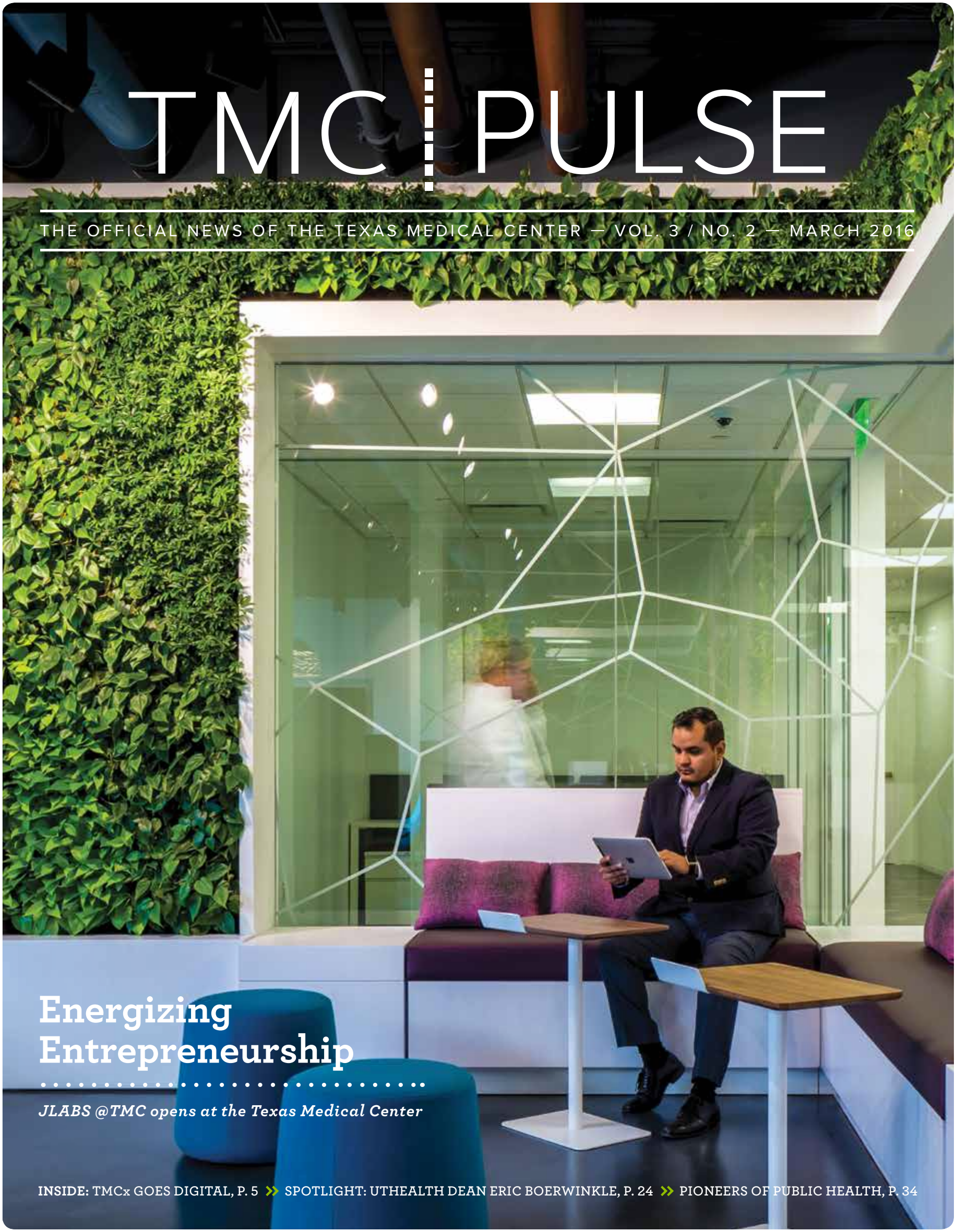
TMC PULSE

THE OFFICIAL NEWS OF THE TEXAS MEDICAL CENTER — VOL. 3 / NO. 2 — MARCH 2016



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HANDS-ON TRAINING // p. 28

FOCUSED ON HELPING HEALTH CARE PROFESSIONALS STAY AT THE TOP OF THEIR GAME, THE METHODIST INSTITUTE FOR TECHNOLOGY, INNOVATION & EDUCATION (MITIE) ENABLES SURGEONS TO SAFELY LEARN INNOVATIVE TECHNIQUES AND USE NEW TECHNOLOGIES.

ON THE COVER: *The new 35,000-square-foot JLABS @TMC facility brings the outdoors in with green features that include a living wall of plants and an indoor atrium. By connecting the interior areas to natural light and vegetation, the architects improved the aesthetics of the space while enhancing the well-being of JLABS resident companies.*

(Credit: Slyworks Photography)

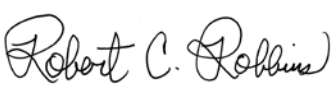
PRESIDENT'S PERSPECTIVE

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

At the recent 2016 Greater Houston Partnership Annual Meeting, Chairman Jamey Rootes spoke of the many pieces of Houston's economy that contribute to this city's role as a global leader. From health care and manufacturing to energy and infrastructure, Houston is second to none. He encouraged us all to continue to champion the collaboration and economic diversity that have made our city great.

Here in the Texas Medical Center, we heed that call every day, in part through the TMC Innovation Institute. In this issue of Pulse, you will read about our partnership with Johnson & Johnson Innovation to bring JLABS @TMC to Houston. This partnership marks an exciting milestone in our efforts to further Houston as a global hub for life science startups and entrepreneurs, using the passion and expertise within the medical center as catalysts for exciting advances in medicine.

We will continue to champion Houston in the coming years through our plans for TMC3 to help expand this campus and encourage growth and collaboration in health care and life science. These new ventures will not only encourage the development of game-changing research and education programs, but we anticipate they will also generate jobs and provide added stability and diversity to our local economy. We are working to build an ecosystem where our own researchers and students can develop companies, with access to the resources that will help nurture and grow their visions. We believe that this endeavor will not only help realize our campus goal of promoting innovation and improving human health, but will also continue to further Houston's potential as a global leader in life science and innovation.



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TMCx Goes Digital

Propelled by last year's successes and a redefined curriculum, the Texas Medical Center welcomes 12 companies specializing in digital health to the second class of its TMCx accelerator program

By Alex Orlando

Earlier this year, a steady stream of medical entrepreneurs from near and far walked through the tiered, luminescent hallway—known informally as the "innovation portal"—into their new workspace. As they unpacked luggage, juggled parking passes and ID badges, scribbled notes on personalized whiteboards at their workstations and darted back and forth between orientation sessions, these eager entrepreneurs got a taste of the controlled chaos that would define the next five months.

Twelve companies specializing in digital health were welcomed as the second class of TMCx—the Texas Medical Center's accelerator program that acts as a gateway to the facilities, resources and network of the world's largest medical center.

TWELVE COMPANIES WERE SELECTED FROM A POOL OF OVER 100 APPLICANTS TO PARTICIPATE IN THE SECOND CLASS OF TMCx, *THE ACCELERATOR PROGRAM THAT SERVES AS A CORE COMPONENT OF THE TEXAS MEDICAL CENTER INNOVATION INSTITUTE.*

"Essentially, we're here to leverage our network and the organizations that are part of the Texas Medical Center, for the benefit of these entrepreneurs," said Erik M. Halvorsen, Ph.D., the new director of the TMC Innovation Institute. "These companies have access to the largest collection of top physicians, scientists and business expertise that exists on a single campus—one which serves over 7.2 million patients each year. If you combine that with the sheer volume of data that flows through our network—as well as the breadth and diversity of these different organizations—it can be a huge asset for digital health innovation."

The second year of the TMCx program marks a notable change: each class will focus on a specialized subset of health care innovation, with two classes participating each year.

> "By putting the focus on digital health, we're hoping to enable fortuitous collisions between the companies that lead to collaborations and increased acceleration."
>
> — ERIK M. HALVORSEN, PH.D.
> *Director of the TMC Innovation Institute*

2016 TMCx Digital Health Class

COMPANY	DESCRIPTION
APRENDA SYSTEMS	Aprenda Systems provides organizations with rich, accurate and timely directory data through access to Signature, the world's first identity convergence platform.
CareSet SYSTEMS	CareSet Systems builds physician networks.
DR Doc Response	DocResponse is a software company focused on health care diagnostics for clinical decision support.
ePreop	ePreop's SurgicalValet software helps coordinate perioperative care while optimizing patient engagement, billing support, readmission prevention and everything in between.
GREENLIGHT MEDICAL	GreenLight Medical is a decision engine to promote cost- and quality-conscious purchases within hospitals for new medical technology review and approval.
movinganalytics	Moving Analytics helps hospitals implement home-based cardiac rehab programs delivered through patients' mobile devices.
Qidza	Qidza is a mobile platform that translates developmental science into fun health-screening activities throughout human development, starting with babies.
Secure Healing	Secure Healing helps hospitals comply with the auditing requirements of HIPAA and other regulations by automatically identifying inappropriate access of confidential information.
SENSELY	Sense.ly is a virtual nurse platform that helps clinicians better manage and communicate with their patients.
The Right Place	The Right Place provides hospitals and post-acute providers a more efficient and reliable way to match the right patient to the right place of care.
VALERA HEALTH	Valera Health is enabling the future of behavioral health care through smartphone-based support for behavioral wellness and care coordination.
XPRESS	Xpress puts providers and patients in charge of health care, giving them real-time access to unbiased pharmaceutical resources and information.

From January through June 2016, the 12 companies will focus on digital health. From August through December 2016, a third class of companies—yet to be selected—will focus on medical devices.

"By all measures, the first class was an incredible success," said Halvorsen, referring to last year's inaugural cohort of 21 companies that solidified the accelerator's status as a beacon for life science entrepreneurship. "But at the same time, there was also some learning that took place along the way. One of those observations was that by focusing the class around particular areas, we could create more synergy for the companies here.

"By putting the focus on digital health, we're hoping to enable fortuitous collisions between the companies that lead to collaborations and increased acceleration," he continued. "Even in the first four days, the companies are already actively collaborating and looking for ways to help each other. It's really exciting to watch."

Thanks to the programmatic overhaul and a tightly woven curriculum, class two is hurtling along and showing little sign of slowing down. Between a barrage of informational sessions, detailed tours to provide an inside look at medical center institutions, and events intended to ignite conversation between the entrepreneurs, advisors and hospital stakeholders, the new arrivals barely had time to catch their breath.

"It was really great to visit the actual hospitals throughout the medical center," said Adam Odessky, co-founder and chief executive officer of Sense.ly, a virtual nurse platform that enables clinicians to better manage and communicate with their patients. "Just understanding how their administration interfaces with treatment, how the different departments flow, and understanding how the procurement and IT processes

THE COMPANIES HAIL FROM THROUGHOUT TEXAS—FIVE FROM RIGHT HERE IN HOUSTON—AND ACROSS THE COUNTRY, *INCLUDING TEAMS FROM CALIFORNIA, NEW YORK AND NEW MEXICO.*

> “In my experience, the TMCx accelerator is the most closely relevant to what we’re doing as a company, [...] This program, specifically, is centered around helping health care entrepreneurs build their businesses.”
>
> —ADAM ODESSKY
> *Co-founder and CEO of Sense.ly*

work—it’s all invaluable. That window into the whole workflow has been instrumental in shaping how we could position our product to better serve their needs.”

Fellow TMCx classmate Katherine Chambers, co-founder and chief executive officer of The Right Place—a Houston-based company that provides tools to nursing homes and helps hospitals identify where to send patients who need nursing home care—is also looking to the future, especially as the field of digital health innovation continues to blossom.

“There’s such a tremendous opportunity within the digital health spectrum to enable workflow efficiency, so that these highly trained people aren’t stuck spending their time on administrative tasks around coordinating where a patient should go for nursing home care,” Chambers said. “That’s where technology can really serve these care teams. Solutions like The Right Place can enable physicians and nurses to spend more of their time actually assisting patients, assessing them and administrating care.”

The future of digital health is also shining brightly for Alexander Izaguirre, Ph.D., founder and chief executive officer of Aprenda Systems, which provides organizations with accurate and timely directory data through access to its Signature software.

“As a platform technology, I see us leveraging the creativity, work and efforts of all of these different companies that no other organization has,” he said. “By the end of the program, I’d love to see that up to 5,000 physicians are using Signature, aggregating great, curative data, developing profiles and sharing that information with health plans and systems. I want us to demonstrate to the world that it’s much easier to get things done when you can share your data as a currency.”

Finding the most effective ways to engage with hospital leadership and cater to potential customers was a pivotal focus of the program’s first two weeks. That emphasis culminated in a curriculum session led by Todd Dunn, director of innovation for Intermountain Healthcare, on avoiding common pitfalls and creating value for customers.

“If you’re an entrepreneur, always remember that in an early stage company, you have assumptions that you need to test and get evidence for,” he said. “Whether you validate or invalidate your assumptions, it doesn’t matter—you need to do both. It’s crucial to spend time from an empathetic mindset and be mindful of your customer, what they struggle with and what they hope to do. Make sure you really understand them before you diagnose what you believe their problems are.”

Last year’s lessons informed more than just the current structure and focus. Weaving connective threads between TMCx alumni and current cohort members, Niko Skievaski, co-founder of Redox and a participant in last year’s class, provided some insight into how to best leverage the resources available and dispensed a healthy dose of perspective.

“By investing in innovation, bringing in the best companies from across the country and putting them on stage in front of all these health systems, the Texas Medical Center is making Houston a national hub for innovation,” said Skievaski. “A lot of accelerator programs will own a piece of your company, and the point of them will be to launch you out at the other side at a $20 million valuation, so that the equity they bought three months earlier can now be valued higher. Whereas, the motive here is to simply help you. That’s how I looked at the program when I was here.”

The responses from the companies have so far been overwhelmingly positive. Based on feedback collected from the first several weeks of the program, 126 out of 150 responses demonstrated that a session either “exceeded expectations” or “far exceeded expectations.” If that’s any indication, the next four and a half months are likely to contain even more pleasant surprises.

“In my experience, the TMCx accelerator is the most closely relevant to what we’re doing as a company,” Odessky said. “Other business accelerators have either been too high-level, helping companies run their businesses from a financial or corporate governance perspective, while others have been focused on a technology leadership perspective. But this program, specifically, is centered around helping health care entrepreneurs build their businesses.

“That’s tremendously helpful, and is allowing us to shape our business around some of our biggest customers—which could be, in fact, places like Texas Children’s and MD Anderson,” he added. “That’s crucial because it helps us align what we do, how we work and our overall value to be much closer to the people we serve.” ■

A United Front to End Cancer

The country's 69 NCI-designated cancer centers recently united in a joint effort to promote HPV vaccination and eradicate cervical cancer

By Shanley Chien

When 33-year-old Kara Million visited her doctor for her annual well-woman exam in 2004, she thought it was going to be a routine checkup, just like all the previous years. She had been going annually, but this was the first time her doctor offered a human papillomavirus test.

"I wasn't really worried about anything," she said. "I was married and didn't have any symptoms of anything."

