

# TMC | PULSE

THE OFFICIAL NEWS OF THE TEXAS MEDICAL CENTER — VOL. 2 / NO. 7 — AUGUST 2015

## Tiny Inventors, Big Ideas

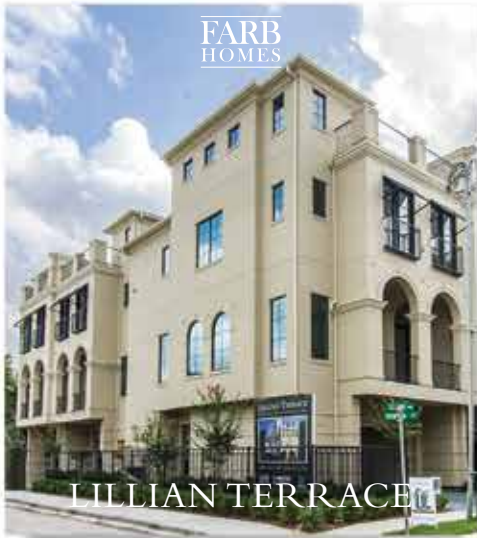
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*Young innovators take on TMCx*



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FARB  
HOMES

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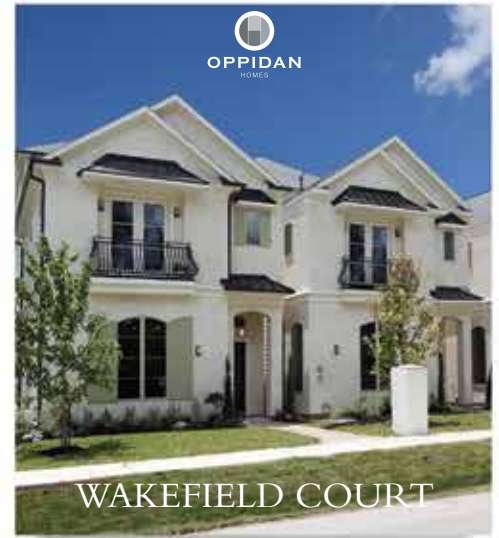
RICE MILITARY  
FROM THE \$640'S



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VISTAS DE SEVILLA

RICE MILITARY  
FROM THE \$440'S



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WAKEFIELD COURT

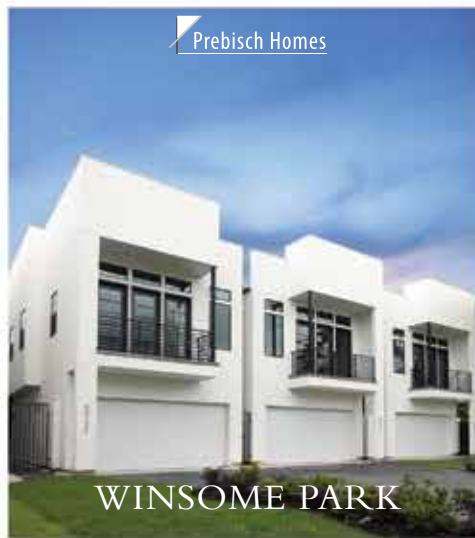
GARDEN OAKS  
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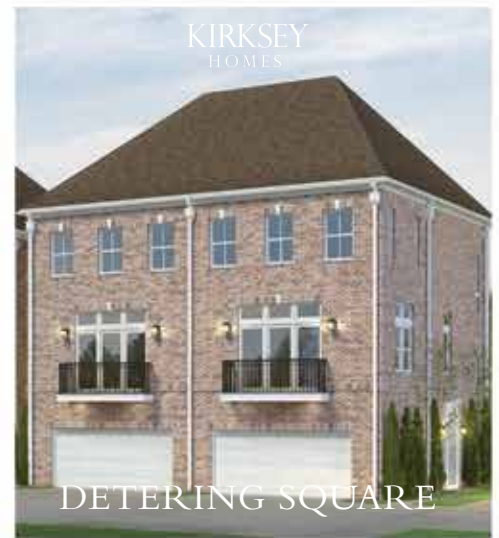
MUSEUM DISTRICT  
FROM THE \$450'S



Prebisch Homes

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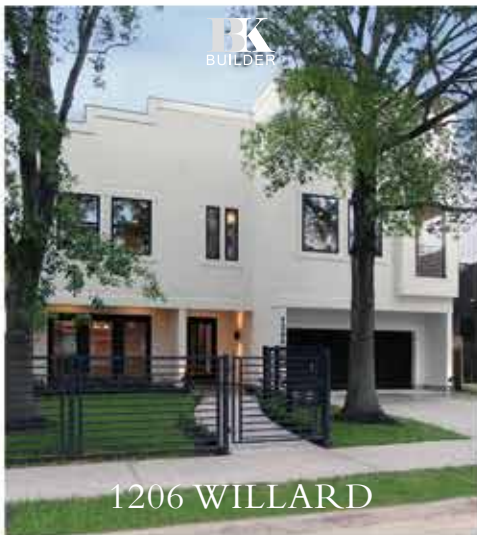
GALLERIA  
FROM THE \$690'S



KIRKSEY  
HOMES

DETERING SQUARE

RICE MILITARY  
FROM THE \$560'S



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BUILDER

1206 WILLARD

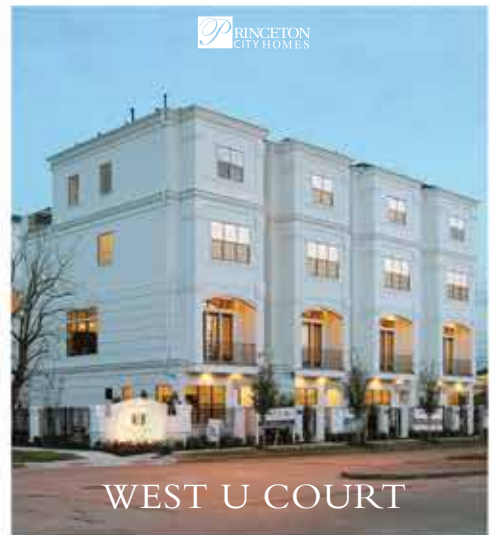
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TRANQUILITY

EMERALDS AT DORRINGTON

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FROM THE \$730'S



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**ON THE COVER:** A prototype of the Alzheimer's Android, a solar-powered robot designed for patients with memory loss, was on display at the TMCx Young Inventors Forum.

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# PRESIDENT'S PERSPECTIVE



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

We recently had the pleasure of working closely with the British International School of Houston to help inspire young inventors to develop products that meet health care challenges. You will read more about their work in this issue of Pulse.

The children demonstrated an idea that I have long believed in, and one around which we build many of our TMC Innovation Institute programs: with the right resources, collaboration and support, great ideas can be transformed into life-changing products.

When you travel to hospitals and universities in Boston and the Bay Area, you see that the spirit of innovation is part of their culture. While we are fortunate to have all of the makings of an equally impressive campus of innovators, we must continue to do more to reach that place. We must challenge ourselves to keep collaboration and innovation alive across the medical center.

We also must continue to instill in the next generation the aspiration that anyone can bring an idea about—such as a new device or diagnostic solution—to improve human health.

In this issue, you will see that there is no such thing as being too young to innovate. From the kids who took part in the TMCx Young Inventors Forum, to the exceptional students of DeBakey High School, and the hardworking medical students and postdocs here in the TMC—the next generation of inventors, problem-solvers and health care professionals will shape the future of medicine.

