disabilities is largely affected by Lex's work in the 1970s and the passing of the ADA in 1990. My mission and vision for rehabilitation has been influenced, to a certain extent, by those accomplishments."

Frieden's role in shaping history stemmed from a head-on car crash in 1967 that left him paralyzed from the waist down. After coming to TIRR Memorial Hermann for rehabilitation, Frieden, then an 18-year-old freshman at Oklahoma State University, left determined to move forward.

"When I left TIRR, my doctors said that I could do anything I had done before I was injured—I just had to figure out how to do it on four wheels," he recalled. "That didn't seem intimidating to me, because we were sending men to the moon at that time. I left with a pretty positive attitude."

Unfortunately, that optimism was deflated by the realities of wheelchair accessibility at Oklahoma State, where a lack of ramps made stairs and sidewalks loom large. After dropping out and setting his sights on Oral Roberts University in Tulsa, Frieden faced another setback.

"After applying, I got a letter back a few weeks later that said my admission had been denied," he said. "I was sure there had been some mistake. Eventually, I just asked the dean, 'What could possibly be the problem?' It was because I had indicated that I used a wheelchair for mobility on my application—their policy was not to accept students with disabilities. I couldn't even tell my parents. It was the first time after I broke my neck that I truly felt depressed."

Rebuffed, Frieden went to the University of Tulsa instead, where he graduated in three years. In 1971, he went on to pursue a master's degree at the University of Houston, enticed by the fact that it was one of the first major colleges in the nation to have ramps in its buildings.

As a student, Frieden had the opportunity to do a fellowship at Baylor College of Medicine, as well as work at TIRR Memorial Hermann. "When I graduated, it just seemed natural to continue working in that stimulating milieu," he said. "Baylor hired me as a research assistant, and my post at TIRR was developing programs to help former patients live independently in the community. And then we began to document what environmental barriers they faced."

That systematic process led Frieden and his peers to question what style of living would help to lessen some of those obstacles. In 1976, they founded the Independent Living Research Utilization program, eventually helping to organize about 400 centers of independent living in the United States over the next decade.

At the same time, Frieden was broadening his scope of interest to include the issue of discrimination—spurred by a decade-late apology letter from Oral Roberts in 1978. After being appointed to report on potential accessibility improvements in Texas—which led to the state's new building code—Frieden testified before Congress in 1983.

As executive director of the National Council on the Handicapped (now the National Council on Disability), Frieden and his peers were tasked with delivering a report on the legislative needs of people with disabilities. After crafting the report, titled "Toward Independence," they prepared to show their findings to President Ronald Reagan. When the explosion of the space shuttle 'Challenger' sent ripples across the globe—two hours before their meeting—the group found themselves face to face with the vice president the following morning—George H.W. Bush.

"He had read our report the night before, and he seemed to relate to our issues. He told us that he and Barbara had a daughter who died as a result of leukemia at a very young age and that one of their sons had dyslexia, so it was a wonderful, productive conversation," said Frieden. "By the end of it, vice president Bush said, 'I'll pass this along to the president, and I'm sure he will appreciate it, but you know I'm just the vice president.' And then he added, 'If in the future I ever have an opportunity to do more to help you, I will.'"

Two years later, Bush was elected as the 41st president of the United States; two years after that, he signed the Americans with Disabilities Act. Among many other significant developments, the law prompted wheelchair-accessible transit systems, led to our current electronic voting system—which allows blind voters to cast secret ballots—and barred employers from denying a qualified applicant based on a disability.

While many physical and societal barriers have dissolved, people with disabilities still struggle to find sufficient employment and face less overt—but no less insidious—forms of discrimination.

> **"While disability awareness has come a long way, it needs to go further. [...] The bottom line is that everybody and anybody can be productive. That has to be recognized and we need to allow people to demonstrate their skills."**
>
> **— JAY STITELEY**
> ***Director of the Mayor's Office for People with Disabilities***

"There's another aspect when we're looking back at the past 25 years," said Frieden. "The unemployment rate among people with disabilities today is nearly as high as it was when the ADA was passed. That's counterintuitive. While all the buildings and facilities have been modified, some of the hiring practices and attitudes haven't changed. We've gone from the case of open discrimination to the case of subtle, poorly-informed judgments."

On the cusp of the 25th anniversary of the law's passage, the opportunities to reinvigorate the conversation and correct misconceptions about disability rights are endless.

"We've come a long way, but we need to continue to enforce change and empower people with disabilities," said Francisco. "You'd be surprised—many people are not familiar with the ADA, and part of that is that they were not educated. They may know some elements but don't know their overall rights. It's an ongoing process, and it should be."

"While disability awareness has come a long way, it needs to go further," added Jay Stiteley, director of the Mayor's Office for People with Disabilities (MOPD). "One of the components of that is to accept individuals with disabilities the same way that you would accept anyone else. It's about recognizing that everybody is different—it doesn't matter who you are, whether you have blonde hair or black hair or whether you read with your fingers or read with your eyes. The bottom line is that everybody and anybody can be productive. That has to be recognized and we need to allow people to demonstrate their skills."

At TIRR Memorial Hermann, advances in technology present another opportunity to level the playing field. From its affiliation with NASA to its therapy programs in wearable rehabilitation robotic systems, the advanced technology available is allowing patients to better reintegrate into their communities.

"Our objective is to study and develop clinical applications for wearable rehabilitation robotic systems, such as exoskeletons, to facilitate recovery and community reintegration for people with spinal cord injury, stroke and other neurological disorders that lead to problems with walking," said Francisco.

"The potential to use biomedical informatics to help people with disabilities is huge," said Jiajie Zhang, Ph.D., dean of the UTHealth School of Biomedical Informatics, where he holds the Dr. Doris L. Ross Professorship. "The technology is already there, so the question is how to bring together the designed products to help people. From cameras that can detect if you've sustained a fall, to voice activation technology, the potential to turn those advances into systematic products is huge."

Frieden believes that Houston—with the Astrodome's long entrance ramps serving as a beacon of accessibility as far back as 1968—can continue to usher in an era of change. "Houston has been on the forefront in many of these breakthroughs largely because of the leadership in our community, throughout the medical center and as a result of public support for these issues," he concluded. "I'd like for Houston to be known worldwide as a model of full inclusion and equal opportunity for everyone, regardless of their personal circumstances." ■

A LOOK BACK

LEFT: Frieden helped establish the Independent Living Research Utilization Program at TIRR Memorial Hermann in 1979.

MIDDLE: Vice President George H.W. Bush greets Frieden at the White House in 1984.

RIGHT: In 1991, Frieden and President Bush celebrate the first anniversary of the passage of the Americans with Disabilities Act at the White House Rose Garden.

(Credit: Lex Frieden)

Local Eats

The Rice University Farmers Market provides some of the freshest food in Houston, sold by vendors located within 200 miles of the city

By Shea Connelly

Cas Van Woerden, owner of the certified organic Animal Farm based in Cat Spring, Texas, chats with customers at the Rice University Farmers Market.

Every Tuesday afternoon, a series of tents pops up in a parking lot at Rice University, in the shadows of the university's football stadium. No, it's not a pre-game tailgate—year-round, rain or shine, this section of blacktop plays host to a farmers market.

The university invited the market, originally known as the Houston Farmers Market and held adjacent to Rice University, to move to its more spacious parking lot in 2007. In 2010, it became known as the Rice University Farmers Market and is now an official part of the university's Housing and Dining department.

Between 25 and 30 vendors set up shop each week, selling everything from fruit, vegetables, meat and eggs, to popsicles, kombucha, artisan pasta and cheese. No two vendors are exactly alike. In fact, market manager Beth Leaver said they make a concerted effort to ensure variety each week so vendors don't have to compete with other stands selling the exact same thing.

"We're not going to have two vendors selling salsa, two vendors selling olive oil," she said. "Vendor selection is based on bringing diversity to the market."

The one thing everyone at the market has in common? An emphasis on local. For the Rice Farmers Market, "local" is defined as being produced within 200 miles of the university.

"If you're getting food from a grocery store, it is probably coming from a distance away where it ripens while it travels. It's not freshly picked that day," said Leaver. "By shopping at a farmers market, you are given the opportunity to ask the farmer about how they grew their produce or how they're raising their animals."

To participate in the market, vendors fill out an application covering everything from the type of business to their growing practices—whether they are certified organic, sustainable or conventional. Admittance depends on a number of factors. Vendors who sell agricultural products take precedence over prepared food vendors. Prepared food products are only considered if the applicant can show that at least one ingredient is sourced locally year-round. Each vendor must have all of the necessary permits and licenses to operate a business, and the weekly fee for admitted vendors is $20.

"We are a nonprofit and all the weekly fees we collect go back into marketing and events we have throughout the year," said Leaver. "We are simply hosting a local and sustainable food marketplace for the community."

Though the goal is to keep the products sold in the market as local as possible, not all vendors are able to create 100 percent local products year-round. The seasonal nature of certain items means that someone who produces peach jam, for example, will not necessarily be able to find peaches locally all year long. The market management understands that, said Leaver, and uses signage to ensure consumers are aware of where their food comes from.

"Since I've been a part of this market, my goal has been to make everything as transparent as possible," she said. "We do site inspections along with having our vendors display signs so our customers can clearly understand what they are buying, where it comes from, and how it was produced."

Signs also clarify product details, such as whether produce is conventional, sustainable or certified organic. One regular vendor, Animal Farm, is certified organic. The 70-acre farm, based in Cat Spring, Texas, sells a variety of vegetables and fruits, as well as bouquets of flowers. Animal Farm operates off the grid and derives electricity from solar energy.

"Our mission is to bring fresh, local food to the people—to give people access to good food, period," said owner Cas Van Woerden.

While the other vendors at the market may not be officially certified as organic, the majority are sustainable,

> By shopping at a farmers market, you are given the opportunity to ask the farmer about how they grew their produce or how they're raising their animals.
>
> — BETH LEAVER
> *Manager of the Rice University Farmers Market*

meaning they follow many of the same practices as organic farmers.

The market also takes the word "farmers" in its title seriously. Although there are a number of stalls selling prepared foods each week, Leaver said priority is given to those interested in selling produce and protein they have grown and raised. That fact is not lost on those who travel many miles into the city of Houston to set up shop.

"I love the Rice market," said Patricia Tieken of Shiner Pork and Beef. "It's the only market I go to where more than 50 percent are actual farmers. That's what people hopefully come to farmers markets for—to support small farmers—and when you come to Rice, you're supporting small farmers."

Tieken, her husband, and their four children run the 100-acre farm where they raise English Large Black hogs and Beefmaster cattle to produce heritage pork and grass-fed beef. They have been participating in the Rice market for about two years.

"When you come here and you buy bison, or pork and beef, or vegetables, or honey, you can't get this quality of food anywhere else," she said. "It spoils you."

Rice's support of the weekly farmers market goes beyond playing host. The chefs at the campus serveries often buy produce from the market and post signs at their cooking stations noting when ingredients are purchased locally. If a farmer who sells at the market has a surplus of a particular product, the serveries will sometimes do "food rescues," meaning the chefs will purchase that surplus item to serve to students.

The market also employs a student intern. Current market intern, Belle Douglass, a rising senior, is co-president of a campus club called Real Food Revolution.

"We are very focused on promoting local and sustainable food and farming practices," said Douglass. "We throw an event every semester where we have an on-campus chef make a three-course meal featuring local foods, a lot of which they buy at the farmers market."

Douglass described Rice's student body as very environmentally focused.

"They like to know in the servery if things were purchased here, and there is definitely a positive response when they are," she said.

The market hosts several major events each year that are popular among students. This past year, they held Oktoberfest, Mardi Gras and Cinco de Mayo events.