But when her HPV test came back positive, Million was instructed to see her doctor every six months in order for them to keep a close eye on her condition.

> "If I could go back 30 years, I would get the HPV vaccine for sure. I don't want anybody to ever go through what I'm going through."
>
> — KARA MILLION
> *Cervical Cancer Survivor*

She continued seeing her doctor on a regular basis and led an overall normal life, giving birth to her son in 2006 and daughter in 2008.

"Everything was still okay. I guess being a mom of two very new kids, I let that six-month time relapse," she said.

It wasn't until 15 months after her last doctor's visit that Million went back for her checkup and, by that time, her condition had worsened. She was diagnosed with stage IIIA cervical cancer.

After six weeks of radiation and chemotherapy and a year of remission, Million and her doctors were hopeful about her outcome. There was no evidence of the cancer returning, but in October 2010, Million was back in the hospital. Her cancer had recurred and, this time, she would need to undergo a radical surgical procedure, called total pelvic exenteration.

"I couldn't even talk about the surgery without crying. I mean, I had two babies at home. The thought of leaving them motherless was breaking my heart," she said.

The surgery consists of removing the uterus, cervix, ovaries, fallopian tubes, vagina and other surrounding organs.

"They removed my bladder. They removed part of my colon, part of my intestines and part of my rectum," Million said. After a 13-hour surgery that produced a scar from her right breast all the way down and around, she was left with two ostomies: one for urine and the other for stool.

"This is my new normal," she said.

Since her procedure, she and another cervical cancer survivor formed a support group for women undergoing total pelvic exenteration surgeries, comforting 15 to 20 different women over the past four years. Although many of those in her support group have survived, there are some who weren't as fortunate.

"It's a high mortality rate. If the HPV vaccination can prevent that, I don't understand why people aren't running out the door just to get it now," Million said, adding that her children will receive the HPV vaccine when they're at the proper age.

"If I could go back 30 years, I would get the HPV vaccine for sure. I don't want anybody to ever go through what I'm going through," she said.

Million's experience is a cautionary tale for the four out of 10 unvaccinated girls and six out of 10 unvaccinated boys across the U.S., but a new collaboration between all 69 National Cancer Institute-designated cancer centers seeks to improve those odds.

Earlier this year, The University of Texas MD Anderson Cancer Center, Baylor College of Medicine and others united to publish a joint statement that endorsed HPV vaccination for nationwide cancer prevention.

It was a groundbreaking move that Ernest Hawk, M.D., vice president and head of the Division of Cancer Prevention and Population Sciences at MD Anderson, called "the beginning of a new age for cancer control actions."

"It doesn't benefit them at all, but it is directly aligned with their mission of service," Hawk said. "That's what's novel here: it's the fact that they chose to come together and agree upon the language, which was terribly difficult, related to HPV vaccination. They're not going to get paid for this. They're not going to get more grant money for it, but everyone knows it's the right thing to do."

The idea to come together in concerted action was inspired by NCI grants that funded 18 environmental scans in January 2015 to study HPV vaccination barriers across 18 cancer centers' communities, looking closely at what factors prevent people from receiving the vaccines. The results of the scan and key informant interviews identified a variety of reasons people cited as barriers, including inconsistent

recommendations by health care providers, anti-vaccination sentiments and insurance gaps. These were then shared with all 69 centers in November 2015 to develop a collective strategy to address those challenges.

The proliferation of misinformation and general lack of understanding of the HPV vaccine—such as the notion that it promotes sexual promiscuity, only needs to be taken by women and is not effective—are detrimental to building healthy communities, making it all the more pressing to raise public awareness and education on the importance of the vaccinations for everyone.

Amid the heated debates and confusion, both Hawk and Lois Ramondetta, M.D., professor of gynecologic oncology and reproductive medicine, and chief of gynecologic oncology at Lyndon B. Johnson General Hospital and co-leader of MD Anderson's HPV-related Moon Shots program, said it's important to not only raise awareness and prevention education, but also to support the health care providers on the front lines of family care.

"Most professionals know what to do, but they're hesitant to get into the conversation because of all these myths, as well as the fact that they feel a little bit isolated in advocating this," Hawk said. "That's one thing we could do: Help practitioners be more intentional in their advocacy of receiving the vaccine."

While many pediatricians mandatorily provide pertussis and meningococcal vaccinations to children, HPV vaccines are not given the same priority.

"It's really not a good idea to, as we say, 'put it in its special chair.' We need to be saying, 'You're due for the pertussis, your HPV and meningococcal. Which arm would you like it in?'" Ramondetta said, explaining that it is effective and there are no significant side effects of administering the HPV vaccine simultaneously with the others.

"Patients come in with very advanced cervical cancers, and it really blows my mind that we are still seeing this in one of the biggest medical centers in the country," she said. "We shouldn't see any cervical cancer anymore. We are a totally developed nation, so we should be able to screen for it and get rid of it."

Ramondetta added that vaccination rates in the U.S. "stink" compared to the rest of the world. Even on a global scale, the U.S. falls embarrassingly behind in HPV vaccination rates among women. While the U.S. came in at 39 percent, the United Kingdom showed 84 to 92 percent of its females received the HPV vaccine; Belgium and Portugal achieved 82 and 81 percent, respectively; and Australia 75 percent. But the country that exceeds all the others is Rwanda. Its campaign to vaccinate sixth grade girls in schools makes it the country with the highest vaccination rate at 93 percent.

Matthew Anderson, M.D., Ph.D., assistant professor of obstetrics and gynecology at Baylor College of Medicine, said that although some women with HPV may not develop cervical cancer, there are still several million women in the U.S. every year who are identified with cervical dysplasia and require additional care, evaluation and interventions that could lead to problems conceiving or staying pregnant. The added time, expense and concern over the slew of potential problems from refusing a vaccination could be prevented.

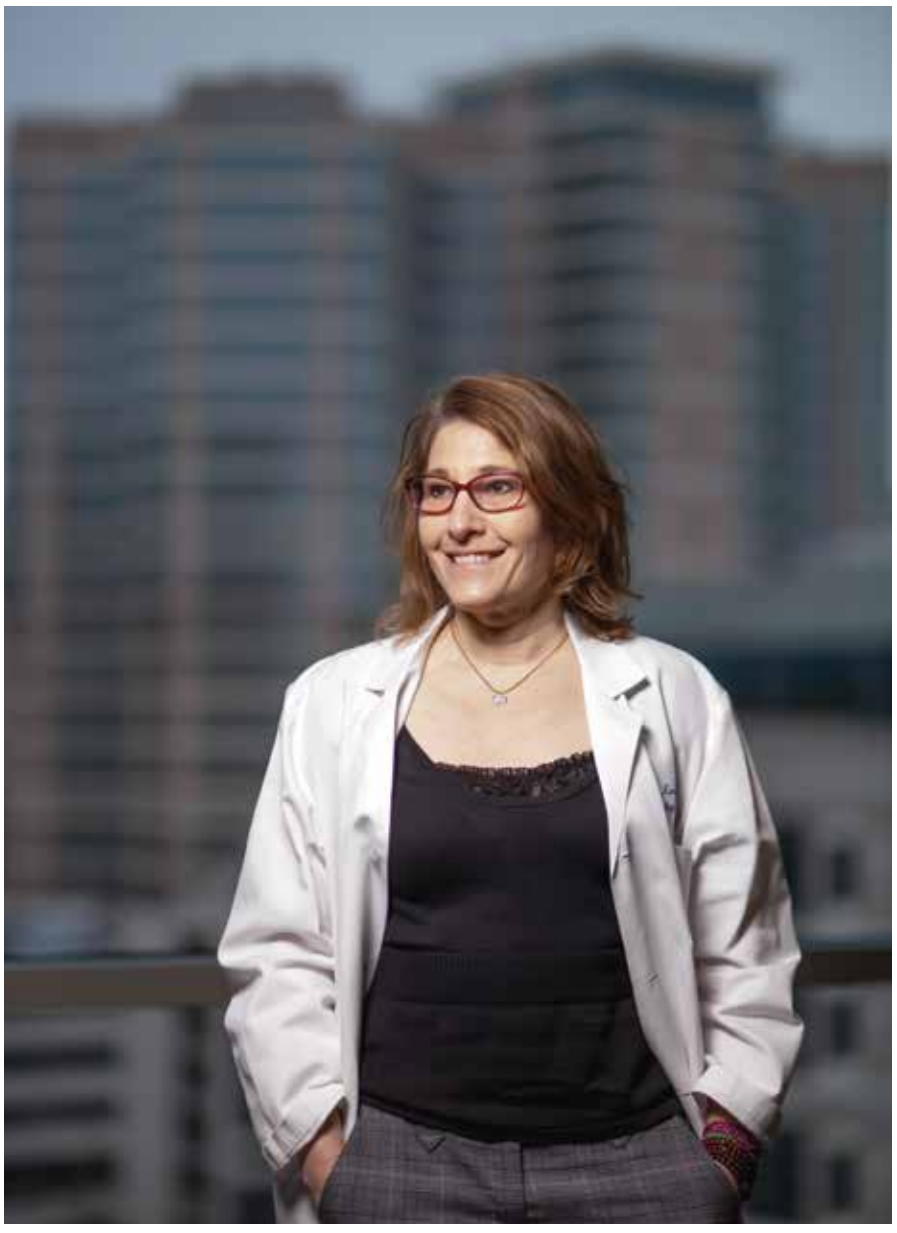
"You can bypass all that with a simple vaccination. The current vaccines now allow for nine different subtypes of HPV that are linked to cancer and can be prevented," Anderson said. "It's highly effective, and it can reduce or eliminate the incidence of HPV-related cancers. From that perspective, there really should be no reason why we, as a society, should not be chasing after that to make that a goal."

The joint effort is aligned with the U.S. Department of Health and Human Services' Healthy People 2020 goal, a nationwide public health campaign, and strives to raise vaccination rates to 80 percent in the next four years.

"It's really exciting that we have so many people working together who are all equally passionate about this," Ramondetta said. "We want to play our role as a cancer institute to make sure people understand that we think HPV vaccination is important." ■

> "We shouldn't see any cervical cancer anymore. We are a totally developed nation, so we should be able to screen for it and get rid of it."

— LOIS RAMONDETTA, M.D.
Professor of Gynecologic Oncology and Reproductive Medicine and Chief of Gynecologic Oncology at Lyndon B. Johnson General Hospital



> "There's very little risk for all of the reward that comes from vaccination."

— ERNEST HAWK, M.D.
Head of the Division of OVP and Cancer Prevention and Population Sciences at The University of Texas MD Anderson Cancer Center

WITH HOUSTON ONLY A MONTH AWAY FROM HOSTING THE NCAA MEN'S BASKETBALL FINAL FOUR, DAN GAVITT, NCAA VICE PRESIDENT OF MEN'S BASKETBALL CHAMPIONSHIPS, SPOKE WITH WILLIAM F. McKEON, EXECUTIVE VICE PRESIDENT AND CHIEF STRATEGY AND OPERATING OFFICER OF THE TEXAS MEDICAL CENTER, ABOUT THE EXCITEMENT SURROUNDING THE GAMES AND WHAT IT MEANS FOR HOUSTON TO HAVE BEEN AWARDED TWO FINAL FOURS BEFORE THE FIRST HAD EVEN TAKEN PLACE.

Q | *First and foremost, tell us about where you were born and raised.*

A | I was born in Hyannis, Massachusetts—it's one of the special places of my life, and we have a family home in the Craigville Beach area and go back every summer. But I grew up in East Providence, Rhode Island, and lived there through high school before I went off to college at Dartmouth College in New Hampshire. I then made my way back to Providence, not by any grand design, but that was just the way it worked out after graduation.

Q | *How much did your father's experience influence what you do today?*

A | In retrospect, quite substantially. I grew up essentially on a college campus, because my dad was the athletic director and head basketball coach at Providence College, so my brother and I would go to practices frequently and be around student athletes and around his team. He coached until 1979, which happened to be the first year that they went to the Final Four as well. 1979 was in Salt Lake City, Utah, and it was the infamous championship game between Michigan State and Magic Johnson and Indiana State and Larry Bird. Certainly that is cool for me now being involved with the NCAA basketball championships, knowing that my love of it started then, as my dad went on to other things like starting the Big East Conference, his work with the NCAA basketball committee, his work with the Boston Celtics. We always had this connection professionally and passionately about things that we shared and loved—college sports and basketball being at the top of the list—so quite substantially I think he impacted my career aspirations.

> “Houston was awarded two Final Fours before hosting the first one, which says an awful lot about the Houston bid, about NRG Park, about the city of Houston, the committee at the time and NCAA staff who awarded Houston the two opportunities to host the Final Four.”

Q | *In light of your history with institutions like NIT and the NCAA, can you tell us about your journey and how that shaped the way you think about the NCAA today?*

A | Well, in hindsight, I have to consider myself very fortunate to have the opportunities that I've had professionally in college basketball and in collegiate athletics. I never knew it would lead to the current opportunity, but along the way it was building to this. I started as an assistant basketball coach at Providence College and worked for Rick Barnes, who is currently head coach at Tennessee—formerly of Texas and Clemson. He had a significant impact on my professional development, a great mentor, and while I was an assistant coach, I had the opportunity to do many other things besides just coach.

Administratively, I did things dealing with travel arrangements, ticketing and recruiting, and made relationships over my six years coaching with other coaches who have now moved on to become very successful head coaches—guys like Tom Crean and Jay Wright are close friends because we were all assistants together back 20-25 years ago. So I was building this network, without even knowing it, of coaches who I've been very close to for a number of years. I then moved on and became an athletic director at a Division II school, at the time Bryant College, which is now Bryant University and a Division I school. As an athletic director, I had the chance to run programs, hire people and evaluate people, develop and mentor folks and learn more about the administrative side of our business. From there, I went on to work at the Big East Conference as the main basketball administrator when it was a 15-team league. I had a chance to help run the basketball championship in Madison Square Garden, to be the main liaison with our basketball coaches, get involved with scheduling and with our television partners—ESPN and CBS at the time—and again, continue to build on that network of athletic directors, conference office personnel, commissioners and television executives, while maintaining my basketball coaching contacts.

All of that now, in my current role with NCAA and NIT, is incredibly valuable, because I have relationships that go back 25 years with coaches and athletic directors and commissioners. I've been in each one of their roles, in some cases at a much smaller level than some of the constituents that we deal with at the NCAA, but I know what it is that they go through, as coaches, ADs and conference office administrators. It's been really beneficial for my work with the NCAA basketball championship. A lot of what we do is work for the membership of the NCAA, so it is working with those constituents to deliver on the things that they need, and I feel like I've been there, so I'm more attuned to what it is that we need to deliver for them.