For as long as they have the drive and determination, we should encourage them to come up with new ideas, and give them the tools and infrastructure to turn those ideas into reality.

*Robert C. Robbins*

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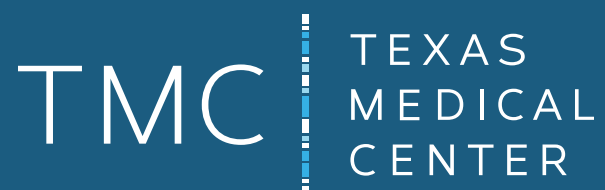
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# TURNING ADVANCEMENTS INTO ACHIEVEMENTS.

## THE DIFFERENCE BETWEEN PRACTICING MEDICINE AND LEADING IT.

HOUSTON METHODIST HAS BEEN NAMED BEST HOSPITAL IN TEXAS BY U.S. NEWS & WORLD REPORT FOR THE FOURTH CONSECUTIVE YEAR, WITH NATIONAL RANKINGS IN 11 SPECIALTIES.



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# Healing Invisible Scars

A TEXAS MEDICAL CENTER PSYCHIATRIST SHARES HER EXPERIENCES IN NEPAL, HELPING SURVIVORS PROCESS THE EMOTIONS LEFT BY A DEVASTATING EARTHQUAKE

BY SHEA CONNELLY



“You would see houses that had been totally destroyed, and you would see people rebuilding them. The resilience is just amazing.”

— SOPHIA BANU, M.D.  
Director of the Harris Health International  
Trauma Survivors Clinic

When a natural disaster strikes, those first hours and days are spent in survival mode. First aid consists of treating the injured, finding food and housing for displaced citizens and tending to other physical needs. As days become weeks and life turns to routine, it's easy to forget invisible trauma—the scars left on the mind. This challenging task of healing the psyche took Sophia Banu, M.D., to Nepal in May. Banu serves as an assistant professor in the Menninger Department of Psychiatry and Behavioral Sciences at Baylor College of Medicine, and deputy chief of psychiatry at Harris Health System's Outpatient Services, director of the child and adult psychiatry clinic at Ben Taub Hospital,

and director of Harris Health's International Trauma Survivors Clinic.

For years, experts warned of the potential for a massive earthquake in Nepal. Records dating back over 750 years show powerful quakes approximately every 75 years in the region. Sure enough, shortly before noon on April 25, 2015, the ground in Nepal started to shake violently. A 7.8 magnitude earthquake rocked the region, 81 years after the last major quake. In less than a minute, buildings were destroyed and thousands of people left homeless. The death toll from the quake and its aftershocks was over 8,000, with 18,000 injured.



OVER THREE WEEKS, BANU TRAVELED TO SCHOOLS  
THROUGHOUT NEPAL TO SPEAK TO STUDENTS AND TEACHERS  
ABOUT THE EARTHQUAKE AND ITS EFFECTS ON MENTAL HEALTH.



Within hours of the earthquake, Banu reached out to a nonprofit organization called Disaster Psychiatry Outreach (DPO), looking for ways to help. Banu had previously worked with DPO after 9/11 in New York City, where she completed her residency.

“My family in Nepal was, thankfully, safe and nothing happened to them,” said Banu. “But I was feeling very helpless sitting here knowing that I could be of some help because I know the language, I know the culture and I’ve worked with a lot of trauma patients.”

While she waited on her vacation time to get approved so she could travel, Banu got to work right here in Houston assisting Empower Nepali Girls, another organization providing aid. She and pharmacy students from the University of Houston and Texas Southern University raised money to collect several bags full of painkillers, masks, gloves, water purifiers and antibiotic ointments to send to Nepal.

Banu’s family also pitched in. Her husband took care of their children and the household while she was away. Her sons, ages six and 11, and their friends operated a lemonade stand in Rice Village to raise money. They had a poster Houstonians could sign to send their best wishes to the people of Nepal. In just over four hours, they raised over \$1,000.

“In times of disaster, you see the best in people,” said Banu. “It makes you believe in humanity.”

Finally, about four weeks after the initial earthquake, Banu arrived in Nepal. As she left the airport, she surveyed her surroundings. Despite the devastation marring the landscape, Banu noted signs of progress.

“There were still tents all along the road and you could see a lot of destruction, the houses all a big mass of bricks and stones,” said Banu. “But I also saw people were on the roads in cars, walking and on bicycles. I was sad to see all the destruction, but also quite glad to see that people were out and continuing about their day-to-day activities.”

In Nepal, Banu worked primarily with school-children and teachers. Over three weeks, she and her fellow volunteers traveled to schools in villages

LEFT: Banu poses with a group of nuns. TOP RIGHT: Banu stands outside one of the schools she visited to conduct a needs assessment after the earthquake.



throughout Nepal, where they spoke to students and teachers about the quake and its effects.

“We would gather them and talk about disaster, how disaster affects the community, what is a normal reaction and when you should seek help,” she said.

They also offered teachers training on how to help children who may be at risk for lasting psychological effects from the trauma.

“In the most remote villages, you may not have much of anything, but you have a school,” said Banu. “That’s one of the reasons why we targeted teachers and trained them in how to identify children with problems related to the trauma and how to help them.”

The goal was education and capacity building—giving communities the tools they would need to continue to support and help survivors, even after Banu and other volunteers had gone home.

Here in Houston, Banu leads a refugee clinic, which she started with the support of Baylor and Harris Health. She has worked with refugees from all over the world. Though there are many similarities in the ways people deal with trauma, she noted different cultures also have unique challenges in the healing process.

In Nepal, Banu said there is a tendency to claim everything is fine, even when it’s not. Asking for help can be difficult. She described one teacher who told her everyone was doing well and did not need to talk about the earthquake. She later found out the teacher had lost his six-month-old baby. He was able to save his five-year-old, but could not rescue the younger child.

“I went to him and I said, ‘I want to let you know that it’s OK if you are feeling sad. You should talk to somebody.’ And he said, ‘No, I’m OK.’ Then, just a minute later, tears were pouring down,” she said. “In a way I felt glad that he was crying because he had to release it.”

The most common fear among the earthquake survivors was that it would happen again. The more than 100 aftershocks that took place in the weeks following the initial quake did not alleviate those fears. But even

in the short time she was in Nepal, Banu said she saw growth.

“We would ask them, ‘What are the five things that worry you the most?’ When we were first there, it was all earthquake-related—landslides, family being hurt, aftershocks,” she said. “By the end of the third week, that started shifting a bit to, ‘I’m worried I won’t get a raise,’ or, ‘I’m not doing well in school.’ You could see normalcy returning.”

The invisible wounds of trauma often take the longest to heal, but Banu said the outward signs of improvement were inspiring. They were visible in the dozens of teachers who sat in a tent under the scorching sun, ready to learn with the eagerness of schoolchildren. They were visible in the young students laughing and playing with bubbles, despite the rubble surrounding them.

“I would go to these villages two or three hours from the city, where the road is not paved,” said Banu. “You would see houses that had been totally destroyed, and you would see people rebuilding them. The resilience is just amazing.” ■



“In times of disaster, you see the best in people. It makes you believe in humanity.”

— SOPHIA BANU, M.D.