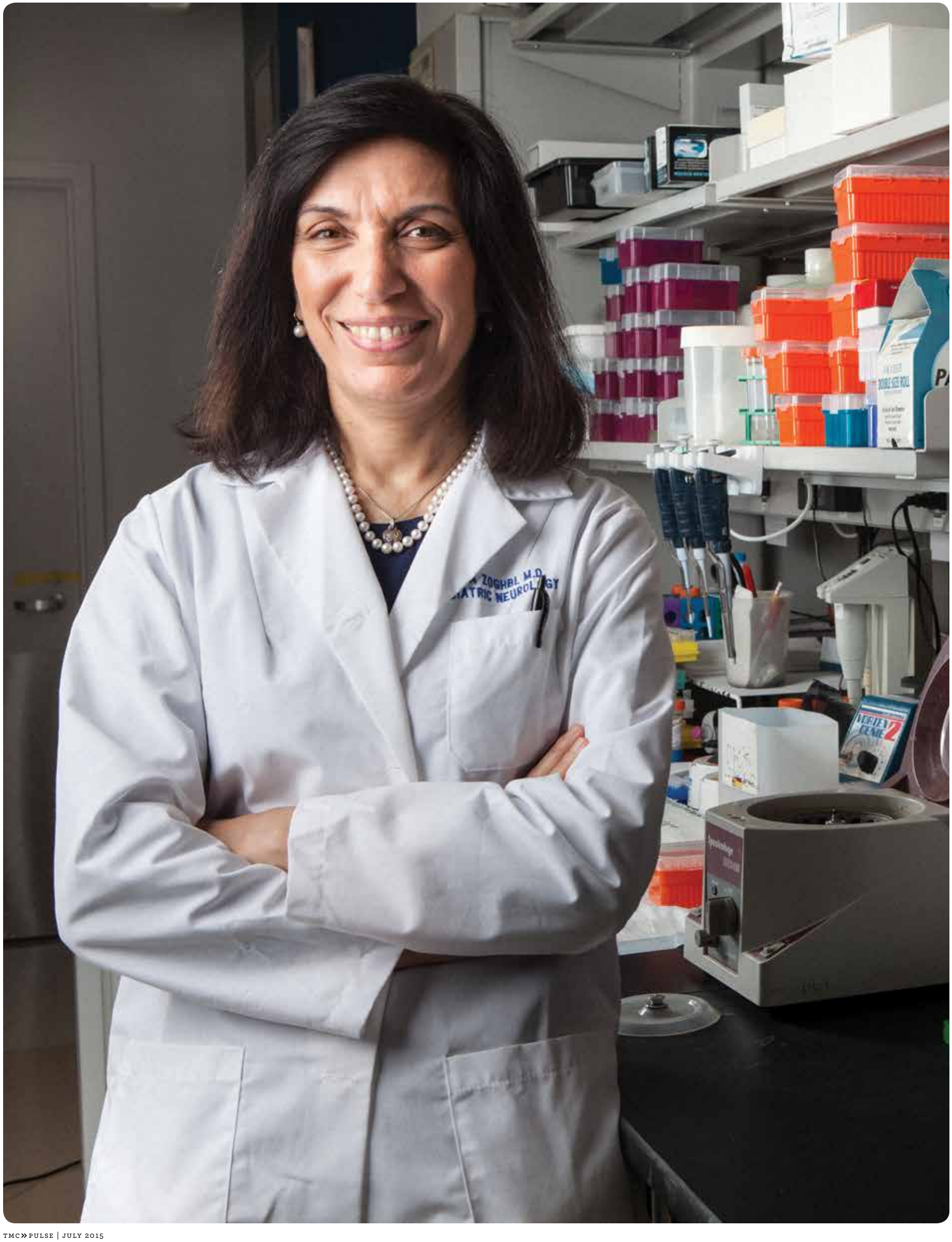
"Some of our Rice chefs will cook onsite with food purchased from the market, we'll have a band play and a few local craft breweries—such as No Label, St. Arnold and Karbach—will join us as well," said Leaver. "It's almost like a street festival, but better. It's a lot of fun, and we encourage the community to join us at these events."

The true value of the Rice Farmers Market, however, goes beyond the university's boundaries. The vendors and market staff described it as being more than simply a place to buy food. It's an education—a way to learn more about where your food comes from and how it's cultivated or raised. It's a community gathering place, where students, professors, university staff and those living in the neighborhoods surrounding the university can come together.

"The Rice market has a real mixture of clientele," said Mike Palmer, who owns Cellar Farms with his wife Cindy Palmer. "We have the college students and also people from different cultures who shop here. We hear a lot of different dialects."

Cellar Farms sells a variety of sustainably grown produce, as well as the honey produced by the bees they keep. The Palmers hang a sign at their stall advertising local pure honey in both English and Chinese.

"That's what we really like about this place," said Palmer. "It's a good open market with a lot of different cultures. The individuals around here just enjoy good fresh vegetables."



HUDA Y. ZOGHBI, M.D., ***PROFESSOR IN THE DEPARTMENT OF MOLECULAR AND HUMAN GENETICS AT BAYLOR COLLEGE OF MEDICINE AND DIRECTOR OF THE JAN AND DAN DUNCAN NEUROLOGICAL RESEARCH INSTITUTE AT TEXAS CHILDREN'S HOSPITAL, HAS HAD AN EXCEPTIONAL CAREER. FROM HER EARLY DAYS AS A MEDICAL RESIDENT IN PEDIATRIC NEUROLOGY TO HER RESEARCH ROLE IN THE DISCOVERY OF THE GENE FOR RETT SYNDROME, ZOGHBI HAS ALWAYS HAD A DESIRE TO GIVE FAMILIES THE ANSWERS THEY NEED WHEN FACED WITH A DEVASTATING DIAGNOSIS.***

Q | *Can you tell us a bit about your formative years?*

A | I was born in Beirut, Lebanon, and was fortunate to have a family who valued scholarship. My parents always encouraged me to study and my bibliophile dad would spend hours reading in his huge library. His library was filled with books from floor to ceiling, a room I enjoyed spending time in as well.

I attended school in Beirut. I fell in love with English literature in high school and decided to declare it my major once I enrolled in a university. My mom disagreed. She felt that literature was not the right path for me, which led to quite a few arguments. She would say, 'I can't believe that you are so good in biology but you are going to study English literature just because you like reading and writing. You can do that as a hobby and focus on medicine professionally. For a woman it will be much better to have a career in medicine than to be a writer.' I eventually began to understand her point, and after much discussion, ultimately entered the pre-med program at the American University of Beirut.

Q | *What led you to Houston?*

A | I completed my pre-med degree at the American University of Beirut and then began medical school there. I was very happy living in Beirut. The city was at its peak, a dream place to be. When the civil war began, however, the quality of life in Beirut quickly deteriorated.

Towards the end of my first year of medical school, Beirut was becoming quite dangerous and my parents suggested that I spend the summer with my sister who was living in Austin, Texas, at the time. I arrived in Texas thinking that my stay would only last through the summer. Unfortunately, the war continued to escalate during those months and I decided to transfer to a medical school in the United States. I ultimately enrolled in Meharry Medical College in Nashville, Tennessee.

While in Nashville, I traveled to Houston for electives at Baylor College of Medicine. During one of my trips, I met Dr. Ralph Feigin, chairman of pediatrics at Baylor and physician-in-chief at Texas Children's Hospital. He encouraged me to consider the program here and asked, 'What can I do to get you to come to Baylor?' He didn't have to do much as I quickly knew Baylor was the right choice for my residency.

When I arrived at Baylor, I studied pediatrics and neurology and just loved it, truly enjoying my residency years. For someone who's been transplanted as an immigrant, not knowing anyone in Houston, the program became my family and Dr. Feigin became like a second father to me. I decided to stay for additional training.

I was trained as a physician, but patient encounters during my pediatric neurology residency inspired me to get research training and led me into science. It was 1985. At the time, the best you could do for a patient with a neurological disease was to meet with the family members, tell them the likely diagnosis, let them know it was probably a genetic disorder that could happen again, and let them know there was unfortunately nothing to be done. It was devastating, to say the least. That's what compelled me to go into the lab. I wanted to learn what I could about biology and genetics, and how to find disease genes so that we could diagnose more accurately and help families by eventually understanding how to treat these devastating disorders.

Q | *Are there any moments from your career that stand out as being your proudest achievements?*

A | Making a discovery in an area that I'd been working on for years always stands out—knowing how important it is for us to understand how to solve a neurological problem or better treat a disease. Those moments stand out the most.

I will never forget the day my collaborator, Harry Orr, and I simultaneously sent each other faxes. We were both exchanging the discovery of the spinocerebellar ataxia 1 mutation in our respective labs. We had been collaborating and both discovered the mutation on the very same day. I will never forget that. It's our special anniversary—April 8, 1993, and we always congratulate each other on that day.

On another occasion, I was returning from a family trip to Lebanon with my children and as I was putting the key in the door, I heard the phone ringing. I picked it up and my postdoctoral fellow, Ruthie Amir, said, 'We found a change in a gene in Rett syndrome patients. Can I show you the data?' And I said, 'Absolutely. Yes!' I had just traveled for 24 hours, yet I still wanted her to come to the house immediately with all her data. That moment, the excitement of seeing the changes for the very first time, plays over and over again in my head. A few days later we wrote the paper, and two days after that, the paper was accepted.

It was a very exciting time when we found the Rett syndrome gene, because it was a result of a 16-year search. When you wait for something for 16 years and it finally comes, it's an unbelievable feeling.

Those two discoveries are the moments that truly stand out. There are many others, of course. When students I've mentored and grown to love graduate, or when my first fellow received a faculty position, I'm holding back a tear. These are all very special and the moments that I am the most proud of. And then, of course, to be recognized for what I love to do is so meaningful and such a privilege.

Q | *Speaking of your discoveries, can you tell us a little bit about what those mean? And what has been the impact of those discoveries?*

A | There have been several different discoveries and each has had a different impact.

Our first discovery was a gene that causes neurodegeneration. It's an inherited disease called spinocerebellar ataxia type 1 (SCA1) that affects balance. Patients experience gradual neurodegeneration and ultimately die from the disease. It's a rare disease, but is a typical adult neurodegenerative disease, which means that it shares features with diseases such as Alzheimer's and Parkinson's. A patient can be healthy for decades and then the symptoms appear. Because we found the gene for this terrible disorder, we can now provide families with the opportunity for early diagnosis. If the family is affected, they can then choose what lifestyle changes they may want to make. Some may choose not to have children, or to adopt children, so that they eliminate the occurrence of the disease in their family. So many patients and their families are grateful for this knowledge.

Once we finally identify a gene, we are able to create an animal model that closely mimics the human disease. This allows us to better understand how, when a particular gene mutates, it wreaks havoc in the neurons. We found out how the mutated gene affects brain cells and what we might be able to do about it.

> "It was a very exciting time when we found the Rett syndrome gene, because it was a result of a 16-year search. When you wait for something for 16 years and it finally comes, it's an unbelievable feeling."

> “My dream for the NRI is that the work happening here will allow us to better understand how the brain works and result in discoveries that will truly help patients with devastating neurological disorders.”

Beyond SCA1, the work on this disorder has helped us better understand Alzheimer's and Parkinson's disease and has provided us insight and new strategies to tackle those more common diseases.

Another discovery, the identification of the gene that causes Rett syndrome, was one of the most important pieces of evidence proving that sporadic (not inherited) autism could be genetically determined. At the time of the Rett gene discovery, in 1999, we had no idea that most autism spectrum disorders were caused by genetic defects. The Rett gene was one of the first genes discovered that can cause autism and other neuropsychiatric problems. Identifying the gene for Rett syndrome also allows us to accurately diagnose children early and thereby intervene sooner and more successfully with physical therapy.

We've also learned that the Rett syndrome gene is important for all aspects of brain function. At the time of the discovery, we had no idea how important it was, but now, after a decade of research, we know it impacts all neurological functions. It tells you when to stop eating by controlling the neurons in your brain that signal when you've had enough food. It's essential to remembering a conversation or reacting to stress. It is important when it comes to learning something new or coordinating movement. It controls the activity of so many brains cells and is a critical gene for many of the brain's functions.

We also discovered that mutations in the same gene not only may cause Rett syndrome, but can also cause other disorders such as juvenile schizophrenia, bipolar disorder (a specific form), as well as classic autism and various intellectual disabilities. The impact of the work is well beyond what we first anticipated when we embarked on the Rett syndrome project. People thought of Rett syndrome as an isolated disorder, but we have learned so much more about other disorders and diseases, including how critical certain molecules are for our brain function, by studying Rett.

And then there's one more very significant point. We study these disorders top down, meaning that we start with a patient, drill down to the cause, and drill still further to find the mechanism of disease. But we also have a very interesting project that started bottom up. It started not with a patient, but with an extremely obscure, small organism: a fruit fly. People don't think about how important fruit flies are. In fact, humans and fruit flies share most of the important genes that control development, behavior and physiology.

In 1993, I was discussing interesting genes with my Baylor colleague Dr. Hugo Bellen. I asked, 'What is an interesting gene in the fruit fly?' And he replied, 'Well, there's this gene called Atonal that's really important for balance and coordination in the fruit fly, and perhaps it's important in mammals as well.' Because of my interest in balance disorders, I decided to find the equivalent gene for Atonal in the mouse and see if it's relevant. In 1993, no one had really taken genes from fruit flies, mice, and humans to compare them. It was unusual at the time. My colleague, Dr. Bellen, and I wrote a grant together to further pursue this idea. Reviewers told us the idea would never amount to anything.

Despite the naysayers, I went ahead and identified the mouse gene and started studying it. As it turned out, this gene is very important. It is the gene that makes the little hair cells inside the cochlea and vestibular system inside the inner ear (hair cells are the mechanoreceptors for hearing and not actual hairs in the ear). The hair cells inside the cochlea sense sound and transmit that information to the brain. If you move your head, the hair cells sense the movement and transmit that information to the brain to help retain balance. The gene, in fact, is extremely important for many components of balance. It turns out the gene also appears to be important for certain brain cancers. In one of the most common child brain tumors, this gene becomes hyperfunctional. It's also critical for special neurons in the brain responsible for breathing. These are the neurons that are vulnerable in sudden infant death syndrome. The gene is also important for making the cells in the intestine that secrete mucus, neuropeptides and antimicrobial peptides. And the gene is important for you to be able to feel things through touch receptors. If you are playing the piano, you can feel the difference between the white keys and the black keys because of the mechano-sensitive cells that depend on this gene. All of this depends on this one particular gene.

We started with a gene from a lowly organism, and by studying it in mammals, we discovered the gene is critically important for numerous functions. Now labs around the world are studying this gene and testing it in cancer, hearing and deafness. Those little hair cells are what become damaged when you hear a loud sound or as you age, causing a loss of hearing and even deafness. If we can find a way to help recreate the hair cells, it may serve as a potential therapy down the line. We also hope to gain a better understanding of neonatal breathing to prevent sudden infant death syndrome through studying this gene.

Q | *What inspired you to start the Jan and Dan Duncan Neurological Research Institute?*

A | I've loved being in the lab working on my research. As you can tell, it took a long time to answer the questions that drew me to research in the first place, but in the end we did succeed. Our hard work paid off in areas we never expected, like the fly gene that turned out to be so important for mankind. When you have this kind of experience, you become very committed to the lab and hooked on the excitement of being a scientific investigator. Any time someone approached me about becoming a department chair, a dean, or other such similar role, I was completely uninterested. I loved being in the lab and didn't want to leave. This remained the case until Cynthia and Tony Petrello, along with Dr. Feigin, challenged me to think hard about what more we could do for childhood neurological diseases. Why are so few childhood neurological diseases being studied in depth? Why is progress so slow? What can we do to change this?