Q | *In regards to March Madness, can you explain how the selection process works?*

A | I think the magic of March Madness, the thing that makes it so special, is I think it is the most democratic event in the country, if not the world. Because you've got 351 Division I NCAA schools, all of which have an opportunity to qualify for the NCAA tournament. While we know that Kentucky and Duke will likely be in the tournament more often than not, even the smallest school in the smallest conference in the country can win their automatic bid and represent their conference in the NCAA tournament. There are 68 teams that comprise the NCAA tournament field, 32 of those teams are what we call automatic qualifiers—they are the winners of their conference championship. Except for the Ivy League, which does not have a conference championship right now, so it's the winner of the regular season. The other 36 teams that are invited to the NCAA tournament are what we call at-large invitations. And they are the 36 best teams, as determined by the basketball committee, that aren't automatic qualifiers. So when the ACC champion is determined to be North Carolina because they win the conference championship, and Duke or Syracuse, who was the runner up or finishes third place in the regular season standings, was determined to be one of the 36 best teams not to have won their tournament, then they are one of the 36 at-large teams.

Q | *How was Houston selected as a site for the Final Four? What attributes made it so appealing?*

A | Houston was selected before I started at the NCAA, actually, back in 2008, I believe. And interestingly, somewhat uncharacteristically, Houston was awarded two Final Fours before hosting the first one, which says an awful lot about the Houston bid, about NRG Park, about the city of Houston, the committee at the time and NCAA staff who awarded Houston the two opportunities to host the Final Four. It's the fourth largest city in the country, it's an incredible media market, the entertainment and cultural opportunities that Houston offers, the food and beverage options that Houston offers are all off the charts, and the facility at NRG park and surrounding facilities and the stadium make for a fantastic venue for the Final Four.

Q | *What do you personally enjoy most about the March Madness season?*

A | Well, I think the thing that we work hardest to provide is an experience for student athletes and their families that they'll never forget. So, along those lines, we've done some things that hopefully make their experience even better than it's ever been. We've moved family members down right behind the bench at the Final Four, so moms, dads, brothers and sisters can be literally right behind the bench and have as good a view as anybody can at the Final Four. We put students in the end zone areas so they're as close to the action as they can be. We've done some things inside the team hotels, like we've created student athlete lounges where we've put video games, pool tables, Ping-Pong tables and snacks just for the team, so they can go in there and hang out together and enjoy that experience together. We have a student athlete family brunch in advance of the national semi-finals, where student athletes' families come and get to enjoy that experience together. The thing we take the most pride in is providing an experience that they'll never forget.

Personally, I think the moment that I enjoy the most—and I really always have, but having the opportunity to work on this special event now firsthand—is that moment just before tipoff on the first sets of the first semi-final game on Saturday of the Final Four, because all four teams that have qualified are all live. They all have their dreams right in front of them to win a national championship, and you've got four different corners of the stadium that have the colors of the four teams, and the noise is deafening and the feeling is electric. And that's the most exciting time for me, just before that first tipoff on Saturday.

Q | *Any closing thoughts?*

A | Well, we're just thrilled to be coming to Houston. You know, we plan years in advance for the Final Four, and very specifically, inside the calendar year leading up to the Final Four, we have monthly meetings in the host city. So we've been coming to Houston since June on a monthly basis. We'll make our final visit next week, and that'll be our last planning meeting with the Local Organizing Committee in Houston and the local authorities. It's hard to believe that we're as close as we are now, having started this process back in June. But the excitement couldn't be higher on our end, so we're looking forward to it. ■

For the full interview, visit *TMCNews.org*

After the Storm

The University of Texas Medical Branch at Galveston prepares for the grand opening of its new Jennie Sealy Hospital

By Alexandra Becker

On September 13, 2008, just after 2 a.m., Hurricane Ike made landfall on Galveston Island, leaving in its wake widespread and unprecedented damage. It razed thousands of homes, flooded historical landmarks and caused the temporary shuttering of The University of Texas Medical Branch at Galveston (UTMB) and its affiliated hospitals.

But before the storm surge—before waves of debris came knocking on the doors of the century-old campus, before millions of dollars of medical equipment was flooded and fried—officials had resolved to evacuate all patients and nonessential employees. It was a decision that almost certainly saved numerous lives, but also one they hope to never have to make again. And, despite the likely inevitable recurrence of another major storm on the island, they might not have to.

Today, nearly eight years later, the campus is preparing for the grand opening of the Jennie Sealy Hospital, a state-of-the-art, 765,000-square-foot facility built with the future in mind.

"There are almost 2,000 pilings that go down 140 to 160 feet into the ground," said David L. Callender, M.D., president of UTMB. "We aren't going anywhere."

The statement is intended to be both literal and symbolic. For a period of time after Ike, there was talk about whether UTMB should remain in Galveston at all. Discussions surrounding the institution's future suggested that it didn't make sense to rebuild in a place where annual weather patterns threatened to repeat history. What this failed to take into account, however, was how indispensable UTMB was, and continues to be, in the south Texas region.

"When you lose that much capacity, you learn a lot about your impact on a community," Callender said. "Between the loss of our Level 1 trauma center, our patients looking for places to go, and our physicians looking for a place to provide care for their patients, it was clear the region relied heavily on us for medical care."

Often cited as one of the most important reasons the Level 1 trauma center should remain in Galveston was the "golden hour"—a term used in emergency medicine to describe the period of time following a traumatic injury during which prompt medical treatment can be the difference between life and death.

"Most of the time we have approximately 50,000 people on the island, plus a convention or visitor group, but during weekends in the summer months or some of our bigger events, that number will swell to a couple hundred thousand. Having a place for people to go for medical care without having to travel a substantial distance is important—especially if you're talking about trauma," explained Donna Sollenberger, executive vice president and CEO of UTMB. Sollenberger was brought in one year and a day after Ike to help rebuild the campus, a position she is honored to have filled. Brimming with pride, she considers the Jennie Sealy a gift back to Galveston, a thank you for the community's ongoing support and resolve.

"I think it's a symbol of not just the resiliency but the tenacity of the people here," she said. "The support has been overwhelming, and it really reinforces the fact that we serve so many people in so many ways."

Sollenberger recalled seeing a MICU nurse walk out of the break room

> "I think it's a symbol of not just the resiliency but the tenacity of the people here."
>
> — DONNA SOLLENBERGER
> *Executive Vice President and CEO of The University of Texas Medical Branch at Galveston*

one day after the units were finally full again. She was chewing her last bite of lunch and Sollenberger made a remark about how busy they were.

"At other places I've worked, the nurse might have responded with a tone of complaint, but she just looked at me and said, 'I know, isn't it great we've got our patients back?' To me, that says it all."

Eventually, even the argument about Galveston's vulnerability to tropical storms fell flat—naysayers had to look no further than the Galveston National Laboratory to see that the concern could be more than effectively addressed.

Known on campus as the GNL, the renowned infectious diseases research facility was built specifically to tolerate inclement weather. After Ike, the only "damage" assessed was a tiny bit of water under the front door.

"It did extremely well, just as the architects had promised," Callender said. "We built the Jennie Sealy to the same standards, and we're confident that we can withstand whatever the Gulf of Mexico sends our way."

All of the critical facilities sit above the major floodplain, at least 25 feet above sea level or higher. The structure was engineered to function in the midst of significant utilities outages, with emergency power capabilities and ample water storage, and should be able to resume normal operations within hours of the passage of another major hurricane. Inside, there are 28 day-surgery rooms, 20 operating suites, intraoperative MRI capability, four isolation rooms per floor, dedicated bariatric patient rooms, 10 family waiting areas, and numerous physician work rooms and nurse stations as well as dedicated private physician and resident team areas, on-call sleep rooms and conference rooms. In addition, there are two unfinished levels available for future expansion and growth.

The 310 patient rooms are all universally sized—quite large for a hospital, measuring in at 285 square feet each—to accommodate all levels of care. Additionally, each room features a now-standard handwashing sink and ADA compliant restroom, along with a family refrigerator, two televisions to accommodate both the patient and his or her visitors, locking drawers for valuables and a sofa bed. Perhaps most impressive of all? Each and every room boasts either a view of the Gulf or Galveston Bay—some of which are rumored to rival even the nicest hotels in town.

If the rooms sound custom-made for the patients, it's because they are. In fact, many of the amenities were added based on patient and staff input. Prior to construction, task forces comprised of UTMB personnel and members of the community toured fully-constructed mock-ups, offering suggestions ranging from the refrigerator to the exact placement of the clinical gases above the bed. When it came time to choose a sofa for overnight visitors, the design team placed three prospective options, accompanied by a ballot station, in the lobby of the John Sealy Hospital—as it turned out, the model they had originally planned to purchase came in dead last.

"I always tell people that story," Sollenberger said. "It's a reminder of why we involve our patients in the decision-making process."

Whether it is the architectural sturdiness, the clinical spaces dedicated to advanced education and excellence in patient care, or the many marks of evidence-based principles for creating spaces that support patient healing, the Jennie Sealy would not have been possible without extraordinary community support and generous philanthropic donations made by The Sealy & Smith Foundation.

"We really cannot say thank you enough," Callender said. "I also want to take the opportunity to say thank you to so many others who worked so hard to make this happen: all of our staff, our alumni, our friends and supporters across the state and the country, the legislature, our federal delegation, The University of Texas System and its Board of Regents, the chancellor—everybody got involved and made the strong case that has put us in the position to open this beautiful facility."

The Jennie Sealy Hospital will begin admitting its first patients in early April. It is truly an institution for Galveston and by Galveston. Even the art throughout the building is almost exclusively created by local artists or depicting scenes native to the island such as waves, sand dollars, palm trees and blue skies—a therapeutic and calming presence for the patients and families in need of UTMB's care. For many, it will feel like home.

> "When you lose that much capacity, you learn a lot about your impact on a community."
>
> — DAVID L. CALLENDER, M.D.
> *President of The University of Texas Medical Branch at Galveston*

Energizing Entrepreneurship

In collaboration with the Texas Medical Center, Johnson & Johnson Innovation officially opens JLABS @TMC—the most recent addition to its network of life science incubators

By Alex Orlando

For months, the exterior of JLABS @TMC—the newly unveiled addition to the Johnson & Johnson Innovation (JLABS) network of life science incubators—appeared modest and unassuming. Apart from the "Coming Soon...Early 2016" emblazoned across a blue banner featuring the pharmaceutical giant's iconic, cursive scrawl, there was little hint of what lay inside. No glimpses of the warm, inviting entryway or the lush, living ferns embedded within the walls. No indication of the network of common areas, laboratory spaces and facilities inside. And certainly no preview of the shimmering, white, fiberglass pod that serves as the central communication portal between the scientist entrepreneurs and Johnson & Johnson locations around the globe. But on March 2, the white curtains that previously shrouded the facility were cast wide open.

JLABS @TMC aims to bring Johnson & Johnson Innovation's mission to catalyze discovery and deliver transformational patient solutions to the Texas Medical Center, the city of Houston and beyond. Housed within the Texas Medical Center's Innovation Institute and located next door to TMCx, the 34,000-square-foot facility can accommodate up to 50 life science startups.

"We provide many different types of assets to bring the community together," said Emmanuelle Schuler, head of JLABS @TMC. "There's already a strong ecosystem in Houston, but we're here to strengthen those connections and bring even more players to the table. The starting point lies in bringing discoveries to patients in the form of new technologies and treatments."

Blending forward-thinking entrepreneurship with the heritage and resources of a 129-year-old company, JLABS strives to be a stepping-stone toward success for its resident companies. Thanks to a flexible model that provides early-stage companies with many of the advantages of being at a big company, while preserving an entrepreneur's equity and freedom to evolve, resident companies are encouraged to focus on what matters most: the science.

"Essentially, we provide the physical infrastructure and resources for early-stage companies that, typically, only internal research and development teams have at large corporations," said Melinda Richter, head of Johnson & Johnson Innovation. "In this facility, half of our space is dedicated to common research and business space, while the other half provides dry labs, wet labs and office modules where companies can start with something as small as a five-foot bench. They can literally put it on their credit card, like a gym membership, and grow as they have the resources and the credibility to grow."

In terms of physical infrastructure, the options available to resident entrepreneurs are expansive: over 70 different types of equipment, from pH meters to centrifuges, spaces for collaboration, common area concept labs, digital fabrication labs and cell-culture facilities, as well as both biology and chemistry labs.

"Even for those companies who only take one lab bench, they have access to exactly the same type of equipment and space," Schuler said. "There's really a whole range of equipment—even cold storage that ranges from -20 to -80 degrees—and all of this is at the disposal of our licensees. The different labs are all designed to meet the needs of the very different types of experiments that our companies conduct.