LEFT: Students gather at a school in the Gorkha district of Nepal. LOWER RIGHT: Banu visits a nunnery in Nepal’s capital, Kathmandu.



# More than a Biomarker

*A new discovery by researchers at The University of Texas MD Anderson Cancer Center may provide hope for earlier detection of pancreatic cancer*

BY ALEXANDRA BECKER



Raghu Kalluri, M.D., Ph.D.

According to the American Cancer Society, approximately 48,960 people in the United States will be diagnosed with pancreatic cancer in 2015; 40,560 of those individuals are expected to die from the disease. This devastatingly low survival rate—as little as one percent for most Stage IV diagnoses—is partly attributed to the fact that pancreatic cancer is seldom detected in its early stages. All this may change, however, thanks to tiny, virus-sized particles called GPC1+ crExos.

Discovered in the blood of patients with pancreatic cancer cells by researchers at The University of Texas MD Anderson Cancer Center and collaborators in Spain and Germany, the presence of these particles, known as exosomes, could be used as a non-invasive screening tool to diagnose early stages of the disease—and as with any cancer, earlier detection corresponds with increased survival.

Published in the June 24, 2015, issue of the journal *Nature*, the study tested the blood of 251 patients with pancreatic cancer and found evidence of these cancer exosomes in each and every sample. GPC1+ crExos were not detected in the blood of patients who did not have cancer.

“So far, our study shows that with 100 percent sensitivity and specificity, we can detect all pancreatic cancer patients as having these exosomes,” said Raghu Kalluri, M.D., Ph.D., chair of cancer biology at MD Anderson and lead researcher for the study. “Whether that number remains the same when we test 5,000 patients, we don’t know. With any such discovery, you need more validation and proof from various other sources, but this is by far the best we’ve seen compared to any other biomarker available today.”

Because these exosomes are present in large numbers in the blood of patients with pancreatic cancer, the



hope is that ultimately, a simple blood test could diagnose the disease. This could have far-reaching implications for screening, diagnostics and treatment, considering there is nothing like it in the field today.

Currently, pancreatic cancer is not generally diagnosed early because symptoms are all but absent until the disease has progressed to a late stage. By the time a patient presents with abdominal pain, weight loss, jaundice, nausea or enlarged lymph nodes, the cancer is almost always too advanced for surgical treatment, which offers the greatest chance of survival by far.

Routine screening for the disease, even for patients with high risk factors such as family history, is prohibitively expensive and can result in false positives—and, because detection relies on imaging such as MRIs and CT scans, still may not spot the cancer in its early stages. A blood test, however, which could measure even the slightest presence of these cancer exosomes, could be offered to the general public, and, based on the results of this study, would provide a definitive—and most importantly, early—diagnosis.

“The hope is that if we can create a tool for early detection, patients will have the opportunity to get surgical intervention for these pancreatic tumors and survival rates will go up,” said Kalluri.

In addition to offering a revolutionary method for exposing the disease at its earliest stages, GPC1+ crExos testing could also be utilized as a monitoring tool for patients already undergoing treatment for pancreatic tumors.

“We could use the test to tailor chemotherapy—to show how well chemotherapy is working or not working, or in the context of relapse or remission or therapy resistance,” said Kalluri. “Based on the levels of the exosomes we see in

the blood, we could get an idea of what the tumor burden is in a particular individual, then customize treatment.”

It is important to mention that the most notable pancreatic tumor marker currently recognized in clinical practice, carbohydrate antigen 19-9 (CA 19-9), is already being used to monitor the progression of pancreatic tumors. Unfortunately, the American Society of Clinical Oncology discourages the use of this antibody for screening purposes due to high incidences of false readings.

Although more research needs to be completed through clinical studies, Kalluri and his colleagues are hopeful that GPC1+ crExos may lead to a breakthrough in pancreatic cancer diagnostics. Interestingly, their study also revealed the presence of these exosomes in some breast cancer patients, suggesting further analysis may offer widespread significance in the broader field of cancer research. If these exosomes are, in fact, present in patients with other cancers, disease-specific assays coupled with genetic analysis could lay the groundwork for blood test screening for numerous types of malignancies. Even more, because exosomes contain RNA, DNA and proteins, GPC1+ crExos may provide additional cancer-specific genetic information and potentially lead to new therapies for the disease.

“More work needs to be done, but we are excited about what we’ve seen so far,” Kalluri said. “These exosomes could prove to be life-saving biomarkers for pancreatic cancer, and, depending on what we discover through further analysis, maybe much more.” ■

“More work needs to be done, but we are excited about what we’ve seen so far. These exosomes could prove to be life-saving biomarkers for pancreatic cancer, and, depending on what we discover through further analysis, maybe much more.”

— RAGHU KALLURI, M.D., PH.D.

Chair of Cancer Biology at The University of Texas MD Anderson Cancer Center



Kalluri and colleagues are studying cancer exosomes in hopes of identifying new tools for screening, diagnostics and treatment of pancreatic cancer.



**PEGGY B. SMITH, PH.D., DIRECTOR OF THE BAYLOR COLLEGE OF MEDICINE TEEN HEALTH CLINIC, WAS DRAWN TO BAYLOR 44 YEARS AGO BY THE OPPORTUNITIES SHE SAW TO HELP REACH THE CITY'S UNDERSERVED YOUTH. TODAY, WITH 10 CLINICS OPERATING ACROSS HOUSTON, SMITH SHARED WITH TMC NEWS HER HOPE FOR THE FUTURE OF PUBLIC HEALTH AND WHAT SHE WISHES MORE PEOPLE KNEW ABOUT THE POPULATION SHE SERVES.**

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

**A |** In reflecting on my childhood, there were several significant events that influenced my career choice of public health. First, I went to a Catholic girls school, and one of the things I embraced from that culture was that we all have a community obligation to give back. The piece of that belief that became very relevant for me, even in graduate school, was that corporal works of mercy can be translated from the traditional biblical sense to a contemporary format. What I found was that the public health field, and

specifically my job at Baylor College of Medicine, is a proxy for that translation.

Secondly, it is personally satisfying to me that I am able to provide quality medical care to people in our community. Public health is so cost effective. I am a pragmatist at heart, and as a pragmatist I know that while our clinics probably cannot afford to offer CT scans, we can afford HPV vaccines that would be more responsive to the primary health care needs than an expensive piece of technology. To me, the cost-effective benefit of public health is just a no-brainer.

The third observation or event was

the realization that when you look at our community, most people have trouble getting out of their medical silos, to address local health disparities. What became very clear to me in the last 10 years is that I work in the best medical center in the world. You have two great medical schools, 56 institutions, brilliant leadership, and yet we have people three miles away who really are living in the Third World from a medical point of view. One of the things that has motivated me in this phase of my career is that we have the capacity to bring the best that the Texas Medical Center has to offer to the communities that need it

the most. You don't have to cross an ocean to offer care; you just need to cross the street. Those are some of the observations that led me to a career in public health. In addition, those realizations helped me to understand early on the relative nature of helping one's fellow man. I am coming up to my 44th year. Here is a sort of pay it forward piece in that I believe we are all six degrees of separation apart. I always tell people that if you need a reminder, get in an elevator with someone who has an active case of TB—you will learn really quickly.

Working in the Texas Medical Center has been very rewarding.