The Petrellos' lovely daughter, Carena, has a neurological disability. I initially reviewed her records because her parents thought she might have Rett syndrome. But she does not. We continued to talk and get to know one another. The Petrellos visited academic medical centers around the country, but they could not find any place where there was an integrated approach to neurological disorders. They wanted to better understand how I had made my discoveries. I explained that I attributed my success to the brilliant people working alongside me, as well as to my ongoing collaborations. I had created my own interdisciplinary, integrated program to make things happen

in my own lab. But not everyone can do that and it's not easy.

The Petrellos made a very compelling argument, 'Look what you've done for Rett syndrome. Why can't you do the same for additional disorders? What can we do to help?'

That's when I started reflecting about what it would take to address a range of devastating disorders. After careful thought, I told the Petrellos that to be successful at researching a wide range of disorders, we needed a place where all researchers who work on these disorders could work together, a place that could offer access to a diversity of expertise—because there is no way you are going to understand a brain disorder just because you've identified a gene. There is no way you are going to get anywhere just by observing behavior or by simply placing neurons in a dish or on a slide and recording from them. It really has to involve connecting all these different approaches with everyone working together from their respective areas of expertise to solve previously intractable problems.

Due to the massive amounts of data that scientists have to understand to solve a problem, an ideal research team would include experts in genetics, biochemistry, physiology, behavior, statistics, mathematics and computer science. We needed to bring together key individuals from various disciplines, ensure they would work collaboratively, and provide an infrastructure of core facilities that offered cutting-edge technology and expertise no individual investigator could afford on his or her own. We quickly realized that we needed a place to bring these different disciplines together under one roof and study disease comprehensively, as a whole, rather than in discrete pieces.

This became the impetus to start the NRI. Mr. Mark Wallace, CEO of Texas Children's Hospital, was very excited and whole heartedly supported the vision. Jan and Dan Duncan stepped in to provide the substantial naming gift. So together, the Petrellos, Mr. Wallace, and the Duncans were instrumental in making our vision a reality.

If you look at our faculty, we've gone well beyond what we first imagined. Of course we planned to have geneticists, neuroscientists, cell biologists and neurologists, but we now also have computational scientists, high-level statisticians and faculty who work at the NRI under dual appointments with Baylor and Rice University. Shortly after we started on this program, we were approached by Dr. Ron DePinho, the newly-appointed president of The University of Texas MD Anderson Cancer Center, to combine our strength in disease neurobiology with their program for developing potential discoveries into therapeutics, and collaborate on neurodegeneration. Our exciting neurodegeneration consortium was created and supported by the Robert A. and Renée E. Belfer Family Foundation.

We also were approached by the Telethon Institute of Genetics and Medicine (TIGEM) in Naples, Italy, where beautiful discoveries have been made in genetics for a variety of disorders. In the area of neurodegeneration and neurological diseases, TIGEM felt our infrastructure at the NRI was ideal, so ideal, in fact, that Dr. Andrea Ballabio, TIGEM director, now has a laboratory at the NRI and a joint appointment with Baylor College of Medicine. Ballabio's NRI lab is performing research that can truly benefit this class of disorders. We are one of only a very few institutes that have this kind of reach, where investigators from labs throughout the Texas Medical Center, across the country, and around the world truly collaborate on solving problems related to devastating neurological disorders and disease.

Because the Texas Medical Center is such a rich environment, we could not have created the NRI anywhere else. The institute works because everyone in the medical center is open, friendly, generous and collaborative. If you draw a map around the Texas Medical Center, you will discover that the NRI is in the very heart of the Texas Medical Center. This was by design and something I absolutely insisted on—we could not go to the periphery, because we needed to be close to as many of the Texas Medical Center institutions as possible to ensure robust collaborations. The work between Baylor, MD Anderson, Rice, UTHealth and others is very fluid precisely because of our location.

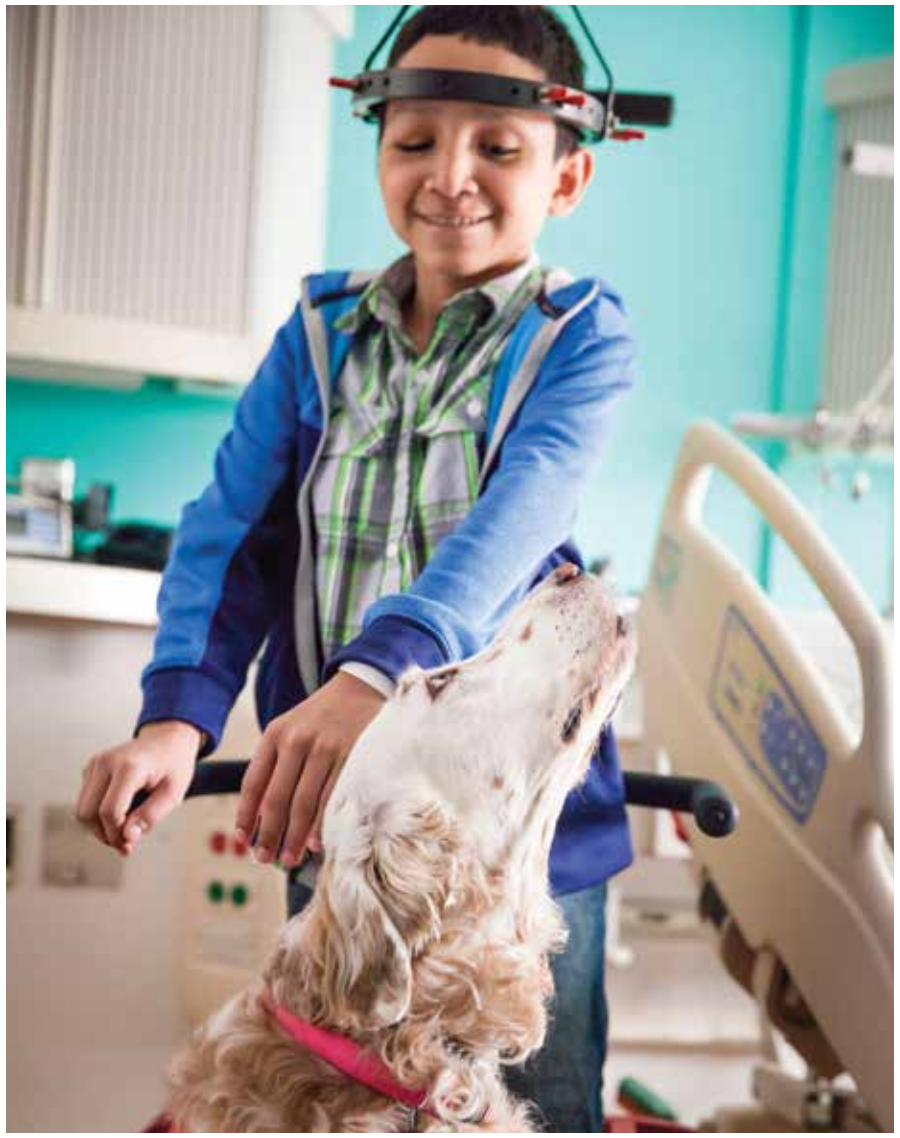
Q | *What do you hope for the future of the NRI and these rich partnerships?*

A | My dream for the NRI is that the work happening here will allow us to better understand how the brain works and result in discoveries that will truly help patients with devastating neurological disorders. This goal is why our brilliant physicians, physician-scientists, and basic scientists have chosen to come to the NRI. If we can better understand the brain, we can better help those suffering from brain disorders.

For our medical center, I have an even bigger dream. I think the Texas Medical Center institutions, along with Rice University, have absolutely some of the best people in the world working in medicine and science. We have the potential to rise up and become the most exciting third coast in America. Yes, the East Coast is steeped in tradition, so much older than Houston and the Texas Medical Center, and the West Coast has unsurpassed natural beauty and the energy of the tech industry. Yet, from an intellectual standpoint, a capability standpoint, and our indefatigable can-do attitude, I think we have so much more to offer than either the East or the West Coasts. The question now is how to harness our energy to elevate the Texas Medical Center to the place it truly deserves, and be recognized for our contributions to science and medicine. ■

For the full interview, visit *TMCNews.org*

(Credit: Texas Children's Hospital)



(Credit: Robyn Arouty)

GIVING PAWS

By Alexandra Becker

A UNIQUE GROUP OF THERAPISTS ARE WORKING HARD ACROSS THE TEXAS MEDICAL CENTER

A few years ago, Connie Richards was walking down the familiar halls of Houston Methodist Hospital's ICU, her yellow tabby Milo perched in his stroller, when she heard a woman call out.

"Is that a cat?"

Richards turned and smiled. She entered the room where the woman stood next to a patient in a coma, her husband, who had been unresponsive for days.

"My husband loves cats," the woman said.

Richards lifted Milo out of his stroller and laid him across the patient's chest. Milo purred while the woman took her husband's hand and slowly drew it across Milo's back. Over and over again, from Milo's tawny crown to the tip of his tail, Richards watched as the woman helped her husband pet the soft fur. As her gaze shifted upward, she saw that the man had tears streaming down his face.

This is the power of pet therapy.

Also known as animal-assisted therapy, the increasingly recognized form of treatment engages animals in rehabilitation programs to help patients recovering from illness and injury. Richards, who is the founder and director of Faithful Paws, one of Houston's long-standing animal-assisted therapy organizations, has been practicing pet therapy with her group for over 18 years. Her cat and three dogs actively serve as certified therapy pets.

"It's incredible some of the breakthroughs I've witnessed," said Richards. "Our mission is to provide unconditional love to people who are facing a rough time in their lives, and over the years we've seen how a simple interaction with animals can transform patients' emotional, cognitive or social state."

The positive effects of animal-assisted therapy have become so well known that institutions throughout the Texas Medical Center—including Memorial Hermann-Texas Medical Center, Children's Memorial Hermann Hospital, Houston Methodist Hospital, Houston Hospice, DePelchin Children's Center, Texas Children's Hospital and The University of Texas MD Anderson Cancer Center, among others—have partnered with various local programs, including Faithful Paws, to provide the service. Caring Critters, another fixture in the TMC, was the first animal-assisted therapy program in the city and has been serving the Greater Houston health care community for over 27 years. Although the majority of therapy pets are dogs (as well as some singularly special cats), their program also boasts therapy bunnies, birds and an ever-popular miniature horse named Sasha on its roster.

> "It is so easy to see the positive impact of the visit by the dogs and their handlers."
>
> — RICHARD WEIR
> *Director of Child Life and Expressive Therapies at Children's Memorial Hermann Hospital*

Both organizations are volunteer-based and require a consistent time commitment of their members, as well as extensive training and adherence to the highest behavioral and hygienic standards. Faithful Paws mandates that all dogs larger than "pocket-sized" pass the American Kennel Club's Canine Good Citizen obedience test in order to be eligible for volunteering, and every pet must be up-to-date on their shots, groomed and bathed prior to visitation.

"Presentation is a big concern of ours," said Richards. "It's crucial that we uphold a credible image, that our pets are well-behaved and groomed, and that we follow HIPAA and hospital guidelines when we visit a campus. Prior to each visit, our hospital liaisons communicate with physicians to make sure each visit is appropriate based on the patient's condition and circumstances. What we do affects every pet therapy group in the United States—we've even had people from other countries contact us for permission to use information we've published on our website and the philosophy we've set out."

The popularity of animal-assisted therapy is growing, thanks in no small part to the fact that its benefits are so vast and well documented—and, it seems, deeply rooted in our biology.

Archeological evidence suggests that canines have shared an evolutionary path with humans for at least 30,000 years, allowing for the development of a relationship that is simultaneously collaborative and reciprocal.

BJ

BREED: Bichon Frise

AGE: 10

BIO: A playful and curious dog, BJ loves bringing smiles to pediatric patients at Children's Memorial Hermann Hospital. She is cared for by Ronnie Forman and has been volunteering with Faithful Paws for a year and a half.

Hondo

BREED: Leonberger Mix

AGE: 1

BIO: Just out of puppyhood, Hondo has already been volunteering with Faithful Paws for four months. He enjoys bringing his infectious energy to hospital patients, family members and staff, as well as residents of assisted living facilities and rehabilitation centers. In his spare time, he loves going to the dog park and playing with his friends. He lives near the Galleria with Dell and Denise Bryant.

In 1984, the American biologist Edward O. Wilson examined this relationship more broadly and postulated that human beings' urge to affiliate with other forms of life actually helps sustain life. Indeed, clinical studies have shown that animal-assisted therapy measurably improves health by lowering blood pressure, diminishing the release of harmful hormones, decreasing anxiety, stimulating positive changes in immune function and reducing symptoms of depression.

The studies are ongoing in hopes of securing further funding and shaping more programs. Researchers from the UTHealth School of Nursing, including Sandy Branson, Ph.D., Lisa Boss, Ph.D., Mara Baun, Ph.D., Duck-Hee Kang, Ph.D., and Nikhil Padhye, Ph.D., are currently conducting a randomized control trial with Children's Memorial Hermann Hospital and Faithful Paws to evaluate anxiety, mood/affect, and biological stress responses in hospitalized children ages seven to 17 by comparing the responses between animal-assisted activity and non-animal assisted activity control groups. The study examines self-reported as well as biological responses measured through saliva, including cortisol and inflammatory markers—to determine just how substantial the influence can be on pediatric patients.