JLABS @TMC *is the* FIRST AND ONLY JLABS SITE *in* TEXAS

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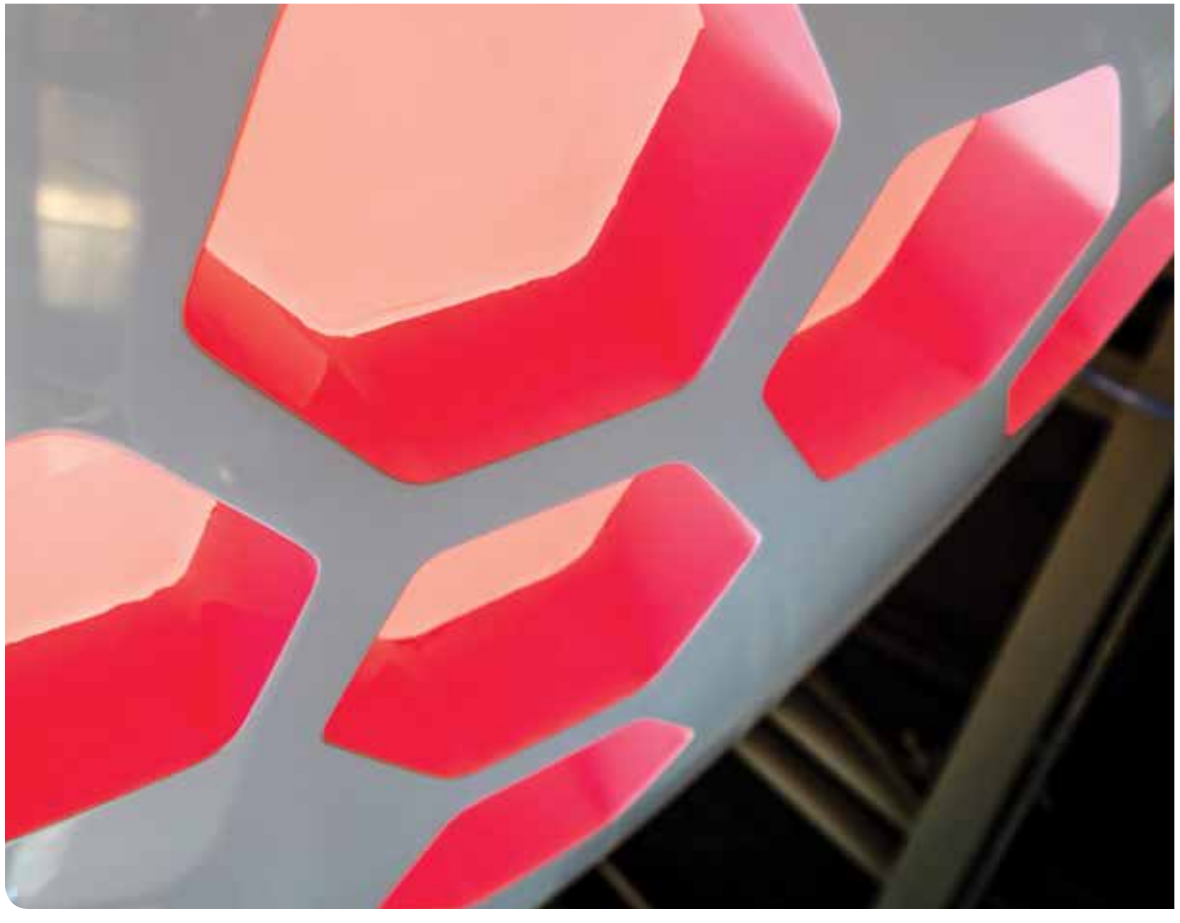
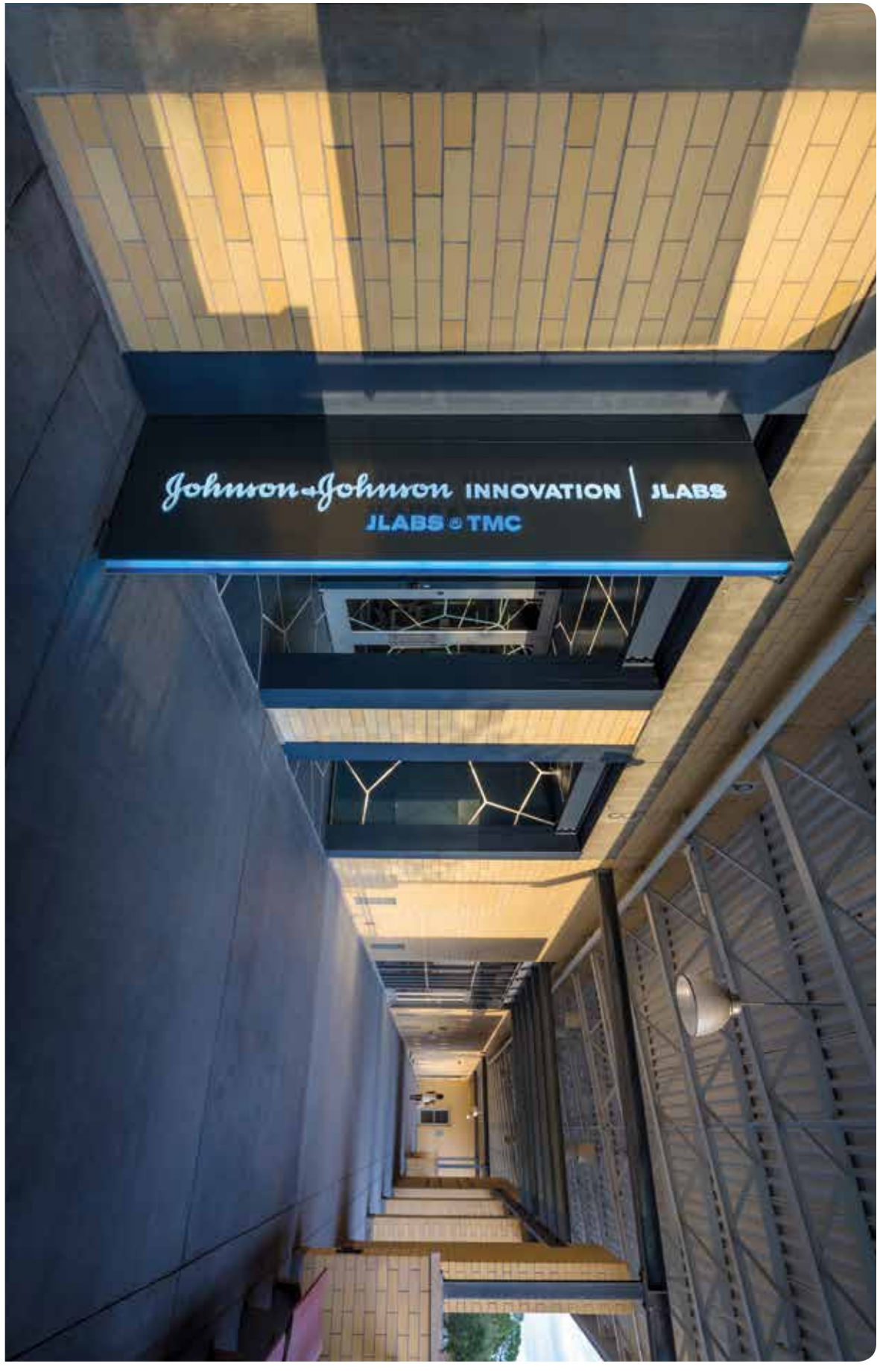
>
> — MELINDA RICHTER
> *Head of Johnson & Johnson Innovation*




Johnson & Johnson INNOVATION | JLABS
JLABS @ TMC

"Very importantly, we also offer access to a medical device prototyping lab," she continued. "We're the first JLABS site to incorporate that feature, although once we open our site in Toronto, it will be available there, too. That's a unique opportunity to capitalize on, especially since Houston is very solid in the area of medical devices."

If the impressive facilities and equipment, neatly delineated between public and private spaces, aren't enticing enough, JLABS also employs a full-time operations team for the benefit of its companies, as well as an on-site business services team. Educationally, Johnson & Johnson Innovation draws from a rich network of experts, helping startups avoid common pitfalls and problems that frequently slow down progress.

"Something that I feel quite passionate about is that, occasionally, I've seen a bottleneck in that translation from discovery to product," Schuler said. "At a very early stage, that transition depends on how to effectively tell the story of your science. That story might take the form of a device; it might be a drug; it might be a drug delivery system. How do you communicate the value of that research and discovery to an investor or to a possible partner of choice? It's not easy, and it requires a different language to communicate that knowledge."

One example of their robust, year-round programming is the JLABS "Sell Your Science" series, which provides bi-weekly sessions for scientists seeking to convey the full potential of their discoveries—all without spilling their secrets. Ideal for inventors who are steeped in jargon at academic institutions and hospitals, it enables them to learn how to craft a compelling narrative straight from the mouths of their target audience: the investors.

> "This is how you build a critical mass. This is how you get people from both inside and outside of the Texas Medical Center—as well as inside and outside of Texas—to say that something really important is happening here."
>
> — EMMANUELLE SCHULER
> *Head of JLABS @TMC*

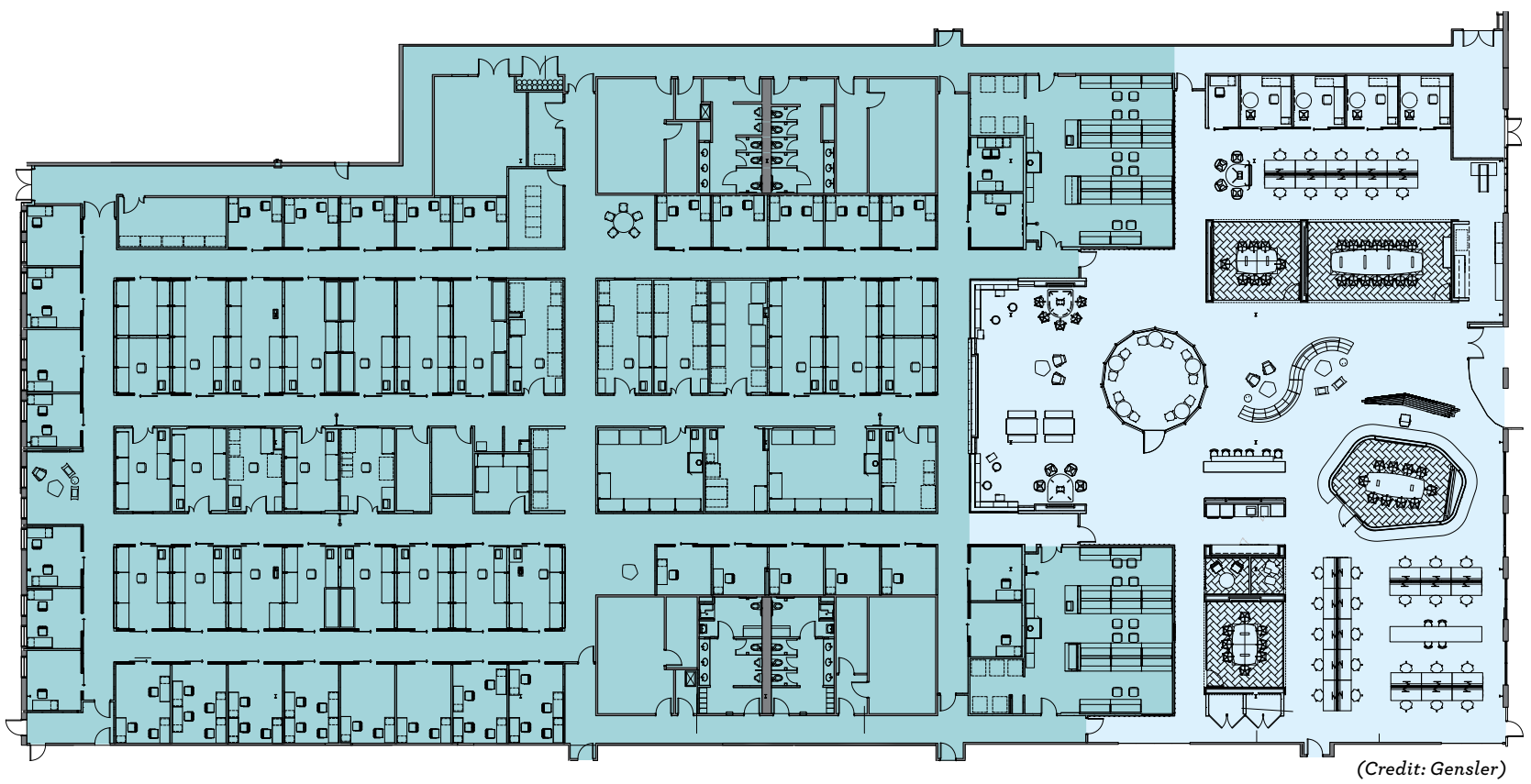
"We also bring potential partners on site here and companies have the opportunity to meet with them on a one-on-one basis," said Schuler. "Through that, we create this very high-level, meaningful connection and provide that level of networking to the community. We want people to see that when they come to JLABS, they come to a special place where the expectation is that something is going to happen."

For Richter, that expectation of greatness is palpable the instant you step foot in the front door, manifested in the aesthetics of the facility. Located mere minutes away from the medical center, a "sparkle of boldness and newness" sets JLABS @TMC apart from the other JLABS sites.

"Walking into this facility will make you smile, by virtue of the design itself," Richter said. "Imagine what can happen at a place like that, where the talent that goes inside is inspired right from the beginning. Without even trying, it creates an environment where people imagine they can do the impossible."

"The concept for the space itself was 'Beyond Science,'" added Lisa Pope-Westerman, design director and principal at Gensler, who worked with Johnson & Johnson Innovation to design the facility. "JLABS' intention is to foster an environment that integrates science and community. Our approach was to create an exciting and dynamic space that would promote interaction between the researchers at JLABS, as well as provide a social gathering space to host many kinds of outside guests."

Those communal spaces will prove crucial in the coming months. JLABS provides not only an internal community of like-minded individuals who all thrive on the same entrepreneurial spirit, but its resident companies are immersed in a vibrant local ecosystem of therapeutic area experts, venture capitalists and potential partners.



(Credit: Gensler)

The JLABS @TMC facility is
LOCATED
NEXT DOOR *to the*
TMCx ACCELERATOR

"Forging a partnership with Johnson & Johnson and building JLABS @TMC was the cornerstone of the TMC strategy to build an innovation platform for the entire medical center," said William F. McKeon, Texas Medical Center executive vice president and chief strategy and operating officer. "This is a tremendous start to a series of industry partnerships that will further advance our capabilities."

"This is how you build a critical mass," Schuler said. "This is how you get people from both inside and outside of the Texas Medical Center—as well as inside and outside of Texas—to say that something really important is happening here. We've got to give it a serious look and explore what it is that's so special about Houston. Part of that appeal has stemmed from our great partnership with the Texas Medical Center. We see a lot of synergies here, and that relationship is still growing, every day."

For Schuler, who characterized the relationship between JLABS and the Texas Medical Center as "joined at the hip," the two organizations have been aligned in vision and execution, even sharing space at TMCx+, the Texas Medical Center's coworking space, while JLABS @TMC was under construction.

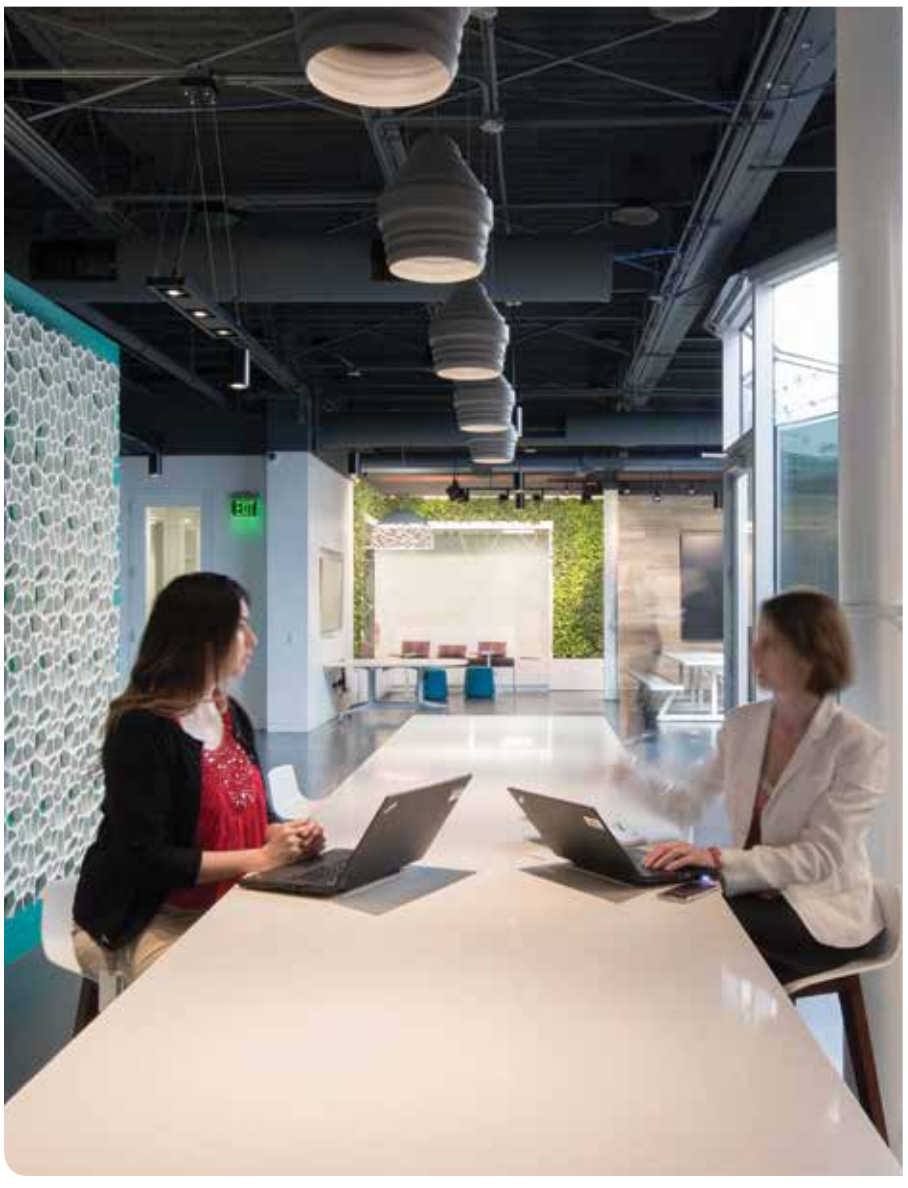
"We're one team," added Richter. "We're not two organizations but one team that has a common purpose: to make a difference for people around the world. When you share a vision like that, it's a powerful motivator to cut through the nonsense and focus on what matters. We transcend the issues because we know that this is about something bigger than both of us."