I also believe I have been very lucky to have had the opportunity to work for an institution that has allowed me to have a fascinating career. I often reflect humorously that Baylor College of Medicine has given me a lot of rope. I can run with it or I can hang myself. So far, I have done the first. We now have 10 comprehensive clinics in the inner city and we believe that we provide high-quality medical care not only in the city, but also in the country.

**Q | Where did you study?**

**A |** The University of Texas in Austin. I really got a great education. I was able to learn evidence-based and practical solutions in a complex arena.

I have had a nonlinear path that began early on in my work career. I started teaching at Rice University as an assistant professor in the psychology department, being strictly academic. In 1972, a wonderful physician hired me to close a clinic for pregnant girls. The program had lost its funding, the director had died unexpectedly and it needed somebody to analyze the data and ‘put it to bed.’ That wasn’t what I had in mind. The opportunity was very appealing. I was able not only to write up the data, but also to find subsequent funding. Since then, our clinics have expanded from maternity to family planning, STI [Sexually Transmitted Infection] and HIV care and primary health services for youth 13 to 25 years of age. It is comprehensive health care, also offering case management, job training and specialized adolescent care provided by mid-level providers and board-certified doctors. It really has been an interesting evolution in terms of going from a narrow focus to a comprehensive community asset offered by the faculty and staff of a medical school.

**Q | How long have you been with Baylor?**

**A |** I am coming up on my 44th year. This can be somewhat embarrassing; I always win the contest, when asked in professional meetings, ‘Who has been in the field the longest?’

One of the things that pushed me into public health was the opportunity available with Baylor College of Medicine and being in the right place at the right time. Serendipitously, my husband, in a spontaneous moment, decided to run for the legislature.

Watching the subsequent process as a spouse, I received great on-the-job training in terms of how public policy is molded, translated and implemented in a community. What I have become comfortable with is the concept that public health is political. If you don’t speak up, by default you get what you deserve. The expertise that we have gathered at the medical school and from the clinic’s 80 employees has allowed me to have a very evidence-based approach in public health and to try to make recommendations to people who embody the culture of Texas and who grasp the economic impact of not doing some upstream prevention. It has been interesting and gratifying to be able to try to translate what happens if you do something, versus what happens if you don’t. For example, how do you make available meningococcal vaccines to inner-city college-bound youth? Such immunizations can be very expensive for a family who is living on \$30,000 a year, but without it, you can’t go to community college or a four-year institution in the state. We have learned how to work with those regulations and provide those medical services to youth, either from public funds or from private philanthropy, to fill in those gaps.

**Q | Can you describe the kind of services offered in your clinics?**

**A |** Our mission is to provide comprehensive primary and reproductive health care to youth 13 to 25 years of age. This also includes social support as their medical home. I believe our physicians are some of the best in the world, as they are board certified and sub-specialty trained in adolescent health. We have extended our eligible patient age to 25 years, as we believe in the brain research that tells us that at about age 25, critical thinking skills replace concrete operational thought.

There are a couple of things that are unique about our clinics in terms of emphasis and scope of service. In 1980’s we decided that if you are going to work in the areas of maternity and sexually transmitted infection, for women, we needed to provide care for the other 50 percent of the equation and that is the male. So we initiated a multi-phased male program, including a male scholarship program for high school completion and/or job training (Project Bootstrap) male medical clinics

and HIV and STI screening, treatment and linkage to care. In working with young men, we are sensitive to the fact that women may say, ‘How do I look?’ But men are very keyed in to, ‘What do I do?’ We have male social workers to help with case management and job training. Several major businesses in our community also collaborate with our male initiatives to provide employment subsequent to successful completion of our program.

Our clinics also provide a one-stop medical approach and we have an extended Class D pharmacy, stocking all the medicines that are necessary for primary and reproductive health care needs. In addition, our services are provided at little or no cost, and no one will be turned away for inability to pay. We feel it is a great investment economically, not only from avoiding morbidity associated with some of the diseases that we see, but also because we prepare these young people to think more about getting out of high school and into college and being productive citizens. Many of our patients have had a hiccup in their life course, but are now very successful and contributing Houstonians.

**Q | Tell us about your work with teen moms.**

**A |** This is an interesting and very rewarding aspect of our clinical practice. As a medical school and as part of

the Texas Medical Center, we believe in an evidence-based approach. We all like to do ‘good,’ but unless the outcomes are parametrically confirmed, the results could have occurred by chance and not been a function of the intervention. Our emphasis, therefore, is on initiatives that are evidence-based. For the young moms, we have adapted such a program called ‘Centering Pregnancy,’ and it is group prenatal care.

The young women sit in a circle and participate in a series of curricular sessions emphasizing perinatal care and child development. As part of the program, they also receive their routine prenatal exam along with the associated lab screenings. The unique part of our approach is that we include the father of the baby and his extended family, as available. We acknowledge that whether or not the couple chooses to marry, the father has the opportunity to have an important relationship with his child. Through Centering Pregnancy, we provide prospective dads information and training not only on the medical aspects of the pregnancy, but also on parenting and child development. We also have a home visitation program called ‘Nurse Family Partnership.’ We enroll first-time moms during their pregnancy, and a registered nurse makes home visits for the first year of the baby’s life and provides social support.

“Our mission is to provide comprehensive primary and reproductive health care to youth 13 to 25 years of age.”



What we found is while the neonate may be born healthy as the result of quality prenatal care, our patients and their infants may develop issues because of negative psychosocial problems. This home visitation program will proactively monitor various benchmarks and disease-related problems for the dyad. The issue of postpartum depression, for example, is often missed in this cohort of young moms. We are able to intervene in a way that the baby isn't put in harms way because the mom needs help. Thus, through our comprehensive and integrated approach, we enroll the at-risk young mom who starts in Centering Pregnancy and is followed prenatally and postpartum via home visitation. At the same time, we become her medical home, providing all of her care until she is 25.

The concept of a medical home for our at-risk patients is important for a couple of reasons. First, when we talk about a medical home, we provide care that promotes 'best practices,' especially for inner-city patients. This is especially relevant in regards to the new, more effective contraceptive methods. These long acting reversible contraceptive methods, also referred to as 'LARCs,' have advanced birth control from technology of the 1960s, vis-à-vis 'Ozzy and Harriet,' to very effective preventive methods. For example, using the technology as seen in Nexplanon, a patient who has a single insert in her forearm the size of a small matchstick can be protected for up to three years from an unplanned pregnancy. The new

generations of intrauterine devices also provide similar benefits. New technology for HIV screening also improves prevention of the spread of this infection, as well as early diagnosis and hopefully linkages to care. These new technologies, seen as best practices, make a huge difference, whether you look at the statistics for adolescent pregnancy documenting a 10-year decline in teen moms or the data on improving outcome management for HIV-positive individuals. Moreover, these two health outcomes are very relevant to patients we see and can greatly benefit from state-of-the-art interventions.

**Q | How have you seen things change in your 40+ years at Baylor?**

**A |** How things have changed! When I joined the OB-GYN faculty, I thought the biggest problem was adolescent pregnancy. That is no longer the big issue. Currently the issues of STI and HIV are huge. There are so many misconceptions about those two conditions, and some people are uncomfortable, unwilling or unable to understand we are all at risk. In my opinion, there are several reasons for such a conundrum. First, I don't know if such positions are the vestiges of a Victorian set of standards, but we are very slow to talk about these issues and sometimes we become confused. Second, I believe that the problems are more complicated. Third, even with the Affordable Care Act, medical screening for these diseases is not widely available for our

age group, as many are unemployed. In addition, the piece that I find is an aha moment for me is that we are now working with adolescents where apparently there are no available parents. Whether it be the result of immigration, incarceration or children being raised by elderly grandparents, the social and family support recommended by a variety of behavioral theories are missing. Parents—no matter what size, shape or gender—are important.