"It is so easy to see the positive impact of the visit by the dogs and their handlers," said Richard Weir, director of Child Life and Expressive Therapies at Children's Memorial Hermann Hospital. "Anxiety levels that often come with being in a clinical setting drop, almost palpably. The children and their families are amazed when the pack appears. They are surprised that there are actually dogs in the hospital! The toddlers become very excited and the older children want to get close, to touch and hug them. I've had the privilege of watching these dogs play a major role in the healing process for our patients."

In addition to the significant clinical implications, animal-assisted therapy also stimulates socialization and conversation, or can simply offer entertainment or diversion from an illness or upcoming procedure.

"Our main goal with pet therapy is to comfort the patients," said Amy Cesak, child life activity coordinator at Texas Children's Hospital. "The animals really help normalize and socialize the hospital environment for them. A few months ago we had a little girl who refused to speak—she'd been here for at least three or four days and she wouldn't say a word—but as soon as one of the dogs walked in, her face lit up and she began talking. She even got out of bed and followed the dog down the hallway and started interacting with the staff for the first time. It's really neat to see how an animal can provide comfort in a totally different way than a human can."

> "Our mission is to provide unconditional love to people who are facing a rough time in their lives, and over the years we've seen how a simple interaction with animals can transform patients' emotional, cognitive or social state."
>
> — CONNIE RICHARDS
> *Founder and Director of Faithful Paws*

Mogie: Ronald McDonald House Houston's Key Comfort Ambassador

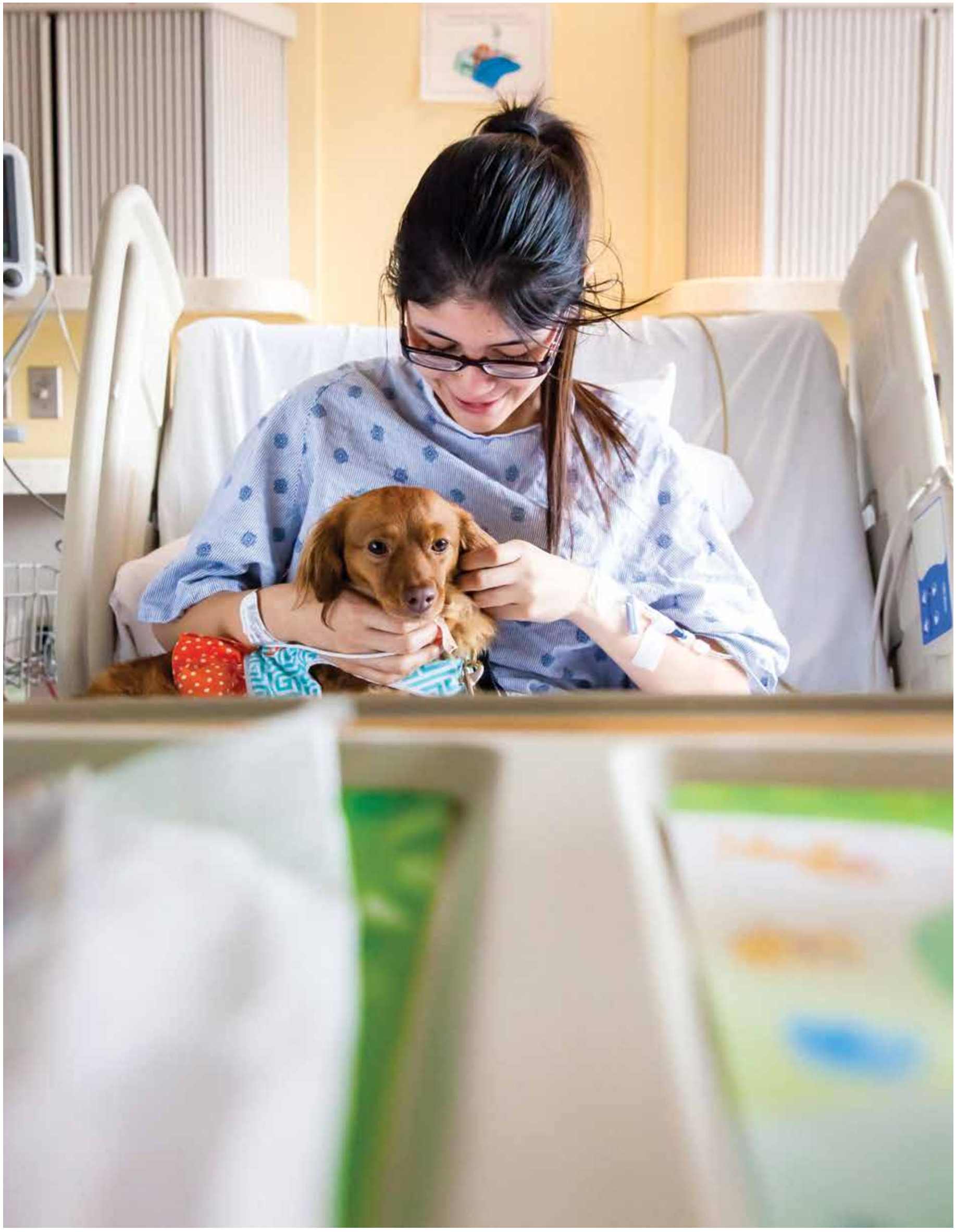
When patients and their families arrive at Ronald McDonald House Houston—often exhausted from their travels and anxious about the treatments and procedures ahead—they are frequently greeted at the door by a wagging tail and a few happy, sloppy kisses from Mogie, the House's Key Comfort Ambassador.

"Mogie loves his job at RMH," said Leslie Bourne, chief executive officer of Ronald McDonald House Houston. "He takes the business of play very seriously."

The five-year-old Labradoodle was trained specifically for his job as Key Comfort Ambassador, but is by no means qualified as a certified therapy pet—in fact, that's part of what makes him so ideal for a setting like Ronald McDonald House Houston.

"Therapy dogs are taught to be very calm in the hospital or work environment, and Mogie is anything but that," Bourne explained. "He loves tennis balls and will play fetch all day long—something trained therapy dogs are not allowed to do at work. But his infectious energy and playful spirit actually provide the kind of therapy our families and kids need the most during their stay at the House."

In addition to greeting new families and playing fetch, Mogie also loves to take naps with children, watch TV, and cuddle with anyone who is feeling sick or scared. He enjoys meeting kids from all over the world who come to the Texas Medical Center for treatment, and he especially likes learning new languages and hearing about different cultures and backgrounds. One of his personal passions is promoting the mission of Ronald McDonald House Houston, and he has visited local libraries and schools to help support its programs. He believes strongly in the power of literacy and is even the star of his very own children's book titled, "Mogie: Heart of the House," which tells the true story of a free-spirited puppy destined to change the lives of the people around him through his positive attitude and unwavering compassion. ■



Sophie and Emmalea

BREED: Shetland Sheepdogs

AGES: 9 and 13

BIOS: Sophie and Emmalea live with Debbie Benningfield and have been volunteering with Faithful Paws for a little over a year. Although they go everywhere together in their matching outfits, the adoptive sisters have vastly different personalities: Sophie is a happy-go-lucky type who loves to be around people, while Emmalea is known for being shy and sweet.

Chloe

BREED: English Setter

AGE: 7

BIO: A member of the Caring Critters team, Chloe has been volunteering at Texas Children's Hospital for over five years. When she isn't lending a floppy ear or a helping paw to patients and their families, she enjoys napping, chasing squirrels, and going on walks with her handler, Dave Brady.

Maisy

BREED: Long-haired Dachshund Mix

AGE: 3

BIO: As one of the newest members of the Caring Critters team, Maisy has already proven she's a natural therapy dog through her playful spirit and calm demeanor. When she's not volunteering at Texas Children's Hospital, she enjoys chasing lizards, hiding her toys and playing fetch with her handler, Carol Parker.

"You can't even describe how happy it makes you to see a dog at your door," said Kayla Deroche, an 18-year-old patient at MD Anderson Children's Cancer Hospital during a recent pet-therapy session with Caring Critters. Deroche, who has been in and out of the hospital over the past 12 months, had been waiting all morning to see one therapy dog in particular: Denali, also known as "Deni," a 6-year-old Great Pyrenees who was adopted by Christy and Stephen Almond just two days before she was scheduled to be euthanized in a shelter in Kentucky.

"I have three dogs at home and I was used to seeing them every day," explained Deroche. "Last time Deni visited I couldn't do anything—I hadn't been able to eat for three weeks—so we just laid on the floor. She was the only reason I got out of bed."

Along with visiting patient rooms, many hospitals in the TMC also utilize the therapy animals in their physical rehabilitation programs to help patients attain specific goals related to mobility, range of motion, or hand-eye coordination. Therapists will work with their patients on brushing an animal, tossing a ball for a game of fetch, or even assisting the handler with walking his or her dog through the hallways.

MD Anderson, in partnership with Caring Critters, offers a group rehabilitation session every Saturday in addition to their animal bedside visitation on their pediatric floor. Called the Welcoming Animals Giving Support (WAGS) program, participation requires a doctor's order for animal-assisted physical therapy.

"Our volunteers help the patients move to the rehab area and they participate in rehabilitation-based structured activities with the dogs," explained Brandon Floyd, hospital and clinic programs manager for the Department of Volunteer Services at MD Anderson. "It's meant to feel like a gymnasium—a kind of recess, if you will—and it really takes the patients' minds off the fact that they are engaging in a prescribed care activity that, for most of them, is actually very challenging."

MD Anderson also partners with the local nonprofit PAWS Houston, which takes pet therapy a step further and works to bring patients' own animals to their bedside. This service is offered through the hospital's Palliative Care program, which focuses on relieving suffering and providing comfort to critically ill patients who may require end-of-life care. In addition to arranging and facilitating these invaluable visits, in many cases the organization can also provide foster care or in-home animal care for pets of those hospitalized individuals.

"It's a unique opportunity for patients to say goodbye," explained Jo-Anne Gaudet, pet therapy coordinator at Houston Methodist Hospital, who also works with PAWS Houston to provide this service. "For most people, their pets are a part of their family, and depending on the circumstance, sometimes even their best friend. We've watched how these visits can really help with depression or provide closure for a patient who is at the end of life. In looking at the person as a whole, if there's something we can do to make their experience at Houston Methodist better, we're going to make it happen."

Whether it's saying goodbye, cuddling on the floor or squeezing in a quick hug as the crew walks through the hallways, an animal's presence is a welcome reprieve not only to the patients and their families, but to the hospital staff as well.

"When we go on a visit, we're not just there for the patients," said Richards. "The nurses, physicians, staff—they all benefit, too. I had this one doctor turn to mush when he took Milo in his arms. Here was this rough-and-tough-looking doctor and he was boo-boo talking to the cat. It's amazing. On any given day, you never know who's going to need that extra comfort."

And as for the animals themselves?

"They love it," said Dave Brady, a volunteer with Caring Critters whose dog, Chloe, has been volunteering for five years. "She can always tell when we're going to Texas Children's, as there are certain things that need to be gathered and packed for our visit. Seeing and hearing these things always results in her becoming visibly excited and ends up with her sitting and waiting by the door to leave. She loves the interaction with the patients, parents, siblings, staff and other volunteers."

Remarkably, these highly trained

animals genuinely understand the difference between their time at work and at play—in fact, most of them are so attuned to their roles inside a hospital or care facility that they even know which individuals need their attention the most.

"We're really there as much for the parents and siblings of the patients as we are for the kids, and the dogs understand that," explained Brenda Chan, whose golden retriever, Andie, has been volunteering with Faithful Paws at Children's Memorial Hermann Hospital for over three years. "Sometimes Andie will approach the family before she approaches the patient, because she can tell how stressed the family is. She'll go straight over to the parents and just cuddle up to them."

According to Richards, this innate knowledge is triggered by more than just natural animal instinct.

"When animals breathe in, they can sense what humans breathe out, through smell—that's how they can tell if you're sick or sad or happy," explained Richards. In fact, canines have more than 150 million olfactory receptors compared to humans' 5 million, and research has indicated that dogs have a keen ability to detect various sicknesses, including cancer, blood-sugar imbalances, and the onset of seizures. "They're essentially doing a diagnosis with every patient, and that's how they know how to act and who in the room might need them the most."

Sometimes, in the midst of watching a parade of animals and their handlers walk through a hospital—stopping for pets and pictures and a wave of smiles as they pass nurses and visitors—it's almost easy to forget how much sadness is experienced within those same walls, and that the reason they are there in the first place is to bring joy and distraction to individuals who are often in the midst of the scariest time of their lives.

No one understands this dichotomy more than Debbie Benningfield, who volunteers regularly at Memorial Hermann-Texas Medical Center, Methodist Hospital, Houston Hospice and other facilities through Faithful Paws. Her beloved shelties, Sophie and Emmalea, are famous in the TMC for their matching nurses outfits and innate ability to heal—Emmalea has been credited with waking up multiple unresponsive patients, and Sophie is frequently requested for her sweet demeanor. A little over a year ago, an MRI revealed a left frontal meningioma tumor in Benningfield's brain.

> "The children and their families are amazed when the pack appears. They are surprised that there are actually dogs in the hospital!"
>
> — RICHARD WEIR

"It was January 29, 2014, and I was standing in the aisle of a Sprouts grocery store when I got the results," she said. "You never forget a call like that."

Through her volunteer work with Faithful Paws, Benningfield was put in touch with her neurosurgeon, Gavin Britz, MBBCh, chairman of the department of neurosurgery at Houston Methodist Hospital. She eventually underwent a craniotomy resection surgery to extract the tumor, and although she was only slated to stay in the ICU for one night and a regular room for two, unrelated heart complications, a brain edema, and trouble coming out of anesthesia required her to remain in the hospital for three weeks.