Between TMCx, TMCx+, JLABS @TMC, and, most recently, the AT&T Foundry for Connected Health—which focuses on digital health innovations that benefit those in and out of the clinical care environment—the TMC Innovation Institute is bursting at the seams, coalescing into a powerful biotechnology cluster that is poised to rival those on the East and West Coasts. For the 12 companies who have already signed licensing agreements with JLABS @TMC—including seven therapeutics, three digital and consumer-facing health companies and two companies in the medical device space—this is just the beginning.

"I think the opportunities here in Houston are tremendous," Schuler said. "The quality of innovation and the quality of the research that's being done in the Texas Medical Center is second to none. I can say that because I've seen, firsthand, those great innovators for the past 12 years at different academic institutions and hospitals.

"There's also an emerging vision of the new leaders who have come to lead some of the institutions, who truly believe in making great discoveries that happen within their premises accessible to patients," she added. "There's a mindset that's evolving, and I think we're capturing that particular moment in time."

> "Forging a partnership with Johnson & Johnson and building JLABS @TMC was the cornerstone of the TMC strategy to build an innovation platform for the entire medical center."
>
> — WILLIAM F. McKEON
> *Executive Vice President and Chief Strategy and Operating Officer of the Texas Medical Center*



A Closer Look:
JLABS @TMC

JLABS @TMC can accommodate up to

50 LIFE SCIENCE STARTUPS

The JLABS @TMC site totals

34,000

square feet

JLABS @TMC will offer over

70

types of core laboratory equipment

The space includes an

indoor atrium

to provide daylight and
secure access to the outdoors

40%

of the JLABS @TMC space is

DEDICATED TO LABS

JLABS @TMC WILL FEATURE...

22 Chemistry and biology labs

5 Common cell culture labs

2 Digital fabrication labs, equipment and support rooms

2 Concept labs, one with 15 benches and the other with 16 benches

JLABS @TMC will be the

first JLABS site to offer access to a

MEDICAL DEVICE PROTOTYPING LAB

Microbes Unraveled

Stunning discoveries about the nature of flesh-eating bacteria could lead to lifesaving therapeutics

By Alexandra Becker

Ashok Chopra, Ph.D., professor of microbiology and immunology at The University of Texas Medical Branch at Galveston.

> "At first, we didn't believe it. We're scientists—we're always skeptical."
>
> — ASHOK CHOPRA, PH.D.
> *Professor of Microbiology and Immunology at The University of Texas Medical Branch at Galveston*

Necrotizing fasciitis, commonly known as flesh-eating bacteria, is as horrific as it sounds. Lurking in fresh and brackish water in warm climates such as ours, it infiltrates the human body through open cuts in the skin or by consuming undercooked seafood sourced from infected areas. Once inside, the microbes spread quickly and aggressively, sometimes liquefying muscles and crippling organs within mere hours. Immediate treatment—including intravenous antibiotics and rapid surgical intervention—is required, but even with these efforts, the infection can leave individuals severely debilitated and often proves fatal.

Ashok Chopra, Ph.D., professor of microbiology and immunology at The University of Texas Medical Branch at Galveston (UTMB), is hoping his groundbreaking research will change these outcomes for the better. Chopra, in partnership with colleagues from the

ANALYZING A SAMPLE OF AEROMONAS HYDROPHILA, CHOPRA AND HIS TEAM DISCOVERED THAT THERE WERE ACTUALLY FOUR DIFFERENT STRAINS INVOLVED, RATHER THAN ONE. ***WHAT'S ESPECIALLY INTERESTING WAS HOW THE STRAINS INTERACTED WITH EACH OTHER.***

Food and Drug Administration, CosmosID Inc., the University of Maryland and Johns Hopkins University, recently published a study in Proceedings of the National Academy of Sciences detailing a shocking discovery about the nature of this bacteria and the mechanisms with which it infects the human body.

Analyzing a human sample of Aeromonas hydrophila, the species of bacteria responsible for necrotizing fasciitis, Chopra and his team discovered that there were actually four different strains involved, rather than one. What's especially interesting was how the strains interacted with each other: three of the four strains were clonally similar, worked together, and produced a toxin called Exotoxin A (ExoA), which breaks down muscle tissue and allows the fourth, phylogenetically distinct strain to move throughout the body and attack other organs. Although the fourth strain produces no ExoA and isn't as virulent as the others, enabled by the former three, it is the one that caused the most catastrophic damage to the body. Even more, the fourth strain has the ability to kill the other three strains after they've done their job, ensuring it has no competition—a hallmark of species endurance and one of the reasons the infection is so persistent.

These discoveries were made possible through the use of new technology developed by CosmosID, a bioinformatics company focused on rapid identification of microorganisms for infectious disease diagnostics as well as a host of other applications benefitting general public health. Utilizing metagenomics—sequencing the DNA of a sample acquired directly from its natural environment (such as an infected human) rather than one cultivated in a petri dish—CosmosID analyzes the samples with such precision that it can differentiate between different species of the same microorganism. In the case of Aeromonas hydrophila, distinct biomarkers revealed the existence of the multiple strains. By studying where those strains traveled in infected individuals, the research team was able to gain insight into their behavior.

"At first, we didn't believe it," Chopra said. "We're scientists—we're always skeptical."

To verify the findings, Chopra and his colleagues at UTMB set out to test the results via an alternative method: bioluminescence imaging. By embedding into the bacteria DNA that encodes a luminescent protein that emits light (think fireflies and glowing marine creatures), they were able to track the different strains in a mouse model and confirm that only the less virulent one reached organs such as the liver and spleen.

"We were very excited," Chopra said. "We had two independent labs using two entirely different techniques, and we came up with the same data. It's such a good correlation and it lays the foundation for setting up additional studies and moving forward with developing new therapeutics."

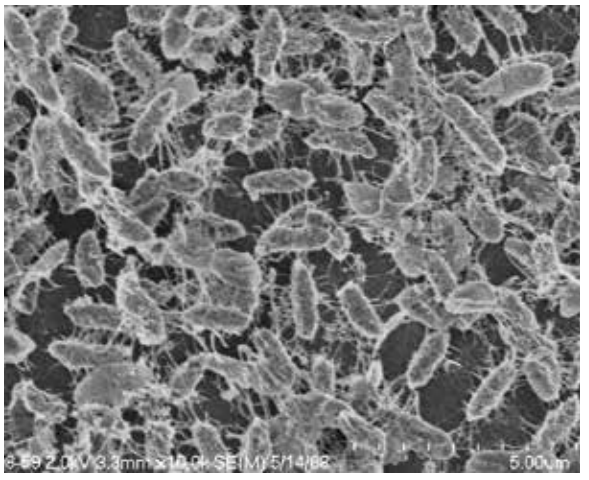
Indeed, this discovery has the potential to revolutionize the way physicians address necrotizing fasciitis.

"I think what is really important to understand is that, before, infection was considered to be mono-microbial if the one species of the organism is involved," Chopra explained. "Now we know that it's not, it can be poly-microbial in some cases—it was four distinctive strains that belong to the same species, as we found. This completely changes the way the infection should be treated."

In fact, according to Chopra, it is not unlikely that the four strains would have different antibiotic resistances. As such, a tailor-made cocktail of antibiotics would be required to effectively combat the infection; before, physicians were prescribing based on the belief that just one strain of bacteria was at play (and if that was the predominant strain, the antibiotic treatment was based on that strain).

"Often, patients may not respond well to the antibiotics. Knowing what we know now, it's likely that one or more of the strains was resistant."

Even better news is that knowledge of the existence of the ExoA toxin means there is another tool available



Aeromonas hydrophila, the species of bacteria responsible for necrotizing fasciitis, magnified to show detail. (Credit: UTMB)

in the fight against this infection: antibodies.

"Now that we know of the presence of ExoA, we can treat patients not only with the antibiotics for the bacteria, but also antibodies appropriate for neutralizing this toxin," Chopra said. "It's the same technique we used to fight Ebola during the 2014 epidemic. Patients were given blood from survivors in hopes that it carried with it antibodies capable of fighting the virus. It's the exact same principle, and it's a powerful tool for fighting infections such as these."

Necrotizing fasciitis is rare, with only about 650 to 850 cases each year in the United States according to the CDC. For those individuals suffering from the infection, this research has the potential to create both limb- and life-saving treatment options, and it doesn't stop there. The same metagenomics technology can be applied to countless other bacterial and viral infections, paving the way for faster, better, more customized therapeutics. CosmosID plans to continue to build its database with hopes that one day it will have the ability to match up samples of any kind of pathogen quickly—and with it, provide instantaneous information on the treatment options available.

"This could be a game-changer," Chopra said. "When we started out, I really didn't know what we would get out of all of this, but it turned out to be a good story in the end. Moving forward, I think this will continue to lead us to something even better." ■

WORLD-RENOWNED GENETICS RESEARCHER ERIC BOERWINKLE, PH.D., THE NEW DEAN OF UTHEALTH SCHOOL OF PUBLIC HEALTH, SAT DOWN WITH WILLIAM F. McKEON, EXECUTIVE VICE PRESIDENT AND CHIEF STRATEGY AND OPERATING OFFICER OF THE TEXAS MEDICAL CENTER, TO DISCUSS THE EXCITING FIELD OF GENOMICS AND HOW COLLABORATION THROUGH THE TMC GENOMICS INSTITUTE WILL PLAY A KEY ROLE IN DEVELOPING FUTURE CLINICAL APPLICATIONS.

Q | *Tell us about your formative years.*
A | I was born in North Central Ohio to a family that valued hard work. It was a rural part of Ohio, and my childhood was dominated by farm life and playing in nature. It was a working farm, although my father had a full-time job. With the encroachments of suburban Cleveland, the land was sold and there are now people who literally live on the farm land and commute to Cleveland every day. When I was a child, we went to Cleveland once a year at Christmastime wearing white shirts and ties to look at the window displays. My brother now farms in Central Ohio, and my mother's side of the family farms in Indiana—some of the best agricultural land in the world. I feel very fortunate to have grown up with a farm background.

Because I was very busy with everyday life on a working farm, I was not the best student in the world. I recall spending about 15 minutes selecting a college, which is a huge contrast with my own children who toiled for years, accompanied by professional counselors, guidebooks and visitation weekends. I didn't want to go to Ohio State because it was too big. It was, unfortunately, right after the Kent State event, so that was out of the question. I picked the University of Cincinnati, which was a great choice because it was my first experience living in a city and it is a great school.

Q | *What led you to select biology?*
A | When one grows up in a rural setting, you are surrounded by life and nature, and I was just fascinated by it all. I was one of those kids who picked up rocks and looked at the

> We are really laying the foundation for medicine of the future by understanding the role of genetic diversity and the impact of disease in different populations. There is no better living laboratory, if you will, than Houston, Texas, for genomics and precision medicine.

critters underneath. I was very interested in fishing, because of the peace and relaxation that it offered me after working hard, and every trip seemed to offer something new about the natural world we live in. It was an obvious choice.

Q | *Our paths are often determined by a series of pleasant accidents along the way. Tell us about how that may have influenced your path.*

A | Absolutely. I am a big fan of serendipity. It plays a huge role in all of our lives, and my case in particular. Growing up on a farm, I was exposed to genetics from an early age. You could say we cloned things the old fashioned way, and the seeds we planted were the results of genetic research. A lot of people don't know it, but there is a very tight historic relationship between the development of genetics and the development of statistics. Many early geneticists were statisticians, and many early statistical tools were developed because of genetic problems. The triumvirate between genetics, agriculture and statistics is very strong.

I, however, was interested in humans. For a while, I toyed with the idea of going to medical school, but I discovered human genetics—in fact, human statistical genetics—at a very young age. I had a professor in Cincinnati, his name was Alex Fraser, and he was involved in genetic analyses, so I had a little glimpse of the field. When I was approaching graduation in Cincinnati and was looking at graduate schools, it was really pretty straightforward. There weren't many undergraduates who were interested in statistical genetics. I ended up at the University of Michigan in Ann Arbor, which was another very good choice. It was a nice city, a big university, great medical school, and really one of the first and best human genetics departments in the country.

The human genetics department in Ann Arbor was very much involved in the aftermath of the bombing of Hiroshima and Nagasaki. When the atomic bombs were dropped, it was the first world catastrophe associated with radiation, so there was a lot of interest in the effect of radiation on the mutation rate in humans.

As a graduate student, we were looking at proteins in an exposed mom and dad and their unexposed child. We were looking for mutations in the child as a result of the parents being exposed to radiation from the atomic bomb. I was looking for ways to automate this very laborious and tedious process. The Cold War was still going on, and at the same time the U.S. government was taking pictures of Cuba and looking for trucks or buildings that were moving around. Again, there was a need to automate this process. I became involved in the statistics of analyzing those pictures, but applying the methods to those pictures of the proteins from mom, dad and their child. We were looking for a protein spot that was in the kid but it wasn't in mom and dad, which was a great candidate to be a new mutation.

One of the problems with analyzing the process of finding new mutations was genetic variation. Recall that we have two sets of chromosomes—one from mom and one from dad. A new mutation would look like an AA mom, AA dad, and an Aa child. An Aa parent would complicate this algorithm. I almost randomly picked a few proteins that had naturally occurring genetic variation so I could train the algorithm in more detail. I picked three, and it turned out that two of the three were proteins that are involved in heart disease. One of them was APOE that is involved in heart disease and Alzheimer's disease, and the other was APOA4 that is involved in triglyceride metabolism. This simple chance event forever captured me into a career on the genetics of heart disease and its risk factors and the genetics of Alzheimer's disease.

While I was a Ph.D. student in human genetics, I spent most of my time getting a master's degree in statistics. My adviser and mentor, Charlie Sing, demanded that I was trained in statistical theory. I guess he figured that I was getting plenty of practical training in applied statistics with him in human genetics. I got my master's in statistical theory, which is probably one of the smartest things that I did, because later, I was unusual in that I could speak the language of biology and the language of statistics and data analysis. It set me apart then and it still does so today.