**Q | How are patients referred to the clinic?**

**A |** We have several different vectors through which we receive referrals, but three methods really stand out. First, because we have a strong contractual relationship with the school districts, the school nurses are aware of our services and are strong advocates. In addition, in Precinct One, under the leadership of Commissioner El Franco Lee, a community collaboration, the North East Adolescent Project, has a relationship in 17 schools. Our social workers work closely with their nurses and principals, teach in the schools in some of the health classes and also accept referrals from the school staff. Finally, we also have an electronic platform—at [teenhealthclinic.org](http://teenhealthclinic.org)—that provides an Internet portal to our services as well as a GPS locator to find which clinic is closer to the teens' homes. This platform is user-friendly for adolescents. I always say, if you're going to hunt moose, you have to go where the moose are—they aren't on the telephone, they are all on their iPhone or Android device. In addition, if a teen has a confidential question, we have an interactive blog, staffed by two avatars named Tye and Taft. A patient can click on their image and ask them questions, which will be answered within a 24-hour period. We have actually analyzed the data and the number one question is not a medical one, it is financial and that is, 'How much does all of this cost?' Even though kids may not be gainfully employed, they are acutely aware that services are hard to come by, especially those that are subsidized. The communiqué that I find most interesting is that any given week, I will get an email on my Baylor College of Medicine server that will say, 'My name is Joe and I

think I have an STI. Can you get me in touch with someone who can tell me how to get treatment?' Our social workers then step in and make an appointment for the patient.

**Q | What do you wish more people understood about the population you serve?**

**A |** There are several components to this answer. First, I would like the population at large to understand that the youth that we care for are teenagers first and sometimes, like all teenagers, they do stupid things. Some of them may have taken sexual risks, which could be a function of curiosity or lack of parental supervision. But they are usually good kids who just need a little help.

The second component to this answer is I would like people to understand that these kids are more like their own children than not. Sometimes they lack economic advantages, but many still have valuable ideals and ambitions. If we can intervene early through prevention and a little 'wind under their wings' as a friend in the system, they have a good chance to succeed.

Finally, the support of our community—which enables us to provide these services—is key. Some of the most valuable medical services that we provide are made possible through the caring and generosity of others. I am able to purchase state-of-the-art contraceptive devices and offer scholarships to deserving young men because of such guardian angels in our city.

**Q | What do you hope for the future?**

**A |** I have been fairly successful in figuring out how to fund and evaluate these clinics by virtue of good luck and some very unique opportunities. Looking forward, in planning for the future, we have established an endowed professorship, which will support future initiatives and will fund the program's leadership and its continued momentum. Such an endowed resource will enable the college to attract someone of a national caliber who has the scientific proclivity and understands the interconnectedness of policy and public health. ■



For the full interview, visit [TMCNews.org](http://TMCNews.org)





## Think muscles, joints and bones.

### It's about getting your life back.

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

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

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

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

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

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



Left: Nikoletta Carayannopoulos, DO, Chief, Orthopaedic Trauma Surgery

Center Left: Joel Patterson, MD, FACS, FAANS, Chief, Division of Neurosurgery

Center Right: Vinod Panchbhavi, MD, FACS, Chief, Division of Foot and Ankle Surgery

Right: Gregory McGowen, PT, Cert MDT, AIB Certified in Vestibular Rehabilitation, Rehabilitation Services

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

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



Working together to work wonders.™





**PROJECT: ALZHEIMER'S ANDROID**  
**INVENTORS:** Josephine, Bart, Isis, Mick

Constructed for “the memory that forgets,” the Alzheimer’s Android is designed to help individuals suffering from Alzheimer’s disease go about their daily routines. Powered by a solar battery, the robot can be programmed by a physician or family member to accompany patients during their daily lives and help them recall tasks like making tea, brushing their teeth or going shopping.



# Tiny Inventors, BIG IDEAS

TMCx hosts young innovators from the British International School of Houston

BY ALEXANDRA BECKER

“Guess what?” asked Texas Medical Center Executive Vice President and Chief Strategy and Operating Officer William F. McKeon to a room full of seven- and eight-year-old students at the British International School of Houston during a classroom visit in late May. “I work inside an old cookie factory.”

The students’ eyes grew wide with disbelief.

“But do you know what’s even cooler?” he went on. The students shook their heads in unison.

“The Texas Medical Center bought the cookie factory, and we made a bunch of renovations, and we turned it into an invention factory.”

This was too much. The Year 3 students, equivalent to second grade in American schools, had been working on their very own inventions for weeks and would soon be traveling to the invention factory—otherwise known as TMCx, the Texas Medical Center’s accelerator program, housed in an old Nabisco factory—to pitch their original ideas to a room full of industry experts, teachers and parents.

Their inventions were part of an eight-week study on innovation, the latest topic in a curriculum designed to foster critical thinking skills and lifelong learning. Following the seven key areas of learning and development set forth by the U.K.’s Early Years Foundation Stage—communication and language; physical development; personal, social and emotional development; literacy; mathematics; understanding the world; and expressive arts and design—the school incorporates the English National Curriculum with the inquiry-based International Primary Curriculum (IPC). Within this model, students are guided through units of study, each lasting between three and eight weeks, and learn to approach a range of topics and issues from various perspectives. Already this year, the

classes have studied the rainforest, the history of chocolate, and dinosaurs—an ever-popular topic that culminated in an overnight stay at the Houston Museum of Natural Science.

“All of our classroom activities are linked with various themes covered in the everyday lessons in the IPC, which helps to further consolidate learning,” explained James Frawley, deputy head teacher at the school. “This gives us the flexibility to challenge our students in all areas of development.”

In addition to creating a robust learning environment and the opportunity for nontraditional classroom experiences, the grouping of the English National Curriculum and the IPC provides a well-defined framework for measuring performance without relying on standardized tests—an increasingly controversial evaluation metric. In fact, the Texas Legislature recently passed Senate Bill 149, allowing for alternative methods for satisfying certain public high school graduation requirements—including testing. Effective May of this year, the bill essentially acknowledges that not all student performances can objectively be measured by the current standards, specifically two of the State of Texas Assessment of Academic Readiness (STAAR) tests.

“In American schools, there is so much testing and teaching to the test—it’s very sad and irritating for the people involved,” said Katharine Forth, whose son is one of the students at the school studying innovation. “This is the other side of the spectrum. The children have a topic across many weeks and the teachers are able to weave their entire curriculum, whether it’s history or culture or math—everything is intertwined with this topic—and they don’t have to break to do any tests. This means the children can really get into their learning for a long period of time, which is necessary for developing deep critical thinking, and ultimately,



“Innovation in the life sciences is what we’re passionate about, and you never see this introduced early enough. These kids are lucky to get this kind of exposure at such a young age.”

— WILLIAM F. McKEON

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

lifelong learning habits.”

The British International School of Houston’s partnership with TMCx for the students’ study on innovation exemplifies the potential created by this style of learning—and it was facilitated by Forth herself. A former scientist at NASA and the CEO of iShoe, one of the inaugural TMCx startups, Forth first began toiling with the idea after her son came home from school one day excited about his next topic of study: inventions that changed the world.