"All of the dogs in our crew came to visit me," she said. "It was truly remarkable, being on the patient side of things, and I can now say firsthand what these dogs can do. There's a picture of me surrounded by them in the ICU that I love. I'm hooked up to wires and machines and barely conscious, but they provided a moment of calm when I could put everything else away—that's when the healing happened." ■

The FOUR-LEGGED THERAPISTS of the TMC

Angel

BREED: Golden Retriever

AGE: 6

BIO: Angel was born with only three legs and one eye. Despite her physical disabilities, she was a happy and obedient puppy, and has dedicated her life to helping others overcome their own handicaps and hardships—even throughout her recent battle with cancer. She lives with Trish Herrera, knows commands in both English and French, and loves to swim and watch television when she's not volunteering with Faithful Paws. In July, she will be awarded a proclamation by the mayor's office recognizing her work as a therapy dog, a first-of-its-kind accolade.

Abby

BREED: Border Collie Mix

AGE: 9

BIO: Abandoned in a barn as a young puppy, Abby found her way to the home of local couple Christy and Stephen Almond when she was just three months old. She has been volunteering with Caring Critters for four years and especially loves visiting children at MD Anderson Children's Cancer Hospital. Her above-average intelligence and boundless energy make her a favorite among patients and pups alike.

Bailey

BREED: Miniature Poodle

AGE: 16

BIO: Bailey has been volunteering with Caring Critters since 2004, and despite being an octogenarian in dog-years, she is as active as ever. She is passionate about helping patients achieve their rehabilitation goals, and frequents The University of Texas MD Anderson Cancer Center and TIRR Memorial Hermann with her handler, Joan Johnson.

KC

BREED: Bouvier des Flandres

AGE: 11

BIO: Eleven-year-old KC has the honor of fulfilling two important roles: for over seven years she has been a volunteer with Faithful Paws and also a hearing service dog for her owner, Carol Seliger. She enjoys her active lifestyle and especially loves seeing patients, running errands and flying to New York to visit extended family.

Louie

BREED: Basset Hound

AGE: 5

BIO: Rescued as a puppy by Gail Edlund, Louie has been volunteering with Faithful Paws for four years. He loves treats and toilet paper, and is known for his gentle and affectionate demeanor. A few months ago, Louie lost his right eye to glaucoma. Although he is now struggling with the same diagnosis in his left, his spirits remain high and he enjoys the company of patients and their families now more than ever.

Sparks

BREED: Pug

AGE: 9

BIO: Born in West Virginia, Sparks spent the first two years of his life attached to a chain and severely neglected. He was finally rescued by Daniel McQuade and together they moved to sunny Texas three years ago. A member of the Caring Critters crew, he is a clever and playful dog who loves to entertain patients at Texas Children's Hospital. His favorite food is sour apples.

Morgan

BREED: Ragdoll

AGE: 8

BIO: Morgan has been volunteering with Caring Critters for nearly three years. He is extremely loving and affectionate by nature, and enjoys sitting with patients and their families while being petted. When he's not at work, he likes to eat and sleep, but most of all he enjoys wrestling with his dog-brother, Harpo, a two-year-old standard poodle. He lives with Sandy Harris in Houston.

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Investing in Innovation

Early-stage investors and life science entrepreneurs connect at the Redefining Early Stage Investments conference

By Alex Orlando

WITH A GUEST LIST OF 426 PEOPLE, THIS YEAR'S TURNOUT AT TMCx MARKS THE STRONGEST NUMBER OF ATTENDEES AT A RESI CONFERENCE TO DATE.

On June 8, the TMCx was abuzz with the collective excitement of over 450 visitors. The Redefining Early Stage Investments (RESI) conference transformed the accelerator space into a venue for early-stage investors and life science entrepreneurs to open dialogue, build relationships, and close investment rounds. In the exhibit hall, poster presentations offered a glimpse of the emerging life science companies in attendance. Nearby, a partnering forum between investors and entrepreneurs compressed 700 meetings into the course of a single day. Panels and workshops took place in conference rooms across the space and provided platforms for investors to communicate directly to their eager audience of fundraising entrepreneurs.

"It can be overwhelming, and we absolutely love that aspect," said Dennis Ford, founder and chief executive officer of Life Science Nation. "We want to give everyone who comes here more opportunities than they can make a decision about, because if we're doing that, we're doing our job. We really want to inundate everyone, for one day, and submerge them in this early-stage investor world to let them get a lot of bang for their buck instead of stretching it out over a period of several days. We want to give them as much value as possible."

"The day had a frenetic pace to it, but it ran with a great cadence," said William F. McKeon, executive vice president and chief operating officer of the Texas Medical Center. "It was so efficient. People knew exactly where they were going with the panel discussions, but the lion's share of the engagement was the matchmaking between investors and entrepreneurs—it was all about prescreened compelling connections for startups and investors, and that pace ran at a vigorous level throughout the whole day. People were exhausted by the end of it."

Through a partnership between Life Science Nation, Texas Medical Center, Johnson & Johnson Innovation and JLABS (JLABS @TMC), the event introduced fundraising CEOs to the right early-stage investors to meet their needs.

"Before RESI, I don't think anyone really figured out how to do justice to the concept of an investor conference," remarked Ford. "It was always an afterthought in these other conferences. Nobody really dedicated a conference to putting fundraising CEOs and early-stage investors together across all these areas, from biotech and medtech to health care IT and diagnostics. As it turns out, RESI was precisely what was needed."

> "Fostering change is all about calculated risk taking, and with many naysayers advising that Houston wasn't ready for a prime time global investor conference, this year's RESI conference knocked it out of the park."
>
> — DENNIS FORD
> *Founder and Chief Executive Officer of Life Science Nation*

THROUGH A PARTNERSHIP BETWEEN LIFE SCIENCE NATION, TEXAS MEDICAL CENTER, JOHNSON & JOHNSON INNOVATION AND JLABS (JLABS @TMC), **THE RESI EVENT CONNECTED EARLY-STAGE COMPANIES WITH POTENTIAL INVESTORS.**

Together with RESI's two existing venues—RESI Boston and RESI San Francisco—the conference series takes place three times a year. "This is our fifth RESI event since our first conference in 2013," explained Ford. "When we would go to these conferences around the world, there were hardly any investors that would show up. Most of the time it was the same old talking heads from pharmaceutical companies, but they were more business development and license oriented—not early-stage corporate venture investors with seed and development capital."

According to Ford, pooling together Life Science Nation's global investor database—which allows fundraising executives to match up with investors that are a fit for their particular stage, sector or disease area—allowed them to develop relationships with a broad range of investors across the emerging health care technology arena. They leveraged those connections to bring their fourth RESI conference to fruition in San Francisco at the annual JP Morgan event.

"I think Houston will end up on par with Boston and San Francisco," said Ford of the event's most recent venue. "Life Science Nation and the Texas Medical Center share the same vision. Everybody was telling both of us that we would never get anybody to Houston in June, and that if we did get people, it would be a very small event. It ended up being one of the most highly active, high-energy RESIs that we've ever had."

Through an expansive series of panels—covering topics from biotech angels to venture philanthropy—the event offered firsthand accounts from investors explaining their current investment mandates and procedures for identifying and qualifying candidates

"People always say, 'If you build it, they will come,' but to do a successful conference, content is king," said Ford. "When we developed the content of RESI, we decided on 16 panels—from a family office panel that invests in biotech and medtech to big pharmaceutical companies and every investor category in between. Because we have an investor database that we maintain, we are involved in a constant dialogue with the early-stage investor community around the globe. We know all of the issues that they have and the fact that they're all different."

"There are 10 categories of early-stage investors and they all have their own personality types," he added, emphasizing the need for entrepreneurs to cater their content to their audience. "With the investors at RESI, we have separate panels for each category, providing them a platform to explain to scientific entrepreneurs the best way to reach them, what they're looking for, and what's on their radar screen. That creates the foundation for this dialogue that you really don't see anywhere else."

Participants chose investor panels that were a fit for their sector and stage, and the rooms were virtually standing-room only. However, the majority of the action took place at the partnering forum, where fundraising executives held up to 16 meetings in a single day with life science investors, understanding and mapping out the best ways to work together if, indeed, there was a fit.

"The partnering is the core of the RESI conference," said Ford. "It was like a beehive of activity—when you walked in you could just feel the energy rising off the ground. That's always been one of the big winners at our conference, because the people can actually go through the matchmaking platform, find people that are a perfect match for them, and go on to have a conversation.

"When you go to other partnering events at other conferences, you're

usually in a sterile environment and they don't work that well," he added. "I don't want to directly compare what we do to speed dating, but you get a round table with a number on it and a half-hour to pitch to one of the participants. Everyone is incredibly receptive to the concept and it is a very sophisticated match making process." Between 8 a.m. and 5 p.m., at least 700 meetings took place.

Meanwhile, in the exhibit hall, 34 of the most innovative early-stage life science companies at the event were chosen to participate in a virtual investment contest—the RESI Innovation Challenge. Competing to raise the most "RESI Cash," cutting-edge life science technologies battled it out through poster presentations showcasing their solutions. Redox, a TMCx company seeking to integrate electronic medical records systems, took home the first prize and a subscription to the Life Science Nation Investor Platform.

For the entrepreneurs present, the day instilled some serious lessons about strengths to promote and pitfalls to avoid when trying to cultivate relationships with investors.

"Too often, many CEOs reach out to investors before they're ready to," said McKeon. "They're largely motivated by their burn rate—when many companies form, they're putting their own money into it or have some friends or family investing, and it's usually not that much. Every day that goes by, they're burning more of that money. There is an element of desperation in that visceral need to get another source of funding, to allow that idea to survive and become a viable company."

The prospect of limited funds slowly ticking away can incentivize anyone to decisive action, but McKeon cautions a more thoughtful, deliberate course.

"My advice is always, 'Make sure you've got a demonstrable product or service with hard, proven data to back it up,'" he said. "Too often, people come with the core concept itself, but don't have the development plans and data to back it up. When investors reach into their pocket to spend money, they don't want to know what could be—they want to know what is. If you don't have that data, then you shouldn't be out talking with investors."

With entrepreneurship workshops providing some tips for navigating the legal marketplace, branding and even a fundraising boot camp, the RESI conference strives to provide a continuum of support, connections and education.

"There are a number of conferences that are aimed at investors, but there's something special about RESI," said Melinda Richter, head of JLABS. "Because they are an entrepreneurial organization themselves, they are passionate and committed to their purpose. All of the attendees feel that, whether they're an entrepreneur just starting out or a strategic investor seeking the right technology. It brings together the right people, for the right purpose."

"There's nobody really doing what we're doing," added Ford. "Life Science Nation, the Texas Medical Center and JLABS all have the vision to bring investors to Houston and highlight the technology. Fostering change is all about calculated risk taking, and with many naysayers advising that Houston wasn't ready for a prime time global investor conference, this year's RESI conference knocked it out of the park." ■

> "There are a number of conferences that are aimed at investors, but there's something special about RESI. [...] It brings together the right people, for the right purpose."

— MELINDA RICHTER
Head of JLABS

JULIANA GARAIZAR, *MANAGING DIRECTOR OF THE HOUSTON ANGEL NETWORK (HAN), SAT DOWN WITH TEXAS MEDICAL CENTER EXECUTIVE VICE PRESIDENT AND CHIEF STRATEGY AND OPERATING OFFICER WILLIAM F. McKEON TO LOOK BACK AT THE PATH THAT LED HER TO HOUSTON, AND HOW THE HAN HAS BUILT A SUCCESSFUL MODEL FOR CONNECTING EARLY-STAGE COMPANIES AND ACCREDITED INVESTORS.*

Q | *Tell us about your early days in Spain.*

A | My early days in Spain started by me accidentally landing at a French school since kindergarten. My mom was working at the school opposite to it and after a while she realized that having her daughter at her same school was not such a great idea since I always wanted to be with her. I therefore became bilingual at a very young age, and that kind of totally shaped my mind to be extremely open to other cultures. Since they didn't have a French high school in Bilbao at that point, I had to go to France to do my high school years before boarding school. Bilbao is about two hours from France, so the whole trip was about two hours to get to the high school every Monday and then go back on Friday. I really wanted to continue my education in the French university, but my parents objected. During my university degree based in Spain, I decided to do my study abroad with the Erasmus Exchange Program at a university in France, in Nantes. During my last year there, I realized that everybody there was applying to jobs outside of France. I always wanted to have an international career, but thought it would likely be Europe, maybe Brussels, where there are a lot of international jobs. But in Nantes, many students were getting jobs in Southeast Asia, because there is a strong connection between France and Southeast Asia and that destination really inspired me. So there was this international trade program from the Spanish government, and basically they would select people to go and work in the Spanish trade commissions all over the world.

I got selected, so I started my career in Singapore at the International Trade Commission of Spain. I was there for a year and a half and loved it so much, I was like, 'I want to stay here. There are so many things going on.' So luckily, I met the head of CitiGroup's Asia technology office. It turned out that all of the technology in CitiGroup was run from that technology office. They were having a system migration for the credit card systems, so they put together a huge department. It was called the ICC, International Credit Card Center. And they needed a project manager for that in America, because nobody there spoke Spanish and was able to understand the business side of things. So I got hired and was doing that for almost four years. I had to travel to Latin America quite a bit, and it was great. And then we started with the migration in Europe. We started with Spain. But then I had to go to Greece a lot, and I ended up doing the migration for Asia, too, and I spent quite some time in Japan.