There was, and still is today, a tight relationship between human genetics at the University of Michigan and UTHealth. In 1972, Jack Schull moved from Ann Arbor to Houston to found something called the Center for Demographic and Population Genetics. Much later (1986), Jack recruited me to Houston, and I moved down here at a young age. Someone once told me I was the youngest tenure track faculty member in the UT system at the time—I was 26 years old. I have been here ever since, so about 30 years. I have worked hard and enjoyed every day. I have particularly benefited from the many colleagues that I have worked with at UTHealth and Baylor College of Medicine through the years.

Q | *Can you share your perspective on the advances we have made since sequencing the first human DNA?*

A | It's unbelievable, and it is even unbelievable to me who spends every day immersed in it. To think that sequencing of the first individual genome occurred only about eight years ago. And in the eight years since, we go from sequencing the first individual genome to today where we are sequencing and analyzing tens of thousands of genomes. It is just mind-boggling.

To make this a reality, we need to think about the parallel development of two technologies: DNA sequencing and accessible computing. There is a strong partnership between the Human Genetics Center at UTHealth, which is very strong in statistical genetics, and the Human Genome Sequencing Center at Baylor College of Medicine. I am a big fan of collaboration in modern biomedical research. Since my early years in Houston, I have always had a strong collaboration with colleagues at Baylor, especially in genetics and in medicine. Richard Gibbs at Baylor and I had a series of meetings together and we made a conscious decision not only to join forces, but to join forces and focus our attention on human disease and precision medicine. We are both adamant and passionate about using genomic and analytic technologies to understand human disease, to use this improved understanding to prevent human disease and prevent bad outcomes for those diagnosed with disease.

This shared vision is embedded in the heart of the Texas Medical Center. I encourage people who are visiting the Texas Medical Center to pause and just look around. There is nothing like it in the world. It is an incredible resource.

But unlike the serendipity of my early career—and I would guess most peoples' early careers—I would say our recent advances in human genomics and precision medicine are really the result of a lot of hard work. I like to have a big, bold vision and then to define a logical and systematic path to achieve that vision. I am fortunate to love to work with people, and bringing together these people with the latest sequencing and analysis technologies, along with the patient populations at such profound institutions as MD Anderson Cancer Center and Memorial Hermann. That is the path forward to success. We have the infrastructure to be the very best in the world. That is why I am so enthusiastic about the developments in TMC3, which is bringing these institutions together to realize this dream. With the great leadership at all of our institutions, I think it is within our grasp.

> “It has been said that these institutions have grown and achieved prominence based on competition; we are going to continue to grow and achieve greatness based on cooperation.”

Also, let’s not forget the people of Houston and the people of Texas—the people and the populations we proudly serve. First, they are as generous as can be, and we should all thank the philanthropic community. Second, we should cherish and encourage diversity in our community. We have enormous ethnic diversity in Texas, but Houston in particular. In some ways, it is a window to what the United States is going to look like in 2050. We are really laying the foundation for medicine of the future by understanding the role of genetic diversity and the impact of disease in different populations. There is no better living laboratory, if you will, than Houston, Texas, for genomics and precision medicine. These are the tools of the future to reduce health disparities.

Q | *What excites you most about the future standard of care, as genomics plays a greater role in medicine?*

A | Having the sequence of every patient that comes to the Texas Medical Center—making it so routine that frankly we take it for granted that we have this information as a foundation of the electronic health record. We sequence these individuals at a young age and integrate that information into the electronic health record, which will then follow them through life. The information may be used in infants to understand congenital heart defects, in toddlers to understand allergies, in teenagers to understand propensity to high-risk behaviors, in young adults to understand the risk of developing diabetes in heart disease, and in the elderly to prevent the occurrence of Alzheimer’s disease and dementia. It sounds like science fiction, but I can assure you it is not science fiction. We are rapidly getting to that point, and this is the right place to do it.

Again, collaboration is key. Heart disease patients get cancer, and cancer patients get heart disease. We are living with these diseases now as chronic conditions. That DNA sequence, which is now a part of the person’s electronic health record, will follow the patient between hospitals. Interoperability of the electronic health record in the Texas Medical Center is one key to our future success. I would like to pause here and make one other point. We need to make sure that the benefits of genomics is not just for the rich and the rarefied. We need to make sure we get it to all of the people. Partnerships with Harris Health and the VA system will be critical.

Q | *We are in the process of developing the TMC Genomics Institute. Why is this important?*

A | I love building bridges among these institutions and I have seen the good that comes from it. It has been said that these institutions have grown and achieved prominence based on competition; we are going to continue to grow and achieve greatness based on cooperation. I think that’s an important point for all of us to remember. My competition is not with Baylor and MD Anderson; it is with Boston and San Francisco. And I really believe that cooperation is the way we are going to continue to grow and place the third coast, the Gulf Coast, on the map of enviable biomedical research and translation hubs. Going back to the philanthropic community of Houston, they are going to appreciate and reward such cooperation.

Q | *How important is it to have co-location of all of these great minds?*

A | It is incredibly important. It is important to have people in a more casual setting, in a routine setting to share ideas and to plan next steps. Building a large program is an interesting combination of having individuals that have a real vision, but also have the ability to translate that vision into a series of very concrete steps to accomplish it.

You get to the level that we work in, and there are a lot of really good ideas. There are very few people that have the sort of engineering approach to take those visions and set down a series of very concrete steps to accomplish that vision. It is a lot of hard work. And fortunately, in the genetics initiative, we have brought together a group of people who not only can work together and articulate a vision, but also have the experience of really doing the systems engineering—what Andy Futreal at MD Anderson calls the ‘plumbing’—to pull this together and accomplish the vision. And having individuals together in close proximity, we can really refine that vision and do the plumbing and the hard work.

And that takes me back to the beginning. One of the things about growing up in a rural setting is you respect people; you respect people no matter who they are, and also you aren’t afraid of hard work. And a lot can be said there. ■

A New Home for Surgical Education

The Houston Methodist Institute for Technology, Innovation & Education offers practicing physicians a platform to hone their technique and safely adopt new technologies

By Alex Orlando

Stepping inside the pristine education and research space at the Houston Methodist Institute for Technology, Innovation & Education (MITIE) is akin to walking on the set of a science fiction film. Beneath the glow of operating lamps, practicing surgeons at 15 skills stations—essentially, mini operating rooms—navigate endoscopic tubes through liver models, reflecting the organs' hollows and rivets on screen. Across the hall, full-body patient mannequins in distress struggle to breathe as they simulate emergency situations. Further down, trainees plug into daVinci surgical systems, maneuvering joysticks while robotically controlled arms spring to life several feet away. For practicing health care professionals looking to stay abreast of new technologies and techniques, the future is now.

"MITIE is really a unique institution," said Brian Dunkin, M.D., the John F. Jr. and Carolyn Bookout Chair in Surgical Innovation and Technology at MITIE, where he also serves as medical director. "Educationally, its focus is one of a kind: it's a purpose-built facility for practicing health care professionals that enables them to stay on the top of their game. Combining that vision with an institution like Houston Methodist—one on a mission to build the country's next greatest academic medical center—was the perfect marriage to create a place that couldn't exist anywhere else. To this day, I still don't think there's anything else like it."

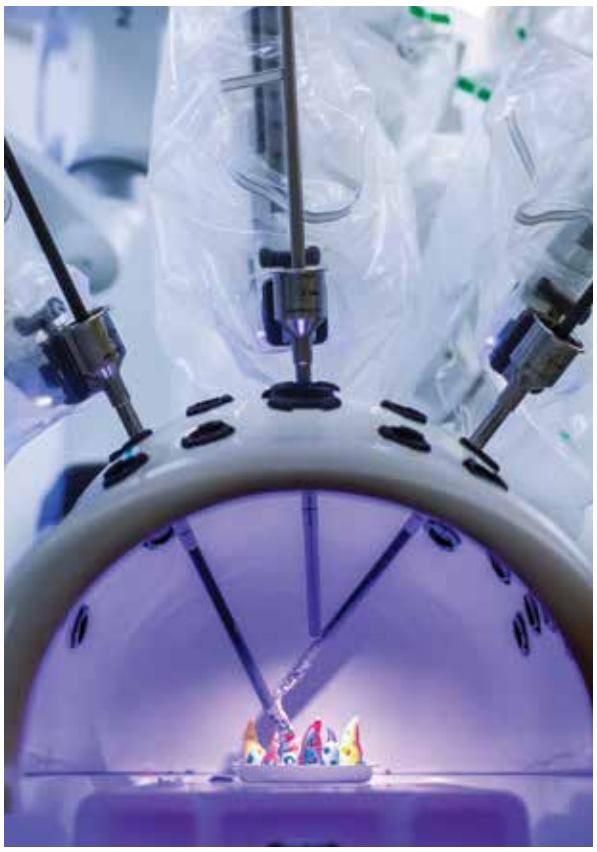
For procedurally-based clinicians (surgeons, nurses and physician assistants), MITIE is positioned as an "educational home," a place where practitioners can learn innovative techniques and use new technologies.

While medical training in the U.S. immerses future clinicians in a rich learning environment, once they're practicing, these same physicians are left to their own devices. Forced to reckon with an ad hoc system of conferences—which frequently don't offer any hands-on training—surgeons are at increasing risk of lagging behind the unprecedented, rapidly escalating pace of advancements in surgical technology.

"There's a massive cohort of our surgical public that we haven't built an appropriate educational infrastructure for," said Barbara L. Bass, M.D., executive director of MITIE, where she is also the John F. Jr. and Carolyn Bookout Presidential Distinguished Chair. "We have wonderful medical schools that really help instill knowledge in aspiring physicians. Then we have fabulous residency training programs, where our residents live for five to nine years in a tightly supervised, highly structured educational environment.

"After that, we act like you're done and send you out into practice," she said. "That's fine, and maybe that worked for the first 40 years of modern medicine, but now with recent medical advances there's been a transformative introduction of emerging technologies, from laparoscopic surgery to computer-assisted procedures that use robotics. All of a sudden, there are surgeons out there in busy practices who are supposed to safely incorporate new technologies where they don't even have any fundamental training."

According to Bass, within a decade of completing training, a surgeon who has not actively worked to remain current will no longer be practicing the standard of care. That realization, compounded by the increasing complexity of operative environments and the introduction of image guidance and robotics, spurred Bass to action. In 2006, after arriving at Houston Methodist Hospital to develop a nationally recognized department of surgery, she proposed the creation of an institute that would serve as a hub for surgeons around the world to



improve their skills and learn about new technologies. Housed squarely in the heart of the Texas Medical Center, Bass believed the institute would be ideally poised to leverage the incredible depth of expertise and cutting-edge research that exists in Houston.

Over a decade later, those ambitions have been realized tenfold. Since MITIE was launched in 2007, the institute has progressed from a single room for robotic surgery training to a world-renowned facility that has trained over 35,000 health care professionals across 27 specialties.

"While physicians are our primary focus, we train health care professionals across the board, from paramedics to nurses to anesthesiologists," said Angela Mitchell, operations manager at MITIE. "The physicians we train practice here until they get the procedure down perfectly. That aligns with our vision at Houston Methodist—in order to be 'leading medicine,' these health care professionals have to practice until they've really got it."

> "I think the surgeons who come here feel empowered to potentially adopt something that's going to move them forward in regards to their skill set. There's great joy in that, and there's a little buzz in acquiring the skills necessary to do something better."
>
> — BARBARA L. BASS, M.D.
> *Executive Director of MITIE*

While parts of the functional spaces of MITIE are similar to other training institutes, the center's unique nature stems from its ability to gather different elements—a procedural training laboratory, virtual hospital environment and research core—together under one roof. For trainees, the educational process begins with didactic lectures delivered by experts in the field, followed by a live procedure demonstration—projected from the operating room itself into an immersive viewing environment known as the "medical presence suite."

Afterwards, the trainees move into the procedural skills lab: a massive room that contains 15 small-scale operating stations, each featuring tools—from high-tech endoscopic cameras to simple surgical needle drivers—to conduct surgeries across multiple specialties. Using both anatomical and inanimate models, the procedural skills lab allows surgeons to practice a specialized operation, master a new surgical technique, or learn how to properly use new equipment—all without risking injury to potential patients. At the other end of the hall, multi-specialty team training is conducted in the virtual hospital, which uses simulation technology to recreate a patient care environment, from the controlled chaos of an operating room to the intensity of the ICU.

"Another important element is the debriefing process," Mitchell said. "For physicians, being able to see exactly where they need to improve is huge because a lot of the other training they receive doesn't include that dimension. Everything is recorded as the scenario plays out, and then the participants are placed in a conference room for either individual or group feedback."

> **“The future of MITIE is to continue to be the place where surgeons are going to come to learn a new procedure. Not because it’s a great-looking facility in a great town in a great medical center, but because it’s going to enable them to become successful at adopting a new procedure into the practice.”**
>
> — BRIAN DUNKIN, M.D.
> *Medical Director of MITIE*

While physician education serves as the backbone that supports MITIE, the institute’s robust research core aims to further the advancement of less invasive and more accurate surgical procedures. Through the development of new metrics for measuring technical expertise—including a special camera that focuses on a surgeon’s face during a procedure, quantitatively measuring his or her level of stress—and even technology that allows practicing surgeons to communicate wirelessly with specialty experts, MITIE’s researchers are setting new standards in surgery.

“The other area of unique expertise at MITIE is our computational surgery program,” Dunkin said. “It’s actually a specialty that we developed here. This is about bringing computer scientists, engineers, mathematicians and clinicians—mainly surgeons—together to work on issues in the operating room to make it function more effectively. We’ve got a whole variety of projects in that domain, from ones that monitor activity in the OR to unique ways to create tools for surgical use. It’s really about bringing computational power into the operative environment and using it to improve performance.”

For Bass, who has over 30 years of experience as a surgeon, MITIE is a resuscitative platform for physicians in practice—one that breathes life into the daily grind of a technically demanding profession and staves off the potential for burnout.

“That broader, restorative purpose is crucial for restoring someone’s faith in their profession,” she said. “I think the surgeons who come here feel empowered to potentially adopt something that’s going to move them forward in regards to their skill set. There’s great joy in that, and there’s a little buzz in acquiring the skills necessary to do something better. Luckily, surgeons are very visually and tactilely oriented, so if you put something in their hands—from a new stapler to a new energy device—they get it pretty quickly. It’s amazing how rapidly that transformation occurs.”

Stefan W. Kreuzer, M.D., assistant professor in the department of orthopedic surgery at The University of Texas Health Science Center at Houston (UTHealth), who has partnered with MITIE on several occasions to teach a course in anterior hip replacement—a minimally invasive form of surgery—is one such individual.

“Since surgeons are very procedurally oriented, you can only show so much on a PowerPoint presentation,” Kreuzer said. “I think what makes MITIE so unique is that their stations are very much like real-world situations. They have all of the equipment there: the monitoring equipment, the lights, the operating room tables. It really allows us to train our surgeons exactly the way they should be performing procedures in the operating room.”