“It was too perfect,” she said. “You have a school where the children are studying innovation for eight weeks and an innovation center in the city training entrepreneurs and fostering innovation, and I thought, why not pay it forward?”

Both the school and TMCx jumped at the opportunity, and the teachers adjusted the course accordingly.



“It’s completely changed their way of thinking about ideas. And, quite honestly, their way of thinking in general.”

— ROSALYN WILLIAMSON

*Instructor at the British International School of Houston*

Students were asked to identify a health-related problem and come up with a solution—an invention—to address it. Working in teams, the curriculum included interviews of older students in the school about their health issues—think broken leg or bloody nose—hour upon hour of brainstorming sessions, and extensive research focusing on materials, mechanisms and competing products on the market. Once their ideas were fully formed, the students sketched their designs and set to work creating prototypes of their inventions.

Forth visited the school weekly to provide guidance throughout the process and address specific topics related to innovation, including how to shape an idea, techniques for effectively communicating a pitch, and the importance of pivoting, or knowing when to shift direction based on practical feedback and unforeseen barriers to success. Other guest lecturers periodically joined Forth at the school to further enrich the students’ learning experience. A group of TMCx business strategists coached the young inventors on presentation strategies, while McKeon’s visit focused on helping the students refine their ideas and pitches.

McKeon began his presentation by recounting his own history of inventions, including a watering device for Christmas trees he created as a young boy and, more recently, a multimillion dollar mobile-connected diabetes management system. He then introduced the concept of patents—and the fact that one of the youngest patent-holders in history was a four-year-old Houstonian—and challenged the students to consider their burgeoning products’ long-term potential and market viability. As he toured the

classrooms, McKeon listened to the groups explain their inventions and the ways in which they addressed a particular health problem, asking the types of questions regularly posed by potential investors (What sets your product apart from other similar devices? Would using this material make the device too costly?), and offering constructive feedback concerning their pitches, including the importance of eye contact and a firm handshake.

“Remember, in the end, you are telling a story,” McKeon told one group. “When someone asks you a question about how your product works, you can’t hesitate. You have to say, ‘It works brilliantly and let me tell you three reasons why.’ If you can tell a great story about how your invention is going to make the world better, or people healthier, or a procedure more efficient, then you’re on the road to success.”

McKeon also stressed the importance of teamwork and reminded the students that each individual in a company should be able to speak knowledgeably about their product.

“You’re only as strong as every part of your group,” he explained. “Investors want to see that you’re friendly with each other, that you support each other, and that each one of you adds value to your company or invention.”

This kind of expert-led guidance has proven to be an invaluable learning experience for the students. Not only have they developed a strong understanding of the history of inventions and the invention process itself, they’ve also had the opportunity to experience the process firsthand.

“It’s completely changed their way of thinking about ideas,” said Rosalyn Williamson, one of the teachers. “And, quite honestly, their way of thinking in general.”

Williamson commented that at the beginning of the topic, some students became defensive of their ideas if they were criticized. After working with real-life inventors, however, they were exposed to a more realistic understanding of the expectations and challenges involved in the process and ultimately welcomed constructive criticism.

“At the start, some students found it difficult to change the direction their work was moving in, but now they’re just used to it. Because the process has been so hands-on, it’s made it much more meaningful for them. They’re becoming skilled critical thinkers and are constantly contemplating ways to improve their models or their ideas; they’re self-editing and self-improving, and it’s just incredible for them to acquire these skills at this age.”

Equally incredible is another kind of thinking being nurtured—one that centers on individual potential and equality. The British International School of Houston is comprised of a diverse student body with individuals hailing from 50 different countries, and the students are recognizing that they can change the world through their ideas, regardless of their race, religion, nationality, language or gender.

“It’s really nice to see the girls having an equal say-so in everything, because they’re not aware of the glass ceiling or stereotypes—they’re kids and they’re all equals at the moment,” explained Williamson. “We hope we’re making breakthroughs and changing thinking for the future.”

The course is doing that and more. Not only has the experience promoted open-minded thinkers and lifelong learners, it’s also kindled a specific interest in STEM studies for many of the students—something TMCx strongly supports.

“It’s wonderful to see this formalized in a curriculum,” said McKeon.







**PROJECT: MIGRAINE HELMET**  
**INVENTORS:** Evie, Artem, Karmah, Linus

Designed for individuals suffering from painful and debilitating migraine headaches, the Migraine Helmet offers immediate relief that no pill, injection or neck pillow on the market today can provide. The helmet works through a combination of head massage and an organic cream that is formulated to expand blood vessels and increase the flow of oxygen. Powered by an at-home generator or a portable battery pack for individuals on the go, the Migraine Helmet also comes equipped with oxygen bags in the case of an emergency.

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**PROJECT: CRUTCH CLUTCH**

**INVENTORS:** Isobeal, Zaina, Adam, Calvin

A state-of-the-art crutch accessory, the Crutch Clutch is designed to keep crutches in place during use. Made of neoprene—a stretchy, comfortable fabric that is low in friction—the sleeve stretches over the crutch top and attaches to an adjustable tether and wristband. Gone are the days of falling over while struggling to pick up crutches!

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“Innovation in the life sciences is what we’re passionate about, and you never see this introduced early enough. These kids are lucky to get this kind of exposure at such a young age.”

“It’s ignited an interest in them that I think is going to follow through for years to come,” said Williamson. “I was listening to my students discuss their invention the other day and one of the girls said, ‘Well, we could use synthetic polymers since they absorb like little sponges,’ and I was amazed at the level of maturity in their newly found vocabulary and understanding of it.”

Bolstering their already peaked interest, TMCx hosted a demo day for the students in June. Headlined as the TMCx Young Inventors Forum 2015, the event provided the students an opportunity to pitch their products to a room full of “potential investors,” including their fellow classmates, teachers, parents, TMCx staff, and a panel of expert judges from institutions throughout the Texas Medical Center.

After welcoming remarks from McKeon and TMC President and CEO Robert C. Robbins, M.D., the 20 groups took turns presenting some impressively clever and polished pitches. Adorned with creative taglines, statistics, and even some original market research (“ten out of 10 children agreed—that’s 100 percent!”), the pitches addressed real issues in health care, among them the inconvenience and discomfort

following a broken bone, methods for monitoring dehydration, migraine pain, memory loss from Alzheimer’s disease and how to make the scarier side of medicine more kid-friendly.

Each group had fashioned a prototype of their invention as well as a poster presentation displaying an executive summary, product design specifications and pictures illustrating the various stages of development. After the pitches and showcase presentations were complete, the judges deliberated for a nail-biting 15 minutes, and winners were announced in five categories.

Best Pitch was awarded to Air Crutch, which envisioned the use of repelling magnets on crutches to alleviate the arm pain associated with prolonged crutch usage, as well as the promise that consumers would “float their way to recovery!” Quickest to Market went to the Baby’s Best Friend Mobile Monitor, which employed sensors and a camera to monitor an infant’s health while he or she sleeps. Portable Drip took home the Most Innovative award for their creation of a wearable IV, while the Greatest Impact category went to Ex-Ant, a tiny nanobot ant intended to cure paralysis after successful implantation in a patient’s spine. The Best Prototype category was so competitive that it ultimately resulted in a tie, with the awards going to Write Wrist, a microphone-powered dictation



“Watching them, you really get the sense that anything is possible. They’re so creative because they are younger and they don’t have the restrictions or constraints that adults experience in the real world.”