So it was great because I was able to travel a lot and meet a lot of people and different kinds of businesses. But I always had to interact with programmers, so I would go there, check what they required in terms of business requirements, and then I had to go and ask the programmers to shift them. At some point, they said, 'You know, it would be great if you would be the only person there, and actually could also fix the programming yourself.' I didn't want to be a programmer, so I got to a point where I said, 'I'm ready to do

my next thing. And I don't know what it is, so I am going to go get an MBA.' The only thing I knew was that it had to be very international oriented. The most international MBA I found was in the London Business School. So that's where I went and tried to figure out what I wanted to do. Very early on, I started gravitating towards the entrepreneurship major, and actually I did an exchange program during my second year and I went to Berkeley. I went around Silicon Valley and I totally loved it. Right after that, I was very lucky that I got hired to run an incubator in the South of France. In the French Riviera, they have a very big techno park there called Sophia Antipolis, and so I was hired for that. I got in touch with their Angel Network, and one year after being in the French Riviera, I got to run that, too. Which was really cool because in my time there, we did amazing things. First of all, we invested very internationally. Most of my members were not actually French. They were people from all over the world who decided to retire in the French Riviera. So we got deals from all over the world. We were one of the first investors in e-Trade—we invested in Turkey, Ireland, the U.K. and China.

Q | *Your husband works for Shell, right?*

A | Yes. I met my husband in Singapore. We were friends of friends. Each one had our significant other at the time. He was working for a pipeline company, Tenaris. He had to move out of Singapore, and for two years he was working all over Nigeria and France, and I was still working in Singapore. And totally coincidentally, we met again at the London Business School.

So I finished one year before him because I was in the 2005 MBA, and he was in the 2006. I got my job in the French Riviera, and he got his job in The Hague for Shell. We were doing the long distance relationship and in 2010, I got offered this job to run the European Business Angel Network from Brussels. But I had to turn down the offer because my husband was offered a great job in Houston.

Q | *When you arrived in Houston, what was your perception of the city?*

A | I was coming from the French Riviera, and it is really beautiful. It's one of the best places in the world. You have the Alps coming into the sea. You have these amazing Italian villas. So I remember coming in with my huge belly and getting into the car with my husband, and I remember being so scared of these highways. Maybe it was because I was pregnant too, but I thought there was no way I could drive here. This was way too much. And then I would see all of these malls and buildings all looked the same. And I thought, 'This is a really ugly place I'm getting into.' So that was my first perception.

But I found that people were extremely nice, compared to the French who are not, particularly if you are a foreigner. And not only that, they don't have anything that is kid friendly. And here everyone was so nice that at first I thought that they were trying to play a joke on me. So I thought that was amazing, and everything was kid oriented. That totally sold me.

I was lucky enough that one of the companies we invested with, Success Europe, was actually a French company that needed the money to establish themselves here in Houston. So my past chairman told me, 'You need to contact them. I'm sure they will need your help in Houston, so whenever you are ready, just go for it.'

And when my son was about seven months old, I approached them and they said, 'Yeah, we would love your help.' Actually, they were doing great here in Houston, and they were doing so good that they wanted to expand and maybe try the American route, too. It was a software provider for the big oil and gas companies, energy services companies and environmental companies. So this company, Amalto Technologies, needed a second round, and their European investors were ready to invest. But they wanted some local investors because they said, 'We are servicing the oil and gas companies, and we want to have these kind of people on board who can open those doors for us. So we need smart money.'

And they told me, 'You are the perfect person to start reaching out and trying some fundraising.' So that's how I approached the Houston Angel Network (HAN). I had met Kala Marathi—HAN's past MD previously. She invited me to a breakfast, and I told her I had a few deals that could be interesting. We were doing pretty well and we had already invested in them, and we wanted to co-invest with HAN. Kala was not replying to my emails, so I went to the HAN website to get her number and give her a call. And on the website, suddenly there was a huge announcement that they needed a new managing director. I called David Steakley, who was in charge of the whole selection process, and I said, 'Is this still open?' And he said, 'Tomorrow is our last day of interviews.' I got the job and started working for HAN in January 2013. So this is my third year.

Q | *What was the size of HAN at that time?*

A | I think we started at around 60 members renewing, and we got up to 90. When the board took place, they made a few strategic changes that they wanted me to implement. One of them was getting rid of the fees for entrepreneurs, and the second part of that deal would be raising the fees for investors. For 10 years, investors were charged a yearly fee of $1,500. Because we were getting rid of the fees for entrepreneurs, we wanted to compensate for that somehow, and we decided to raise to $1,750. We knew that for the least active members who were doing that more for social reasons, it would kind of be a make or break. So that was a pretty big bet for the new board.

Q | *How would you describe the Houston Angel Network?*

A | HAN has changed a lot over the years, and I think that's an interesting part. We have totally changed the perception that entrepreneurs had of HAN. Because, of course, I was getting a lot of feedback from entrepreneurs for what HAN meant to them. And HAN meant a pretty elite class of people who would meet every month at the Houstonian, and would only approach entrepreneurs that had a very clear model, and most of them were revenue-generating deals. So if you were before that, it was very difficult to get there. The only route was basically applying. And if you were getting a pitch slot, then you would get access to them. But if not, there was no feedback, there was no, 'What can we do?' if you are not selected.

So things have changed a lot. First of all, we decided to get rid of the entrepreneur fees. We decided to get more engaged investors. Another thing that we also did was try to be more open to entrepreneurs. When we got rid of the fees, we got better deal flow, because more deals could apply to us. And we decided that we wanted to see deals that not only had revenue, but also some of the deals that maybe were not on revenue yet but we thought could be interesting. Another thing we decided to do was if you are not making the cut for pitch, we are going to give you some feedback. We are going to point you in the right direction, and we want you to reach out to us again whenever you feel you are ready. So in many cases, we were giving more advice than before, and we kept in close contact with them. That's also helped out a lot. And we have invested in companies that the first time they came to us was two years ago, and now we have finally invested in them. Because we keep that door open.

Q | ***If you broke up the companies by industry, what are your largest areas of engagement? Is it largely energy? Is it energy and health?***

A | So, we have always been very strong in energy. Surge was actually an initiative that came out of HAN members and HAN invested around 70 percent of Surge 1 and 2. We have been mentoring most of the companies in these first stages of Surge, so we have invested a lot in the Surge fund, and also in follow-on investments in specific Surge companies. That was a pretty obvious fit for us because many of the people were having some connection to the energy industry. Then, there seems to be a legacy in consumer goods, mainly food and beverage deals. And I think that's because of the Sweet Leaf Tea deal that got a very good exit. So that created a sort of Sweet Leaf Tea effect where they kept on investing in the spin-offs of the Sweet Leaf Tea. And that's something that I think is also pretty attractive for new members because it's something that is easy to understand. We also invest a lot in IT and life sciences.

The year that I came in, one of the initiatives that was pretty strategic to us was also to create sub-interest groups. So the sub-interest groups would help us to do the due diligence and do the vetting. It would be a sort of investment committee. But more importantly, it would be an educational tool for members who wanted to know more about those sectors. So we found out we had a lot of energy people who were interested in the life sciences deals, but of course they wouldn't dare invest in those deals. With these sub-interest group meetings and the fact that some of them were about trends and training people on what were the hot places to invest in the life sciences as an Angel, many of them became more comfortable with investing in life sciences, and that has been instrumental for HAN. And we are aiming to have a third of our portfolio in life sciences. Three years ago we were nowhere near that, and now today we had our agenda planning session where we select the deals for the pitching session in two weeks and I would say 70 percent of the deals we saw were health related—either health IT or life sciences. So that was awesome.

For the life sciences and the energy, we were getting so much traction in terms of deals that we decided to split them and we had oil and gas and energy tech, so we have a chair of energy tech, which is taking care of the group and of the deals. And the same thing happened with the life sciences. Now we have health IT chair, because it's very different from the rest. So that means that we have further divided.

In terms of IT, by itself, we were investing in a lot of B2B players, but we wanted to diversify, and do a little bit of B2C. We were reaching out to Austin and California to get those kinds of deals. So we have been co-investing a lot with different Angels to try to get those deals. And now we have a committee in place and the co-chairs are very versed in B2C deals, and all of that, so we are getting better deal flow.

Q | ***It seems there are a lot of exciting things happening in this city right now, and I'm sure you see a lot of them in your role. The Texas Medical Center, for one, is investing heavily in innovation...***

A | I have to say that I have been so lucky in terms of timing, because all of these things have been put together in the last three years, and that's when I came in, so we could engage since the very beginning with these amazing accelerators and programs put together and that are really developing the ecosystem. Again, now we are a lot about collaborating and creating a stronger ecosystem, so we really want to have HAN members involved from the inception, as mentors, but also as presenters, doing the accelerator programs, being able to coach, being there for demo day, and giving a lot of feedback.

Instead of having to fish for deals, whenever a demo day is put together, we have amazing deal flow quality that has already been pre-filtered and comes to you. It has nothing to do with the way it was before.

Q | ***What do you see for the future for HAN?***

A | The future for HAN, for sure, there are a few things that I think are going to be important for us. First, consolidating our number one position as an Angel Network in the U.S., then our relationship with the Texas Halo Fund, our sidecar fund. THF 1 is closing, so they are doing the last deals and follow up investments. We want to put together a THF 2, and we really believe that we want to improve some of the processes, and also the relationship between HAN and THF, to make it more like a hybrid than it is now.

We have realized a few things with THF 1, and one of them is that although THF 1 had been designed to follow HAN, it was more the other way around. HAN members are very interested in what THF has to say about a deal. They ask, 'Would you follow me if I invested?' So that's very important. At the end of the day, what's really happening is that THF is very heavily signaling the deals, and HAN is following Halo, and I think we want to make that change effective for THF 2. And another thing that we want to do is make it a slightly bigger fund. Our main investors for THF 1 were Angels, not only from HAN, but also from the Alliance of Texas Angel Networks that we created. I think this time, we want to be able to reach out to private equity, not only because we want them as investors, but also we want to have a clear exit strategy from the beginning, so those people know what our investments are and see a clear path to exit. ■

For the full interview, visit *TMCNews.org*

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Transplanting History

A first-of-its-kind surgery performed by Houston Methodist and MD Anderson relieves a cancer survivor of a unique and debilitating condition

By Shea Connelly

> "You saw something that was grey and lifeless come back to life in front of your eyes and turn into something pink, healthy and vibrant. That was miraculous and exciting."
>
> — MICHAEL KLEBUC, M.D.
> *Plastic Surgeon at Houston Methodist Hospital*

Four years ago, a painful Catch-22 situation brought Jim Boysen to The University of Texas MD Anderson Cancer Center. A deep scalp wound, the direct result of cancer treatment, was preventing him from getting kidney and pancreas transplants he desperately needed. At the same time, scalp reconstruction was stymied by his damaged kidney and pancreas.

"I was between a rock and a hard place," said Boysen.

Little did he know that first visit set the stage for a trailblazing collaboration between MD Anderson, Houston Methodist Hospital and a handful of other Texas Medical Center institutions that would make medical history.

The now 55-year-old software developer from Austin, Texas, has faced more health trials than many do in a lifetime. Diagnosed with juvenile diabetes at age 5, Boysen received kidney and pancreas transplants in 1992. In 2006, he was diagnosed with leiomyosarcoma, a rare cancer of the smooth muscle, on his scalp. Though the cancer was successfully treated with chemotherapy and radiation, he was left with a wound so deep on the top of his head that it reached all the way through his scalp and skull to his brain.

On August 4, 2011, the wound brought Boysen to Jesse Selber, M.D., an associate professor in the Department of Plastic Surgery at MD Anderson. A scalp wound was not unusual to Selber, a microvascular reconstructive surgeon who has performed other scalp-related procedures. But the severity of the damage, in addition to the complicating factor of the failing organs, presented a unique challenge.

"For fear of an infection after transplantation, this wound was preventing him from getting his vital organs," said Selber. "So that day I thought, 'Well,

MD Anderson's Jesse Selber, M.D., (left) and Houston Methodist's Michael Klebuc, M.D., operate on Jim Boysen's skull and scalp. (Credit: Houston Methodist Hospital)

would it be possible to transplant the skull and scalp together with the kidney and pancreas?' All at the same time, and all from one donor."

Selber considered the advantages of his idea. A dual surgery would enable Boysen to complete both the operations he needed in one fell swoop. Additionally, transplanting a scalp would ordinarily not even be worth considering—any tissue transplantation requires the patient be put on lifelong immunosuppression. But Boysen was a special case.

"Those medications can be dangerous, and we have a high threshold for doing it," said Selber. "It's mostly done for vital organs, however, Jim was going to get a kidney and pancreas transplant so he would already need those medications."

The same medications needed to protect Boysen's new kidney and pancreas could also protect the scalp and skull, Selber thought. He ran the idea by Boysen, who was immediately on board.

"I think they just found the right guy at the right time—when I had my pancreas done, that was experimental, too," said Boysen. "I was not scared."

Knowing the scalp and skull transplant had never been done before, let alone at the same time as not one, but two solid organ transplants, Selber and his team spent the next year planning out how the technical aspects of such a surgery might go.

"We had one really big missing piece at that time," said Selber. "We didn't have a transplant service to work with."

During a talk about face transplantation Selber gave at LifeGift Organ Donation Center, he met just the man for the job: A. Osama Gaber, M.D., director of the Houston Methodist J.C. Walter Jr. Transplant Center.

"Dr. Gaber approached me and said something like, 'We should start a face transplant program,'" said Selber. "I said, 'I would love to do that, but first can you help me with this very complicated patient?' That marked the beginning of a collaboration between MD Anderson and Houston Methodist."

That collaboration would soon grow to include a handful of Texas Medical Center institutions.

"That's what we try to do here in our transplant program," Gaber said. "To be collaborative and extend this to the community. You're going to need a lot of expertise you may or may not have within only one institution or another."