“There will always be a need for a quaternary level of care system that can do things that are groundbreaking, innovative and important for development and research,” added Robert K. Zurawin, M.D., associate professor of obstetrics and gynecology at Baylor College of Medicine, who has also lent his expertise to MITIE. “That’s another value that MITIE provides. Because it’s in the heart of the Texas Medical Center, with all of the available resources of its great hospitals and clinicians, MITIE integrates clinical care and research with the most advanced tools for medical education. That allows MITIE to stretch the boundaries of medicine on all fronts—and that’s as important as just being able to deliver world-class patient care.”

In an effort to push those boundaries of research and development, the American College of Surgeons recently gathered medical experts across multiple specialties at MITIE to establish a national model for retooling, credentialing and privileging for surgeons in practice. Bass and Dunkin envision MITIE as a key player in the future of reassessment for practicing physicians—all while remaining a safe, supportive home for the teaching, training and dissemination of new technologies.

“The future of MITIE is to continue to be the place where surgeons are going to come to learn a new procedure,” Dunkin said. “Not because it’s a great-looking facility in a great town in a great medical center, but because it’s going to enable them to become successful at adopting a new procedure into the practice.” ■

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Giving the Gift of Gait

For those suffering from spasticity conditions, being able to put one foot in front of the other is a life-changing experience

By Shanley Chien

When 8-year-old Darius makes his way down the hallways of Children's Memorial Hermann Hospital, the forearm crutches that help support his balance do not impede his speed or hinder his determination even in the slightest. He races down the corridors with the same energy and spirited personality as that of the Energizer Bunny.

But Darius is all too familiar with hospitals. He was diagnosed with spastic cerebral palsy as a baby and has been in therapy since he was three months old to manage his spasticity, a condition caused by damage to the part of the brain or spinal cord that regulates voluntary movement and is characterized by stiffness or tightness in the muscles that can affect a person's movement and gait.

"I knew he had brain damage," said Sarah Sonia, Darius' mother. "But you just can't tell how serious it's going to be, what's it's going to affect, what he'll be capable of—all of that. It was just taking it day by day."

By the time Darius was able to walk, therapists arranged for him to utilize a four-wheeled rear walker to help him get around, but it wasn't until one of Darius' in-home therapists recommended it that Sonia looked into a highly specialized surgical procedure called selective dorsal rhizotomy. The procedure entails severing and destroying nerve roots in the spinal cord responsible for faulty neuromuscular conditions to help relieve spasticity symptoms.

> "It was hard trying to explain to him, 'You actually weren't strong, baby. We did this so that you could get strong.'"
>
> — SARAH SONIA
> *Darius' Mother*

Darius shows off his karate moves and spars with his mother. He attends the American Society of Karate and recently received his yellow belt.

Although the thought of any type of spinal surgery on her son gave Sonia pause, she researched her options and decided that the possibility of her son being able to take steps without his walker seemed promising.

"You're going in and you're messing with something that could potentially leave him paralyzed. As a parent, I had to make a decision. Is this worth doing?" Sonia said. "He was only six, about to turn seven. It was hard. There was a period when I thought we could keep stretching him and he keeps going to therapy, but I just had to consider what was best for him. What would his best option be?"

Only a handful of neurosurgeons in the country are able to perform the SDR procedure, and—fortunately for Darius—one of them was located in Houston at the Texas Medical Center.

On June 15, 2015, UTHealth pediatric neurosurgeon Manish N. Shah, M.D., director of pediatric spasticity and movement disorder surgery at Children's Memorial Hermann Hospital and the Memorial Hermann Mischer Neuroscience Institute, successfully performed the surgery on then-six-year-old Darius. Within six weeks, Darius, who was unable to ambulate before, put one foot in front of the other, taking his first real steps ever in his lifetime.

The surgery entails making a one- to two-inch incision in the lower back along the spine and cutting three-quarters of the nerve rootlets. It was inspired by Shah's mentor, T.S. Park, M.D., neurosurgeon-in-chief at St. Louis Children's Hospital, but what makes Shah's approach unique is the abbreviated procedure time coupled with a higher success rate. He was able to shorten the procedure from eight hours to just 2.5 hours while permanently eliminating the spasticity and enabling children to walk.

Shah said some neurosurgeons only cut one-third of the nerve rootlets, but the major problem with this approach is that often the spasticity returns over time without the option of a second chance with the surgery.

"I know this to be true because other patients who have had the 30 percent nerve rootlet cut have come to my clinic and lamented that it worked for a year but now it doesn't work," Shah said. "It's a one-shot deal because it's very hard to identify the nerve rootlets after somebody has cut part of it."

But Darius' journey would not have been possible without the multi-institutional, multi-disciplinary "soup to nuts" approach behind his new ability to walk.

The collaborative efforts and shared interest in helping children with spasticity between three institutes—TIRR Memorial Hermann, Children's Memorial Hermann Hospital and Shriners Hospitals for Children-Houston—culminated in the formation of the Texas Comprehensive Spasticity Center at McGovern Medical School at UTHealth, Memorial Hermann Mischer Neuroscience Institute and Children's Memorial Hermann Hospital in 2014.

"We want to give the kids a chance to develop as much as possible and to optimize their function and their independence," said co-founder Glendaliz Bosques, M.D., who serves on the medical staff at TIRR Memorial Hermann and Children's Memorial Hermann Hospital and runs the inpatient rehabilitation unit at Shriners. "But it's tough when your body just doesn't react like your brain is telling it to react. We want these kids to get the best option out there and to be able to do the things we envision them doing."

> "What's amazing about children is how resilient they are. But what's truly difficult to watch is a child who has a great immobility from this disease that you know you can fix, but no one's ever offered them anything before."
>
> — MANISH N. SHAH, M.D.
> *Director of Pediatric Spasticity and Movement Disorder Surgery at Children's Memorial Hermann Hospital and the Memorial Hermann Mischer Neuroscience Institute*

Although the center is composed of only eight people—including pediatric neurosurgeons, orthopedic surgeons, therapists and clinical administrators—they operate as a well-oiled machine. First, Shah, Bosques, pediatric neurologist Nivedita Thakur, M.D., and the three therapists on their team who help coordinate rehabilitation therapies, evaluate patients together and present their prognosis as a team in a one-hour session with the patients at TIRR Memorial Hermann. Should patients require any sort of surgery—including SDR, deep brain stimulation or baclofen pump—they undergo spasticity management and are then taken to Children's Memorial Hermann Hospital for the actual procedure.

"That's why it's such a profitable hour for the family, because they get six opinions at once. They know exactly what's going to change in their child's life when they walk out the door," Shah said. "They know if they're going to eventually get surgery or not, or if they need to change their therapy regimen, if they need any equipment, and then how they're going to get all of those things."

Once patients have recovered for several days after the surgery, they are transferred to Shriners where they work on their rehabilitation in an intensive in-patient therapy program with specialized therapists three to five hours a day for six weeks.

"When you do the surgery, you're basically taking all the spasticity away and you unmask all these weaknesses that patients have, so you basically need to reteach them how to move," Bosques said.

For Darius, learning how to properly ambulate was life changing, but it wasn't always met with the same positivity and ease as it is now.

"In his eight years, that's the first time I've ever noticed him being depressed," Sonia said. "Because he had learned to move around with his spasticity, he was used to it. He had known it for seven years. When he had the surgery, because the nerves were clipped, he realized how weak he actually was. But prior to that, he thought he was strong.

"It was hard trying to explain to him, 'You actually weren't strong, baby. We did this so that you could get strong,'" she added.

Eventually, the center's commitment to rehabilitating Darius and his insatiable desire to move came to fruition. Not only was Darius able to walk, but he finally had the opportunity to take up a new hobby: practicing karate.

Glendaliz Bosques, M.D., works with one of her therapy patients at TIRR Memorial Hermann.

Since the center's inception a year and a half ago, doctors have collectively evaluated 250 patients and operated on six patients, ranging from ages three to 10 years old, each resulting in what Shah calls "a remarkable outcome."

"That's not because of the surgery, but because of the amazing partnership we have with Dr. Bosques, TIRR and Shriners, as well as the therapists we have on our team," Shah said. "That's a very special thing."

The center's goal is not only to expand its comprehensive and holistic approach to treating patients, but also to help children who continue to go untreated.

"What's amazing about children is how resilient they are," he said. "But what's truly difficult to watch is a child who has a great immobility from this disease that you know you can fix, but no one's ever offered them anything before. That's painful. That's heartbreaking."

"We'll continue to grow and we're hoping to be able to help more kiddos," Bosques added. "We're up for the challenge." ■

Pioneers of Public Health

THE HARRIS COUNTY HOSPITAL DISTRICT WAS CREATED IN 1966 WITH THE MISSION TO PROVIDE QUALITY HEALTH CARE TO THE UNDERSERVED POPULATION WITHIN HARRIS COUNTY. FIFTY YEARS LATER, THEY ARE STILL HOLDING TRUE TO THAT MISSION.

By Britni N. Riley

Long before public health care was subsidized by the government, Houstonians set out to offer health services to the underserved in the community through a city- and county-run hospital in 1924. By 1938, the second major city-county hospital named Jefferson Davis Hospital was built on Allen Parkway.

In 1948, a young Michael E. DeBakey, M.D., had just been named chairman of the department of surgery at Baylor College of Medicine. At that time, there was only one hospital in what would eventually become the Texas Medical Center.

"Back then, Baylor was way out in the country," said Kenneth Mattox, M.D., chief of staff and surgeon-in-chief at Ben Taub Hospital and distinguished service professor of the Michael E. DeBakey Department of Surgery at Baylor College of Medicine. "They were hunting deer in the woods around the medical school."

In an effort to provide medical experience to his students, DeBakey scheduled a meeting with Ben Taub, chairman of the Jefferson Davis board, to ask if his students and residents could make rotations on the patients at the hospital. The meeting—originally scheduled to last 15 minutes—turned into five hours and formed a partnership that would create the largest public health care system in the third most populous county in the United States.

"In the early days of Jefferson Davis, predating Harris Health System, there was no budget for public health care," Mattox said. "If a patient needed a heart valve or a hip prosthesis, Dr. DeBakey would call Mr. Taub and between the two of them, they would pay for it."

After a matter of time, it was evident that the hospital did need funding and a switch to single ownership, as opposed to being owned by the city and county. In 1966, the Harris County Hospital District was formed, and it included Jefferson Davis Hospital in addition to another three-year-old hospital named after Ben Taub.

> "Our founders had a vision that the hospitals would be here for the underserved. As long as there are medically underserved people in our community, we will be there and continue to grow and continue to meet the needs of the community."
>
> — GEORGE MASI
> *President and CEO of Harris Health System*

The formation of the Harris County Hospital District marked the beginning of the Harris Health System we know today. Shortly after its inception, the Harris Health System began opening outpatient clinics throughout Harris County to extend their services to those unable to travel to the city center. The clinics were formed at the request of Carlos Vallbona, M.D.

"Vallbona was an absolute visionary," said Brian Reed, M.D., vice chief of staff of Harris Health's Community Health Program and associate professor at Baylor College of Medicine. "His vision for developing community health centers and teaching future doctors in those facilities was revolutionary for the time and paved the way for what Harris Health is today."

Over the last 50 years, the Harris Health System has grown to meet the needs of Harris County. In 1989, the second Ben Taub Hospital was built adjacent to the first to meet new building codes. That same year, the Lyndon B. Johnson Hospital was built with 328 beds in the northeast corner of Harris County, outside of Loop 610. The hospital replaced an outdated Jefferson Davis Hospital and was also the first Harris Health facility to be staffed outside of Baylor College of Medicine.

The former dean of The University of Texas Health Science Center at

Houston (UTHealth), Frank Webber, M.D., saw an opportunity for UTHealth students to gain public health experience at the Lyndon B. Johnson Hospital. Their involvement with the Harris Health System also expanded to staffing some of the outpatient clinics in Harris County.

"We serve a very important group of people out here who would otherwise have to drive miles and miles to get the care they need," said Carmel Dyer, M.D., chief of staff at Lyndon B. Johnson Hospital and professor and director of the division of geriatric and palliative medicine and associate dean of the Harris County Programs for UTHealth. "We serve everyone from the surrounding areas of Harris County and we serve a very important part of the community."

Collaboration has been at the core of what makes the Harris Health System work as well as it does. All 47 locations are staffed by faculty physicians and residents from the two medical schools in the Texas Medical Center.

"The local model that we have developed here in partnership with the academic community and the management of Harris Health is a balance which makes Harris Health one of the best examples of public health care delivery that exists in the world," Mattox said.

Today, Harris Health serves a total of 325,000 individuals through nearly 2 million patient visits annually through its multiple locations, including its community health centers across the county. In fact, the community health centers have become the focal sites for Harris Health System's ability to reach the largest number of patients.

"We have worked hard to establish a medical home for our patients in the clinics," Reed said. "We are able to function as a one-stop shop at our outpatient clinics—we have X-rays, physical therapy, dental services, behavioral therapy and a pharmacy all in one place to make it more accessible for our patients."

The group has also expanded to three hospitals throughout the county: Ben Taub, one of only two Level 1 trauma centers in the city; Lyndon B. Johnson, the busiest Level 3 trauma center in the state of Texas; and Quentin Mease, a geriatric and rehabilitation facility. They also have five school-based clinics, 10 homeless shelter clinics, a free-standing dental center and a dedicated HIV/AIDS clinic, the first such free-standing facility in the nation.

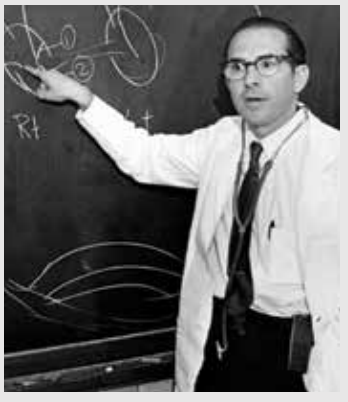
Without the Harris Health System, one third of Harris County's population would not receive affordable top-notch health care. Because of this, it serves as a safety-net provider in Harris County.

The vision of the Harris Health founders 50 years ago made it the system it is today. Though many practices and technologies have changed, their core mission has remained the same: to improve our community's health by delivering high-quality health care to Harris County residents and training the next generation of health professionals.

"Our founders had a vision that the hospitals would be here for the underserved," said George V. Masi, president and CEO of Harris Health System. "As long as there are medically underserved people in our community, we will be there and continue to grow and continue to meet the needs of the community." ■

"In the early days of Jefferson Davis, predating Harris Health System, there was no budget for public health care. If a patient needed a heart valve or a hip prosthesis, Dr. DeBakey would call Mr. Taub and between the two of them, they would pay for it."

— KENNETH MATTOX, M.D.
Chief of Staff and Surgeon in Chief at Ben Taub Hospital



(Credit: Harris Health System)

ACCOLADES

ERIC BOERWINKLE, PH.D., has been appointed dean of UTHealth School of Public Health. Boerwinkle, a world-renowned genetics researcher and educator who has authored more than 800 scientific publications in top-tier journals, joined the UTHealth faculty in 1986 and has served as professor and chair of the department of epidemiology, human genetics and environmental health at the School of Public Health since 2003. He has also directed the Human Genetics Center at the School of Public Health and the Brown Foundation Institute for Molecular Medicine (IMM) for the Prevention of Human Diseases, which are a part of UTHealth.