— ROSALYN WILLIAMSON

*Instructor at the British International School of Houston*

system for individuals who have broken their dominant wrist, and Shot Buddy, a kid-friendly needle-masking system.

After the last trophy was awarded, all of the students were called up to the stage to receive one-of-a-kind TMCx Young Inventors medals to recognize their accomplishments and to “graduate” as inventors themselves. Alongside them were their teachers: Peter Moor, Lyndsey Giles, Audrey McLean and Rosalyn Williamson—each of whom deserved recognition in their own right for their expertise, guidance, enthusiasm and flexibility throughout the course. Because no demo day is complete without a luncheon, TMCx then treated the students and staff to a celebratory, kid-approved feast featuring mac ‘n cheese, pizza, chicken

fingers and ice cream sundaes served in color-changing TMCx-branded souvenir cups.

Although most of the inventions had a ways to go before they’d be ready to hit the market, it was evident that the imaginations that built the products were extraordinary, and that within the exhibit hall sat, cross-legged and curious, the future of medicine.

“Watching them, you really get the sense that anything is possible,” said Williamson. “They’re so creative because they are younger and they don’t have the restrictions or constraints that adults experience in the real world.”

Perhaps the future of medicine won’t be found in the “real” world at all. Perhaps it lies within innocent imaginations, nontraditional learning environments, unending questioning of the status quo and the spark in the eye of a child studying a color-changing cup full of ice cream, thinking.

“Don’t be afraid to dream,” urged Alexander Izaguirre, vice president and chief technology officer for Baylor College of Medicine, who served as one of the panelists for the event. “Don’t let anyone take that away from you, and build the future for all of us, because we’re ready for it.” ■





# And the WINNERS ARE...

Pint-sized entrepreneurs from the British International School of Houston pitched their most creative health care solutions during the TMCx Young Inventors Forum



## Best Prototype <sup>\*tie</sup>

PROJECT: **SHOT BUDDY**

INVENTORS: Ella, Hannah, Henrietta, Sofia

To make the scarier side of medicine a little more kid-friendly, the Shot Buddy team created a needle-masking system for kids who hate getting injections. The invention works by clipping the syringe and needle into a cover shaped like a zoo animal. Available in a variety of options, each needle cover comes with a matching toy so the patient's distraction is twofold: the needle itself is hidden and the child is also preoccupied.



## Best Prototype <sup>\*tie</sup>

PROJECT: **WRITE WRIST**

INVENTORS: Diego, Florens, Manon

Intended to help children and adults who have broken their arm or wrist but still need to write, the Write Wrist is a microphone-powered dictation system driven by "cutting-edge" technology. Designed especially with school-aged children in mind, the machine can be placed directly on a patient's cast and will write whatever is spoken into the microphone. Unfortunately, it cannot be programmed with answers to pop quizzes.



## Best Pitch

PROJECT: **AIR CRUTCH**

INVENTORS: Aaniyah, Adam, Oscar, Erick

In an effort to relieve the armpit pain associated with prolonged crutch usage, the Air Crutch team engineered a device with repelling magnets between an under-arm pad and the top of a crutch. Complete with a storage compartment for keys and snacks as well as a locking mechanism to prevent the magnetic force from pushing the crutches too far forward or back, the Air Crutch will allow patients to "float their way to recovery!"



## Quickest to Market

### PROJECT: THE BABY'S BEST FRIEND MOBILE MONITOR

INVENTORS: Oliver, Catriona, Cooper, Elizabeth

A brightly colored mobile designed to hang above a baby's crib, the Baby's Best Friend Mobile Monitor does more than distract and entertain. Equipped with a smartphone-connected camera, sensors that detect drastic changes in skin color, emergency alarms and microphones, the device is engineered to identify potential health issues including fever, coughing, choking or even Sudden Infant Death Syndrome. It also comes with a sleeping pad that detects movement and temperature while vibrating to soothe a restless baby.



## Most Innovative

### PROJECT: PORTABLE DRIP

INVENTORS: Zhafran, Haris, Michael, Maxwell

Because nobody enjoys being stuck in a hospital bed, the Portable Drip team invented a wearable IV, providing patients with increased mobility and freedom. Available in a variety of colors and sizes, the Portable Drip can be worn like a shirt or smock, with large pockets fit for IV bags that have been designed to minimize the entanglement of tubes and wires.



## Greatest Impact

### PROJECT: EX-ANT

INVENTORS: Jai, Jack, Santiago

Smaller than the tiniest ant, the Ex-Ant nanobot is designed to cure paralysis after successful implantation in a patient's spine. After embedding the device near the site of the injury, the minuscule machine will crawl to the damaged area where its legs will extend to become a new link in the spinal cord, bypassing the injured nerves to ensure that messages from the brain are successfully sent to all parts of the body.

# From Problem to Product

*The TMC Biodesign program, a one-year innovation fellowship, is reimagining the process for developing new medical devices and digital health solutions*

BY ALEX ORLANDO

The history of innovation is populated by precise moments in time. Archimedes abruptly leaping out of his bathtub; Newton lounging beneath a tree when he received a beneficial bump on the head from a wayward apple; Sir Paul McCartney waking up one morning with the tune to “Yesterday” perfectly crystallized in his mind. But what if innovating isn’t simply an innate ability waiting for the right catalyst? What if “eureka” moments can be gently elicited through the right combination of mentorship, resources and a well-defined curriculum?

That mindset underscores the recent launch of the Texas Medical Center’s innovation fellowship, TMC Biodesign. A one-year program, TMC Biodesign brings together teams of highly accomplished individuals from diverse backgrounds—including engineering, medicine, business, computer science, design and research—to create novel digital health solutions and new devices for health care’s greatest unmet needs.

“I think the fundamental premise of the biodesign model is that being a successful and active inventor and entrepreneur is a teachable skill,” said Robert C. Robbins, M.D., president and chief executive officer of the Texas Medical Center. “Most people think that Edison or Einstein were just born that way. A lot of people have an inquisitive mind or want to tinker and think about how to do something differently, but there are tangible lessons to be learned.”

With the first class slated to begin this September, TMC Biodesign aims to provide fellows with the expertise and experience necessary to cultivate those



skills. As part of the Texas Medical Center Innovation Institute, the fellows will be in a privileged position to draw from the combined resources of the medical center community.

“Our first priority is to enable our fellows to have very unique experiences that are only possible if you are part of a program like this,” said Farzad Soleimani, M.D., assistant professor of emergency medicine at Baylor College of Medicine and co-associate director of TMC Biodesign. “If you go to, for example, a research institution, you’re confined to the resources of that institution. Because of the design of this program, we can establish a curriculum that cherry picks the most remarkable experiences from the collective pool of our member institutions.”

TMC Biodesign aims to nourish the evolving spirit of entrepreneurship stemming from the Texas Medical Center Innovation Institute—which currently includes TMCx, TMCx+ and JLABS @TMC. The biodesign methodology, a process for streamlining discovery and commercialization,

“I think the fundamental premise of the biodesign model is that being a successful and active inventor and entrepreneur is a teachable skill.”