For the next year, Selber and Gaber built the team that would facilitate and perform the surgery, which ultimately included over 50 health care professionals.

"There were a million steps to plan," said Selber. "We did process maps, we planned every piece and we refined that process over and over again because it was going to happen all of a sudden. Transplantation is spontaneous, so you never know. The whole team had to be ready."

On May 21, the call came from LifeGift: They had found a suitable donor. The donor selection process had been a bit more complicated than normal. The donor was a registered donor on the Donate Life Texas registry, but the skull and scalp donation required additional authorization from the donor's family.

The organ retrieval took place at Memorial Hermann-Texas Medical Center. Meanwhile, Michael Klebuc, M.D., the surgeon who led the Houston Methodist plastic surgery team, spent the day preparing Boysen and giving him updates regarding his upcoming surgery. About 20 hours after the alert from LifeGift, it was go time.

On May 22, after years of planning, Selber said, "15 hours of some of the most fascinating and complex surgery I'd ever been a part of, which required dozens of surgeons and countless staff and health professionals" took place at Houston Methodist Hospital. The intricacy of such a surgery cannot be underestimated.

"A lot of times, people have the misconception that you just place the tissue there and it will grow," said Klebuc. "Nothing could be further from the truth. That composite of tissue, which is bone, the skull, the hair-bearing scalp, comes with its nutrient blood vessels... They're about 1/16 of an inch, so to make that tissue live and survive in a new location, you have to connect those blood vessels using stitches about half the diameter of a human hair."

The skull and scalp transplant took place first, followed by the kidney and pancreas transplants.

"During the operation, when we removed little clamps and let the blood start to flow into the tissue for the first time—you saw something that was grey and lifeless come back to life in front of your eyes and turn into something pink, healthy and vibrant," said Klebuc. "That was miraculous and exciting."

> "I feel really good, and I would like to get back to what I was doing probably five years ago, before my renal failure started to affect my life."
>
> — JIM BOYSEN
> *Patient*

By the time Boysen woke up, history had been made. The implications of the surgery are far-reaching.

"We now have a team that is technically capable of performing vascularized composite allografts," said Selber, which could include the transplantation of faces, hands, abdominal walls and more. "This is something that's offered in only a handful of places around the world, and we're now prepared to offer this in the Texas Medical Center."

The success of the surgery is due in large part to the breadth of expertise available in the Texas Medical Center and the opportunity for cross-institutional collaboration, Gaber added.

"The resources that are present here, that we were able to put together—very few places would have resources like this," he said. "The quality of the doctors, anesthesiologists, neurosurgeons, plastic surgeons, microvascular surgeons—it's very unique to have that group."

After surgery, Boysen headed to Nora's Home for several weeks of recovery. Nora's Home is a hospitality house designed to host transplant patients and their families. Gaber is president of the board of directors of Nora's Life Gift Foundation, and the home is named in memory of his daughter.

News of the groundbreaking surgery swiftly spread around the world. The procedure has the potential to open the door to even more revolutionary surgeries in the Texas Medical Center and beyond.

While the wide-reaching impact of his surgery is not lost on Boysen, however, his personal goal is more simple: to be able to live a higher quality of life.

"I feel really good, and I would like to get back to what I was doing probably five years ago, before my renal failure started to affect my life, and just continue for another 20 to 30 years of life."

Dream Jobs

Baylor College of Medicine honors two medical school graduates and newly commissioned Air Force captains

By Alexandra Becker

TOP: Air Force Capts. Cecil Roberts, M.D., third from left, and Tim Soeken, M.D., third from right, were promoted during a commissioning ceremony in the DeBakey Library and Museum. (Credit: Baylor College of Medicine)

In the span of just four days, Cecil "Robbie" Roberts got married, graduated from Baylor College of Medicine, and was awarded the rank of captain in the U.S. Air Force during a special commissioning ceremony hosted by Baylor College of Medicine.

"It was very hectic but at the same time, a huge step forward," said Roberts. "It really reinforced the responsibilities I'm taking on and also the tremendous privilege I have to serve not only patients, but patients in the military community."

The commissioning ceremony honored Roberts and fellow medical school graduate and Air Force inductee Tim Soeken, who previously served as a pilot in the Air Force for five and half years before entering medical school. Both honorees were members of a reserve component during their four years at Baylor, and the military commissioning ceremony marked their formal acceptance as active duty members as well as their promotion in rank from second lieutenants to captains in the United States Air Force.

"We're both extremely grateful to everyone involved for making the ceremony such an occasion," said Roberts. "You really only need a notary public to administer an oath of office for an officer in the military, but everyone really went above and beyond to recognize this milestone, and I know Tim and I are both humbled by the experience."

Timothy Porea, M.D., a Baylor faculty member and the clinical director of Texas Children's Cancer and Hematology Centers, who recently retired from the Navy and is the advisor for medical students in the military at Baylor College of Medicine, served as emcee. The event took place May 26 in the DeBakey Library and Museum prior to the Baylor College of Medicine graduation commencement.

"Houston is not a military town in the sense of having any concentrations of active duty personnel, installations, or equipment such as fighter planes, ships or tank battalions," explained Porea. "By virtue of holding this ceremony, though, we are recognizing the service that these two men are about to undertake on our behalf, as well as the service of the many people in this city who have come before them in wearing the cloth of our nation."

Speakers included Paul Klotman, M.D., president, CEO and executive dean of Baylor College of Medicine; Alicia Monroe, M.D., provost and senior vice president of academic and faculty affairs at Baylor College of Medicine; and Jagadeesh Kalavar, M.D., chief of staff at the Michael E. DeBakey Veterans Affairs Medical Center Houston.

> "As of their graduation and commissioning, Robbie and Tim instantly outranked over a quarter of a million Air Force enlisted personnel and almost 1.2 million enlisted in all branches of the Armed Service. These young men and women will look up to them not just for their medical knowledge, but for what they represent as an officer in the military."
>
> — TIMOTHY POREA, M.D.
> *Senior Faculty Member at Baylor College of Medicine and Clinical Director of Texas Children's Cancer and Hematology Centers*

In front of colleagues, family and friends, the graduates pledged their oath of service to their country and were formally commissioned to the rank of captain. Their ranks were then officially changed on their uniforms by members of their family—Roberts' by his mother and Soeken's by his wife and son.

In a special address to the families, Porea said, "You have every reason to be tremendously proud of your sons, husbands and father. Thank you for supporting them in their endeavors to this point, and thank you in advance for your continued support through residency and their time as a staff physician in the Air Force. These jobs will take them away from you for varying amounts of time, and these times will not always be convenient or planned in advance. Know that they are not only engaged in the calling of caring for those who need help in times of sickness but also in the equally noble profession of serving our country, wherever that may lead them."

Both graduates will go on to complete their residencies through The San Antonio Uniformed Services Health Education Consortium Program in Fort Sam Houston, Texas. Roberts plans to specialize in psychiatry while Soeken will focus on ophthalmology.

"Eventually I hope to be stationed somewhere in the United States taking care of airmen who have served overseas," said Roberts. "I'll probably be working with patients suffering from things like PTSD or other mental disorders that may be correlated with stressors unique to the military population, and I can see myself working in the inpatient setting, taking care of more acutely psychiatrically ill individuals, or in the outpatient clinic setting as well. Either way I am looking forward to using my medical training to help members of the military."

Because Soeken was trained as a military pilot prior to enrolling in medical school, he plans to use both specialties in his future career—serving as an Air Force pilot who also practices medicine.

"It sounds weird and it actually is pretty weird," admitted Soeken. "The military has about a dozen officers who are both pilots and physicians, and basically we're there for special circumstances and to offer our unique perspective. We could be called in to help determine the cause of an accident, evaluate new life-support equipment or consult on any number of things that might require both skill sets. We're not flight surgeons—they're the physicians who actually care for the pilots—we're physicians who are also pilots."

After he completes his residency, Soeken expects to spend part of his week performing surgeries in an eye clinic and the rest of his time flying—that is, when he's not consulting on special projects or unforeseen events.

"I can't wait," he said. "I get to have two different dream jobs."

"It's an incredible responsibility, as well as a great honor," said Porea. "As of their graduation and commissioning, Robbie and Tim instantly outranked over a quarter of a million Air Force enlisted personnel and almost 1.2 million enlisted in all branches of the Armed Services. These young men and women will look up to them not just for their medical knowledge, but for what they represent as an officer in the military." ■

HEALTH POLICY

By Arthur Garson Jr., M.D., MPH
Director of the Texas Medical Center Health Policy Institute

THE TMC HEALTH POLICY INSTITUTE CONSUMER HEALTH REPORT: REFLECTIONS ON THE SURVEY | We recently presented data from a Nielsen-Harris survey of 1,000 Texans to determine what consumers think about their health insurance, both personally and for the country, and how they want their health care delivered. The Houston Chronicle's Jenny Deam reported on this poll extensively. In the days since the release of the data, the conversation has centered on two issues.

1. Following release of the survey, the Houston Chronicle wrote an editorial entitled "Tone deaf," saying:

> Health insurance is important to Texans, but our top elected leaders don't see it that way. Do Texans really care whether they can show the receptionist their health insurance card the next time a family member needs an expensive medical procedure or a child needs a routine checkup? [...] Apparently it matters a great deal, according to a first-of-its kind survey commissioned by the Texas Medical Center. An astounding 83 percent said that having health insurance was either "very important" or "absolutely essential." [...] Do the elected officials who purportedly represent these Texans believe that medical insurance is important? Well, not so much. Here's Gov. Greg Abbot, for example, responding with the same, tired tea-party talking points when asked earlier in the week about expanding Medicaid, so that more Texans would have coverage. [...] It's astounding to us how elected officials can be so hidebound by ideology that they lag behind their fellow Texans on a number of issues, including Medicaid expansion.

This issue is complex, as some feel they must weigh re-election against covering the uninsured. Privately, some high-ranking people are actually very much in favor of Medicaid expansion (as long as it does not mention "Medicaid" and is called something benign like "Harriett"). Perhaps some think the 83 percent are not in their district, or that this is not a sufficiently important issue to swing the election. We will examine these issues in the next survey.

2. When the idea of a "fat tax" was fielded several years ago, the Houston Chronicle editorial was entitled, "Weighty matters: Nation's obesity problem needs action—not a food fight." The piece concluded, "And then there's the talk of a food tax to steer consumers away from their truly unhealthy indulgences. If there's a way to start a food fight, this is it. [...] Already, the idea of taxing sodas and juices with high sugar content has triggered a high-profile national campaign opposing the idea. We'll need more time to digest the details, but the idea seems like it might be an appetizing way to lower costs."

Six years later, more than half of Texans support a higher price for unhealthy foods—especially among the 18- to 34-year-olds: 75 percent were in favor of a "fat tax." This was a pleasant surprise. The World Health Organization tells us that the major deterrent to smoking is the cigarette tax. Maybe the time has come either to subsidize healthy food or increase the price of less healthy food. At least we should begin identifying food and drinks in a simple way called "front of package labeling" (because nutritional information on the back of the package is so difficult to digest.) In a study of vending machines at the University of Virginia, after one year of labeling, sales on green (fewer than 140 calories) increased 15 percent, yellow (140-199 calories) increased 30 percent and red (200 calories or more) decreased 5 percent. Making everyone happy, total sales increased 6.5 percent. Next year's survey will get more specific about these issues.

These discussions are quite important, as they will hopefully guide policymakers to think about what their constituents actually want. We have many unanswered questions, at the top of the list: "How different are Texans from the rest of the U.S.?" Our survey will expand to several states. Stay tuned. ■

—This column first appeared in the Houston Chronicle

innovation

By William F. Mckeon

Executive Vice President and Chief Strategy and Operating Officer of the Texas Medical Center

IN OCTOBER OF 2014, THE TEXAS MEDICAL CENTER LAUNCHED THE LIFE SCIENCE ACCELERATOR, TMCx. | Today, TMCx is hosting over 40 startup companies, hailing from across the United States and beyond. While these are still early days, there is great excitement and support throughout the medical center and Houston. TMCx serves as the cornerstone of the Innovation Institute, comprised of several additional and equally important elements.

The TMCx accelerator is ideal for early-stage startups that require resources and expertise to help companies migrate from an idea to a viable health care solution As companies successfully navigate across the "valley of death," and receive initial financing, their challenges expand from the technological to the operational. This is a critical time, as companies move from makeshift offices to ones that can support their early stage of growth. Typically, startup companies have no credit history, and are unable to afford market-rate rental prices or qualify for long-term rental agreements, making this an especially challenging transition.

In recognition of these challenges, the Texas Medical Center recently completed the development of a new area designed to meet the needs of emerging companies. It is called TMCx+. Located adjacent to the TMCx accelerator, TMCx+, as the name indicates, possesses those additional capabilities and resources required by more established companies.

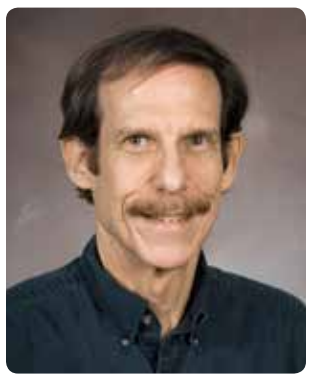
TMCx+ is a fully furnished space containing 13 suites of secure, lockable offices for emerging companies. Each suite has two executive offices and a pod of desks that can support up to eight people. The TMCx+ space is equipped with a large community space, a café and six conference rooms.

Developed with no prior commitments, the TMCx+ space opened in late May. One month later, the space is fully occupied and the waiting list is growing every week. This is yet another indicator of the exponential demand and momentum of the entrepreneurial community in Houston.