ROBERTO CASAL, M.D., assistant professor and director of interventional pulmonology at Baylor College of Medicine Department of Medicine, has received the Geoffrey McLennan Memorial Award for Advances in Interventional Pulmonology from the American Association for Bronchology and Interventional Pulmonology. Casal is the fifth and youngest person to receive this honor, which is awarded to mid-career physicians who are deemed by peers as likely to continue to make important contributions in the field.

CHRISTOPHER SPENCER GREELEY, M.D., has joined Texas Children's Hospital and Baylor College of Medicine as head of the Section of Public Health Pediatrics and professor of pediatrics. Greeley is board certified in general pediatrics and child abuse pediatrics. He currently serves on the AAP Section on Child Abuse & Neglect Executive Committee, is the co-chair of the Texas Pediatric Society Committee on Child Abuse & Neglect and president-elect of the Ray E. Helfer Society.

KALPALATHA GUNTUPALLI, M.D., professor of medicine at Baylor College of Medicine, was named Master Fellow of the American College of Chest Physicians in recognition of her exceptional leadership, consistent and enduring contributions to medical education and clinical practice, and advancing the mission of the organization. Master Fellow is the highest honor of the organization, whose mission is to champion the prevention, diagnosis and treatment of chest diseases through education, communication and research.

ABIGAIL NODLER, M.D., has joined the Menninger Clinic as a child and adolescent psychiatrist in the hospital's recently launched division of outpatient services. An assistant professor of psychiatry and behavioral services at Baylor College of Medicine, Nodler is board certified in adult psychiatry as well as child and adolescent psychiatry. She received her medical degree from Texas Tech University School of Medicine and her undergraduate degree from Agnes Scott College in Atlanta. Nodler completed residency at the University of Alabama-Birmingham and also completed a child and adolescent psychiatry fellowship at Harvard University Medical School and the Cambridge Health Alliance.

MICHELLE PATRIQUIN, PH.D., a McNair Neuroscience Postdoctoral Fellow at Baylor College of Medicine, has joined the Menninger Clinic as a staff psychologist practicing in the hospital's recently launched division of outpatient services. Patriquin specializes in assessing and treating childhood psychiatric disorders, including autism spectrum disorder, anxiety, depression, ADHD and childhood trauma. She received her doctorate degree from Virginia Tech, completed a pre-doctoral internship in child and pediatric psychology at the University of Alabama-Birmingham, and completed a post-doctoral fellowship at the University of Houston.

ZEENAT SAFDAR, M.D., has been named director of clinical research at the Houston Methodist Lung Center and director of pulmonary hypertension program at Houston Methodist Hospital. Safdar is a world recognized leader in pulmonary hypertension and serves on several committees and journal editorial boards. She has been elected as a Fellow of the American College of Physicians, American College of Chest Physicians and Pulmonary Vascular Research Institute.

FERNANDO STEIN, M.D., associate professor of pediatrics at Baylor College of Medicine, was selected as president-elect of the American Academy of Pediatrics. He was chosen by members of the AAP, which is made up of more than 64,000 primary care pediatricians, pediatric medical subspecialists and pediatric surgical specialists dedicated to the health, safety and well-being of infants, children, adolescents and young adults.

To learn more about the Final Four, check out our Spotlight with *NCAA Vice President of Men's Basketball Championships Dan Gavitt on p. 10*

March Madness Comes to Houston

For the second time in just a few short years, the city of Houston will host the 2016 NCAA Men's Basketball Final Four festivities

By Shea Connelly

The months of March and April represent the start of many things: warmer weather, the official beginning of spring—and March Madness. Since 1939, when the University of Oregon was declared champion of the first-ever NCAA men's basketball tournament, college basketball fans around the country have anticipated those weeks in spring that are inevitably filled with rivalry showdowns, buzzer-beater wins and shocking upsets. This year, the city of Houston will play a vital role in the madness as host of the Final Four festivities April 1 through 4.

In just one month, the seats of NRG Stadium will be filled with tens of thousands of screaming fans, eager to learn which teams will face off in the championship game. All of the planning for that tipoff moment was set into motion years ago, when Houston was selected to host its second Final Four in a short five-year timespan.

"Houston was awarded the 2011 Final Four in 2003 and the 2016 Final Four in 2008," said Doug Hall, president and CEO of the Houston Final Four Local Organizing Committee. "We were put into a unique situation where we'd been awarded two Final Fours without hosting one in the modern era."

That meant the pressure was on in 2011 to show NCAA officials and fans what kind of host Houston could be. The Bayou City was up to the challenge and the community turned out in large numbers to solidify Houston's position as a great sports town.

"Houston loves major events," Hall said. "Whether it's Final Four, or the Super Bowl, or the Shell Houston Open, the city gets behind big events—particularly those that don't come here every year. It's a unique opportunity for it to be held in your hometown."

> "With a multitude of activities for people to get involved in there's something for everyone, and we want everybody to say, 'I can't wait for it to come back.'"
>
> — DOUG HALL
> *President and CEO of the Houston Final Four Local Organizing Committee*

Hall, who also served on the 2011 Local Organizing Committee, was brought back to the committee in October 2014. He and his team have been hard at work to make this the best Houston Final Four yet.

"I want everybody on Tuesday morning to say, 'Wow, that was an awesome event,'" Hall said. "With a multitude of activities for people to get involved in there's something for everyone, and we want everybody to say, 'I can't wait for it to come back.'"

The Final Four festivities include much more than the tournament games. Following the format of previous Final Four events, there is the Fan Fest, presented by Capital One, which will feature interactive games, giveaways, autograph sessions and more; the March Madness Music Festival, free concerts featuring national and local headliners; Reese's Final Four Friday, open team practices followed by a must-see All-Star game; and the Final Four 4 Miler, which benefits the Lone Star Veterans Association. Keeping in line with the NCAA's commitment to youth programs, there are a number of events geared toward children, including Youth Clinics, during which kids will learn from NCAA coaches and athletes, and the Final Four Dribble, which will have kids dribbling a brand new basketball through the heart of downtown Houston.

"Not everyone can get tickets to the game—there are only 75,000 tickets—but everybody can participate in one or multiple of the activities around Final Four," Hall said. "Even if you don't have a ticket, there's plenty to do."

Beyond the support of the Local Organizing Committee and the NCAA, the success of the Final Four also depends on community participation. This includes a number of local organizations, like Houston First, the Greater Houston Convention and Visitors Bureau, the Houston Downtown Management District, the City of Houston and the Texas Medical Center.

"We are proud to support the Final Four in Houston," said Robert C. Robbins, M.D., president and CEO of the Texas Medical Center. "We look forward to showing visitors the incredible diversity of this city and what a great host we can be to such an exciting event."

In addition to organizational support, the Final Four depends on the participation of individuals in the community. There are still many of opportunities for members of the Houston community to volunteer at or participate in the various events surrounding the Final Four.

"How we get judged as a city is, do people really turn out to the ancillary events?" said Hall. "Do they come to the extracurricular activities? Do the out of town visitors and the NCAA staff feel like this city really supports their event? That's what they want to see." ■

FINAL FOUR HOUSTON 2016 FAN EVENTS

Registration for all events and more details available at www.ncaa.com/finalfour

FAN FEST
April 1–4

$10 Adults
Kids 12 and under free
Youth basketball clinics, a tournament, giveaways, special guests and more
George R. Brown Convention Center

MARCH MADNESS MUSIC FESTIVAL
April 1–3

Free to public
Top local and national artists perform on two stages
Discovery Green

FINAL FOUR FRIDAY
April 1

Free to public
Open team practices followed by the Reese's College All-Star Game
NRG Stadium

FINAL FOUR 4 MILER
April 2

$25 Registration
$35 Race day
Hermann Square at City Hall

POWERADE YOUTH CLINICS
April 2

Free
Skills clinics for kids, grades 3–8
Jack Yates High School, The Zone, J. Frank Dobie High School, Strake Jesuit High School

FINAL FOUR DRIBBLE
April 3

Free to public
Children (registered online) are given a basketball to dribble along a route to Fan Fest
Hermann Square at City Hall

UTHealth Researchers Look at Nanotechnology to Help Prevent Preterm Birth

Using nanoparticles to engineer a special drug, a team of researchers from the Texas Medical Center, including McGovern Medical School at The University of Texas Health Science Center at Houston (UTHealth), has demonstrated in pre-clinical trials a new way to both reduce preterm birth and avoid the risks of medication in pregnancy to unborn babies.

Lead investigators of the research are Jerrie S. Refuerzo, M.D., associate professor in the department of obstetrics, gynecology and reproductive sciences at McGovern Medical School; Biana Godin, Ph.D., assistant professor in the department of nanomedicine at Houston Methodist Research Institute; and Monica Longo, M.D., Ph.D., associate professor of obstetrics, gynecology and reproductive sciences at McGovern Medical School.

The findings were presented by Refuerzo during the Society for Maternal-Fetal Medicine's 36th Annual Meeting—The Pregnancy Meeting in Atlanta. Refuerzo is also chair of Quality for Obstetrics and Gynecology/Women's Services at Children's Memorial Hermann Hospital.

Existing tocolytic (anti-contraction or labor-repressant) medications, such as indomethacin, that are used to treat preterm labor can cross the placental barrier and cause heart defects or other problems in the fetus.

The team bioengineered an innovative microscopic nanoparticle of indomethacin aimed at reaching the pregnant uterus but not crossing the placenta to the fetus. This targeted liposomal indomethacin, called LIPINDORA, was coated with an oxytocin receptor antagonist to make it bind to uterine tissue.

Refuerzo and the team, which also includes McGovern Medical School's research assistant Alejandra Elder Ontiveros and laboratory manager Nataliya Buleyeva, as well as Houston Methodist Hospital's Fransisca Leonard, Ph.D., were honored by the March of Dimes during the conference. Joe Leigh Simpson, M.D., senior vice president for research and global programs, presented Refuerzo, Godin and Longo with the March of Dimes award for Best Abstract in Prematurity at the meeting. This marks the 13th year that the March of Dimes award has been presented.

LIPINDORA was given to near-term pregnant mice and the researchers found that the treated mice were significantly less likely than controls to have preterm uterine contractions or to deliver prematurely.

Preterm birth (birth before 37 weeks of pregnancy) is the No. 1 killer of babies in the United States. About 380,000 babies are born too soon each year in this country, and those who survive an early birth often face an increased risk of a lifetime of health challenges such as breathing problems, cerebral palsy and intellectual disabilities. Even babies born just a few weeks early have higher rates of hospitalization and illness than full-term infants.

Refuerzo said the team currently is conducting tests of LIPINDORA's effectiveness in human uterine tissue donated from C-sections, in particular looking for biomarkers to indicate that the tissue has an anti-contraction response to the drug. If successful, the team hopes to begin a Phase I human clinical trial of the drug within the next few years.

Two other McGovern Medical School faculty at the conference presented research findings, including a regenerative patch that can be used for in-utero surgery and rates of patient satisfaction among postpartum women.

Saul Snowise, M.D., a UTHealth fetal interventional fellow at The Fetal Center at Children's Memorial Hermann Hospital, compared a patch made from human umbilical cord to one made from biocellulose film in an animal model for in-utero repair of spina bifida. The umbilical cord patch showed promising results in cell development and decreased inflammation.

Robyn P. Roberts, M.D., a maternal-fetal medicine fellow instructor at McGovern Medical School, studied patient satisfaction in postpartum women. She found that postpartum women who received delayed physician rounding (after 8 a.m.) were more satisfied with physician communication and overall hospital experience without prolonging their hospital stay for time of discharge.

— Deborah Mann Lake, UTHealth

March 2016

2 ***Student Appreciation Day***
Wednesday, 11:30 a.m. – 12:45 p.m.
The TMC Library
1133 John Freeman Blvd.
mary.stevenson@exch.library.tmc.edu
713-799-7139

3-5 ***7th Re-Evolution Summit—Minimally Invasive Cardiac Surgery (MICS): The Ultimate Hands-On Summit***
Thursday–Saturday
7:00 a.m. – 5:00 p.m.
Houston Methodist Research Institute
6670 Bertner Ave.
John F. Bookout Auditorium, 2nd Floor
cme@houstonmethodist.org
713-441-4971

5 ***2016 5K Causeway FunD Run***
Saturday, 7:45 a.m. – 12:00 p.m.
Galveston Island
8522 Teichman Road, Galveston, TX
shpevents@utmb.edu
409-772-3006

8 ***Neurofibromatosis Type 1: Updates on Lifelong Care and Screening***
Tuesday, 7:00 p.m. – 8:15 p.m.
The Children's Museum of Houston
1500 Binz St.
geneticevenings@bcm.edu
832-822-4182

23 ***The Fourth Annual Neuro ICU Symposium***
Wednesday, 7:00 a.m. – 5:00 p.m.
The JW Marriott
5150 Westheimer Rd.
mnineuroicu@memorialhermann.org
713-704-7375

28 ***Simon Powell, M.D., Ph.D.: The Generation of Collapsed Replication Forks and Their Impact on Genomic Instability in Cancer***
Monday, 12:00 p.m. – 1:00 p.m.
Houston Methodist Research Institute
6670 Bertner Ave., Boardroom R2-311
cme@houstonmethodist.org
713-363-9049

29 ***Autophagy in Health and Disease***
Tuesday, 9:00 a.m. – 12:15 p.m.
UTHealth McGovern Medical School
6431 Fannin St., Suite MMS 2.135
john.h.byrne@uth.tmc.edu
713-500-5605

Houston Hospital 15th Annual Butterfly Luncheon
Tuesday, 11:00 a.m.
The Houstonian Hotel
111 North Post Oak Lane
cnordt@houstonhospice.org
713-677-7123

30 ***Friends of Nursing Luncheon and Fashion Show***
Wednesday, 11:30 a.m. – 2:00 p.m.
River Oaks Country Club
1600 River Oaks Blvd.
dgugino@stlukeshealth.org
832-355-5856

Cheves Smythe Distinguished Lecture: The Science of Frailty
Wednesday, 4:00 p.m. – 5:00 p.m.
UTHealth McGovern Medical School
6431 Fannin St., Suite MSB 2.006
john.h.byrne@uth.tmc.edu
713-500-5605

MARCH:
NATIONAL KIDNEY MONTH

Approximately 26 million American adults are affected by kidney disease, and one in three people is currently at risk for developing the condition due to diabetes, high blood pressure or a family history of kidney failure.

Kidneys play an integral role in maintaining our overall health. The organs filter nitrogenous waste from 200 liters of blood a day and help regulate the concentration of salts. They are also responsible for controlling red blood cell production, balancing the body's fluids and releasing blood pressure-regulating hormones. With all the hard work these fist-sized organs do, it's important to take care of your kidneys.

Join the National Kidney Foundation and the Texas Medical Center in celebrating *World Kidney Day on March 14* to promote healthy kidneys. The national campaign seeks to raise public awareness of kidneys, risk factors for kidney disease, and to encourage at-risk individuals to participate in free screenings offered by the National Kidney Foundation throughout the month.

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