It is very exciting to see how the Innovation Institute has become a place where innovators from throughout the medical center and across the city of Houston come together to share ideas and perspectives. We can't wait to see how it will evolve and expand over the coming months. ■

ACCOLADES

M. JUSTIN COFFEY, M.D., associate professor at the Menninger Department of Psychiatry and Behavioral Services at Baylor College of Medicine, has joined the Menninger Clinic as medical director of the Brain Stimulation Program and as director of medical informatics. Coffey's clinical interests focus on brain-behavior relations in patients suffering from severe mood disorders and movement disorders, including catatonia. Previously Coffey held the same position at the Henry Ford Health System in Detroit where he also served as medical director of the hospital's Consultation-Liaison Service.



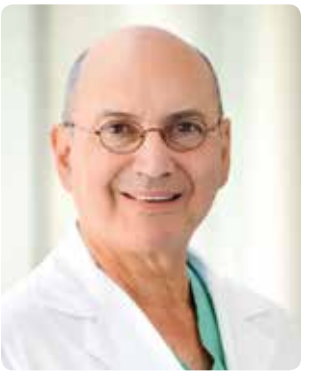
BARRY R. DAVIS, M.D., PH.D., Guy S. Parcel Chair in Public Health and professor of biostatistics at The University of Texas Health Science Center at Houston (UTHealth) School of Public Health, has been appointed to the Federal Drug Administration's Cardiovascular and Renal Drugs Advisory Committee. Davis, who directs the Coordinating Center for Clinical Trials (CCCT) at UTHealth School of Public Health, will represent the field of biostatistics on the committee. He was recommended and selected for the four-year appointment based on his work in the design and analysis of clinical trials and his frequent participation in major cardiovascular clinical trials.

WESLEY LEE, M.D., co-director of Texas Children's Fetal Center, section chief for women's and fetal imaging at Baylor College of Medicine - Texas Children's Hospital/Texas Children's Fetal Center, and professor of obstetrics and gynecology at Baylor College of Medicine, was the recipient of the William J. Fry Memorial Lecture Award from the American Institute of Ultrasound in Medicine. The award recognizes an AIUM member who has significantly contributed to the scientific progress of medical ultrasound.

COLLEEN O'BYRNE, PSY.D, assistant professor at the Menninger Department of Psychiatry and Behavioral Services at Baylor College of Medicine, has joined the Menninger Clinic as a staff psychologist for the hospital's Hope Unit for adults. O'Byrne has clinical expertise in psychological testing, treatment of trauma and psychodynamic therapeutic interventions in hospitals, and most recently served as a psychologist for the military at Fort Belvoir Community Hospital in Virginia.

AKASH PATEL, M.D., assistant professor at Baylor College of Medicine, Department of Neurosurgery, was selected by the Congress of Neurological Surgeons Fellowships Committee to receive the 2015-2016 CNR Getch Fellowship Award. The award provides $100,000 for advanced training and is granted to a neurosurgeon or fellow engaged in clinical research that promises to significantly impact the field of neurosurgery. The award will be presented at the CNS Annual Meeting in September 2015.

CHRISTIAN SCHAAF, M.D., PH.D., assistant professor of molecular and human genetics at Baylor College of Medicine and investigator at the Jan and Dan Duncan Neurological Research Institute of Texas Children's Hospital, has been named as the new chair of the Education Committee of the American College of Medical Genetics. During his two-year term, Schaaf hopes to develop an online genetics academy, which will offer new and interactive educational tools that can be accessed anywhere and anytime. In addition, he intends to engage students to encourage their interest in the field of medical genetics.



RICHARD STRAX, M.D., associate professor of Medicine at Baylor College of Medicine, Department of Radiology, has received the Texas Medical Association Award for Excellence in Academic Medicine at the Silver Level. The award recognizes physicians for their achievements and dedication to teaching and service to academic medicine. Strax received the award at the TMA's TexMed 2015 conference and will be recognized in an upcoming issue of TMA's Texas Medicine and other TMA publications.

HUDA ZOGHBI, M.D., professor in the Baylor College of Medicine departments of Molecular and Human Genetics, Pediatrics, Neuroscience, and Neurology, and director of the Jan and Dan Duncan Neurological Research Institute at Texas Children's Hospital, received the Mortimer D. Sackler, M.D., Prize for Distinguished Achievement in Developmental Psychobiology, awarded by Weill Cornell Medical College and Columbia University College of Physicians and Surgeons. Zoghbi has pioneered research on Rett syndrome and other rare brain disorders, and has advanced research of autism and adult neurodegenerative diseases.

Baylor College of Medicine and Texas Heart Institute Announce Affiliation

Baylor College of Medicine and Texas Heart Institute today announced a formal affiliation agreement that centers on cardiovascular research, education and patient care at the two institutions and at Baylor St. Luke's Medical Center, part of CHI St. Luke's Health.

The announcement, made by Baylor President, CEO and Executive Dean Paul Klotman, M.D., and Texas Heart Institute Board Chair David Grimes, also outlines the goal of strengthening and expanding the collective cardiovascular programs.

The affiliation brings two outstanding institutions into closer alignment. The objective is to build on the expertise and synergies of both, with a unified leadership team. The two institutions are jointly recruiting a chief executive officer for Texas Heart Institute who will also serve in a cardiovascular leadership role at Baylor.

"Baylor College of Medicine and Texas Heart Institute have worked together for many years, and several Baylor faculty members already hold leadership positions at Texas Heart Institute," said Klotman. "This affiliation formalizes our relationship and emphasizes the importance of having common leadership of cardiovascular programs."

"This affiliation builds upon not only the prominence of both organizations, but a shared vision with global implications," explained Grimes. "This is about further elevating cardiovascular discovery and care on an even brighter international stage. Additionally, we are excited with what this will mean as we work to identify the right CEO to lead our vision going forward. With this affiliation, we are well positioned for even greater success."

In addition to leading the mission of Texas Heart Institute, the new CEO of Texas Heart Institute will also co-direct the Cardiovascular Research Institute at Baylor, overseeing cardiovascular services at Baylor St. Luke's Medical Center. A search is now in progress to find the ideal leader for this effort.

This affiliation continues to build on the foundation created by two of the most renowned cardiovascular pioneers, the late Michael DeBakey, M.D., and Denton Cooley, M.D. Cooley, founder and president emeritus of Texas Heart Institute, has a faculty position at Baylor, serving as Distinguished Emeritus Professor.

> "The importance of this affiliation cannot be minimized. [...] This will have far-reaching implications on both research and the delivery of care for decades to come across the globe."
>
> — JAMES WILLERSON, M.D.
> *President of Texas Heart Institute*

James Willerson, M.D., president of Texas Heart Institute, said, "The importance of this affiliation cannot be minimized. Texas Heart Institute has been ranked among the 'Top 15' heart care centers in the U.S. for each of the past 24 years consecutively. This will have far-reaching implications on both research and the delivery of care for decades to come across the globe."

The institutions will work together on a wide array of cardiovascular issues, including coronary artery disease, atherosclerosis and ischemia, heart failure and cardiomyopathy, arrhythmias and channelopathies, congenital developmental heart disease, aortopathies, valvular heart disease, cardiovascular regenerative medicine, heart assist devices, stem cell research and genetics. CHI St. Luke's Health, including Baylor St. Luke's Medical Center, will serve as an important partner in the clinical efforts. ■

— Lori Williams, Baylor College of Medicine

Memorial Hermann Breaks Ground on $650 Million Texas Medical Center Renovation and Expansion Project

Memorial Hermann recently broke ground on the $650 million expansion and renovation of its Texas Medical Center (TMC) Campus. As the Houston region's only full-service health system, this expansion will enable Memorial Hermann to stay ahead of the fast-growing advances in medicine, keep pace with the extraordinary growth of the city and, most importantly, meet the health needs of the community for years to come.

Local dignitaries, community leaders, affiliated UTHealth physicians and Memorial Hermann leadership all gathered to celebrate the official groundbreaking event. In attendance were: Rep. Al Green; President and CEO of the Texas Medical Center, Robert C. Robbins, M.D. ; Houston City Council Members Jack Christie and Ellen Cohen; numerous staff representatives of local, state and federal officials; Giuseppe Colasurdo, M.D., President of UTHealth and Dean of UTHealth Medical School; Memorial Hermann Health System Board Chairman Will Williams and several other Memorial Hermann System and Foundation board members; and key representatives of Memorial Hermann leadership including President and CEO Dan Wolterman.

"I am proud to stand with the leadership of Memorial Hermann as they begin the $650 million expansion and renovation of the Memorial Hermann-Texas Medical Center Campus," said Rep. Green. "For nearly a century, Memorial Hermann-TMC has diligently served the community and remained a leader in the fields of medical technology, research and innovation. With the completion of this additional 1.34 million square feet, Memorial Hermann-TMC will be able to better address the growing health care needs of the Greater Houston Metropolitan Region as well as continue to provide access to quality health care for countless individuals."

At the event, Rep. Green presented Memorial Hermann-TMC with a Certificate of Special Congressional Recognition that saluted the hospital's "continued commitment to providing the latest medical innovations and procedures for treating patients as well as your dedication to exceptional patient care."

The Breaking New Ground expansion and renovation project began in fall 2014 and is expected to be completed in 2019. Highlighting the project will be the construction of a new patient care building and an additional building that will include parking and infrastructure capabilities to support the new growth. ■

— Kathryn Klein, Memorial Hermann

Study: Microendoscope Could Eliminate Unneeded Biopsies

In a clinical study of patients in the United States and China, researchers found that a low-cost, portable, battery-powered microendoscope developed by Rice University bioengineers could eventually eliminate the need for costly biopsies for many patients undergoing standard endoscopic screening for esophageal cancer.

The research is available online in the journal Gastroenterology and was co-authored by researchers from nearly a dozen institutions that include Rice, Baylor College of Medicine, the Chinese Academy of Medical Sciences and the National Cancer Institute.

The clinical study, which involved 147 U.S. and Chinese patients undergoing examination for potentially malignant squamous cell tumors, explored whether Rice's low-cost, high-resolution fiber-optic imaging system could reduce the need for unnecessary biopsies when used in combination with a conventional endoscope—the worldwide standard of care for esophageal cancer diagnoses.

The study involved patients from two U.S. and two Chinese hospitals: Mt. Sinai Medical Center in New York, the University of Texas MD Anderson Cancer Center in Houston, the Cancer Institute and Hospital of the Chinese Academy of Medical Sciences in Beijing and First University Hospital in Jilin, China.

In the study, all 147 patients with suspect lesions were examined with both a traditional endoscope and Rice's microendoscope. Biopsies were obtained based upon the results of the traditional endoscopic exam.

A pathology exam revealed that more than half of those receiving biopsies—58 percent—did not have high-grade precancer or cancer. The researchers found that the microendoscopic exam could have spared unnecessary biopsies for about 90 percent of the patients with benign lesions.

"For patients, biopsies are stressful and sometimes painful," said lead researcher Rebecca Richards-Kortum, Ph.D., Rice's Stanley C. Moore Professor of Bioengineering, professor of electrical and computer engineering and director of Rice 360°: Institute for Global Health Technologies. "In addition, in low-resource settings, pathology costs frequently exceed endoscopy costs. So the microendoscope could both improve patient outcomes and provide a significant cost-saving advantage if used in conjunction with a traditional endoscope."

When examined under a microscope, cancerous and precancerous cells typically appear different from healthy cells. The study of cellular structures is known as histology, and a histological analysis is typically required for an accurate diagnosis of both the type and stage of a cancerous tumor.

To determine whether a biopsy is needed for a histological exam, health professionals often use endoscopes, small cameras mounted on flexible tubes that can be inserted into the body to visually examine an organ or tissue without surgery. Rice's high-resolution microendoscope uses a one-millimeter-wide fiber-optic cable that is attached to the standard endoscope. The cable transmits images to a high-powered fluorescence microscope, and the endoscopist uses a tablet computer to view the microscope's output. The microendoscope provides images with similar resolution to traditional histology and allows endoscopists to see individual cells and cell nuclei in lesions suspected of being cancerous.

By providing real-time histological data to endoscopists, Rice's microendoscope can help rule out malignancy in cases that would otherwise require a biopsy. ■

— Jade Boyd, Rice University

(Credit: Jeff Fitlow/Rice University)

July 2015

7 ***Rice University Farmers Market***
Tuesday, 3:30 p.m. – 6:30 p.m.
Rice University parking lot adjacent to Rice Stadium
6100 Main Street
ricefm@rice.edu

10 ***8th Annual Yatsu Day Symposium: Stroke Recovery in the 21st Century***
Friday, 7:30 a.m. – 4:45 p.m.
Cooley Conference Center
7440 Cambridge Street
continuing.ed@utmb.edu
409-772-9300

14 ***Rice University Farmers Market***
Tuesday, 3:30 p.m. – 6:30 p.m.
Rice University parking lot adjacent to Rice Stadium
6100 Main Street
ricefm@rice.edu

21 ***Rice University Farmers Market***
Tuesday, 3:30 p.m. – 6:30 p.m.
Rice University parking lot adjacent to Rice Stadium
6100 Main Street
ricefm@rice.edu

25 ***1st Annual EMS Orthopedic Trauma Symposium: Techniques & Controversies in Modern Orthopedic Trauma Care***
Saturday, 7:30 a.m. – 4:00 p.m.
Memorial Hermann-Texas Medical Center Hermann Conference Center
6411 Fannin Street
rodolfo.cabrera@memorialhermann.org
713-222-2273

28 ***Rice University Farmers Market***
Tuesday, 3:30 p.m. – 6:30 p.m.
Rice University parking lot adjacent to Rice Stadium
6100 Main Street
ricefm@rice.edu

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