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

## THE TMC BIODESIGN PROCESS

TMC Biodesign is structured to expose fellows to the entire product development and entrepreneurial life cycle, fostering their understanding of how innovations become viable ventures. **Fellows go through three established stages in the biodesign process: identify, invent and implement.**



### IDENTIFY

The program begins with immersive clinical shadowing where the fellows observe patients and health care professionals in a specified setting. From their observations, they identify a variety of unmet needs and begin a process of needs screening, exploring current treatment options and analyzing stakeholders.

### INVENT

After determining the greatest unmet need, the fellows begin the concept generation and selection stage, utilizing biodesign principles to brainstorm a range of potential solutions. The fellows prototype multiple designs and continuously iterate, guided by the mentorship of experienced clinical and entrepreneurial advisors.



### IMPLEMENT

The final weeks of the program are dedicated to development strategy and market integration. Fellows also focus on creating a successful business plan and the steps necessary to receive funding and licensing. They now understand how to cultivate innovative solutions into viable ventures.



will help support the steadily growing community of innovators in Houston.

Identify. Invent. Implement. Those are the three established pillars of the biodesign curriculum, developed by Paul G. Yock, M.D., at Stanford University—and the model that TMC Biodesign will follow. First, fellows will go through an immersive clinical shadowing experience, closely monitoring both patients and health care professionals in a specified clinical setting.

“Biodesign fellows are trying to solve real-world problems—they can’t just read about them,” said Robbins. “They have to be out on the front lines every day talking to people. Many of the successes that came out of Stanford’s biodesign program were not necessarily physicians. They were technicians, word clerks, nurses and pharmacists.”

“When these fellows go out into the clinical areas and really listen, that’s the foundation for everything else,” added William F. McKeon, executive vice president and chief operating officer of the Texas Medical Center. “They’re not hammers looking for nails. That’s the exciting thing about this program—they go in as sponges to listen, learn, observe, and then identify those opportunities where they can advance care.”

Based on their initial observations, the fellows identify a broad range of unmet needs—anything from problematic processes to cumbersome

technology—and begin a process of “needs screening,” exploring both current treatment options and analyzing possible target markets.

“After that comes the ‘invent’ stage, where they really dive into concept generation and selection,” explained Jessica Traver, business associate at TMCx, where she is helping to develop TMC Biodesign. “That’s where the fellows work to ideate and brainstorm potential solutions with help from their advisors and mentors. It’s also where they prototype as much as possible to find the ideal solution. We encourage fellows to iterate, iterate, iterate—that way they can ‘fail fast’ to find out what works best.”

The final months of the program (“implementation”) are dedicated to overcoming hurdles entrepreneurs are all too familiar with: development strategy and market integration.

“Once you’ve built out your product, you have to figure out how to integrate it into the complex web of hospital systems,” said TMCx Business Analyst Sandeep Burugupalli, another asset in the launch and execution of TMC Biodesign. “For example, you have to think about reimbursement—how will you sustain and scale your solution? It’s one thing to create it, but it’s another thing to integrate it into the existing fabric of health care.”

The TMC Biodesign program is

## **A ONE-YEAR INNOVATION FELLOWSHIP, TMC BIODESIGN BRINGS TOGETHER TEAMS OF EXPERTS FROM DIVERSE BACKGROUNDS TO CREATE NOVEL DIGITAL HEALTH SOLUTIONS AND NEW DEVICES.**

predicated on a simple assertion: with the right mixture of mentorship and resources bolstered by a solid curriculum, it’s possible to pave a path that leads directly from identifying a problem to developing a solution. The missing ingredient? Bright, fearless individuals who relish the thought of extending themselves beyond their discipline.

“The key to a successful biodesign experience is the willingness to invent, create and be open to new ideas,” said Eric S. Richardson, Ph.D., professor of bioengineering at Rice University, where he is developing a master’s of engineering program with a focus on the biodesign model. “Fellows have to be comfortable with an unstructured design setting. There are certain people who thrive on ambiguity.”

Two teams of four individuals each will populate the inaugural class of the fellowship.

“We want fellows who not only enjoy thinking outside of their specialty, but also thrive on multidisciplinary interaction,” said Robbins. “You put

these talented people who are at the top of their discipline together, and it’s like putting the team together that led to the first person on the moon. It wasn’t just the astronauts, it was the rocket scientists, the engineers and the administrators. There are a multitude of people who have to come together for these big moonshot projects.”

According to Robbins, while nurturing budding startups is an important component of TMC Biodesign, it isn’t the sole driving force behind the program.

“I think it’s important to remember that this is an education program,” he said. “The goal is not necessarily to create startup companies. It’s a nice byproduct, and it’ll clearly be a secondary objective, but I think our main focus will be ensuring that the fellows receive an incredible education about how to design new devices, diagnostics and digital platforms to improve human health.”

The benefits of that education become tangible through the successes of individuals like Lily Truong, chief executive officer of Clear Ear—a consumer health company that developed a product line for better ear wax management and one of the 22 inaugural TMCx startups. Conceived as a class project at the Stanford Biodesign Program, Clear Ear was born when Truong discovered that the number one cause of treatable impaired hearing worldwide is earwax buildup. That discovery—and Truong’s relationship with her co-founder, Vandana Jain, M.D.—would not have been possible without the structure and support of her biodesign experience. “Biodesign changed my life,” said Truong. “I’ve always had a passion for health care innovation. That’s where I want to make an impact. Before biodesign, I didn’t have a full idea of how to accomplish that. Now I know how to find an unmet clinical need, invent a solution that meets that need, and then ultimately implement a strategy and bring it to market so it can improve the health of those around the world.” ■



# Educating Leaders of Tomorrow

*Since 1972, the Michael E. DeBakey High School for Health Professions has given bright and motivated students a unique introduction to the world of health care*

BY SHEA CONNELLY



*Students in scrubs return from a trip to the Texas Medical Center. During their junior and senior years, DeBakey students spend time in the medical center, shadowing medical and health science professionals.*

On a Wednesday morning at the Michael E. DeBakey High School for Health Professions, a classroom full of juniors is buzzing with activity. Anatomical diagrams throughout the room point out the different bones of the skull and names of the teeth. Students eagerly share what they have learned about being a dentist and show off models of the dental offices they designed. They speak about medical terminology with the confidence one would expect from a pre-med college student rather than a high schooler. Students and teachers alike say that is par for the course at DeBakey.

Founded in 1972 as a joint project between Baylor College of Medicine and the Houston Independent School District, DeBakey is a public magnet school that offers the opportunity to focus on health sciences at an early age. Starting freshman year with the Principles of Health Science, students receive an overview of a multitude of fields in health care, both inside and outside the classroom.

The DeBakey application process is competitive. Last year about 1400 eighth-graders completed the full application process, and the school only admits about 250 freshmen each year. The coursework students are expected to complete is similarly rigorous.

"All of our kids graduate with calculus, all graduate with at least one AP science, and then of course the four years of health science," said Principal Agnes E. Perry. "We also require three years of a language other than English."

The workload is intense, students said, noting school can be stressful at times as they juggle homework and high expectations. They know the late nights will all be worth it, though, when they are fully prepared for college. For DeBakey students, the question is never, "Will you go to college?" but simply, "Where will you go?"

"It just seems like the norm, even if the rest of my family hasn't gotten here," said rising senior David Dominguez, who plans to be the first in his family to

attend college. "Even if there was some bit of doubt in my mind that, 'Oh, I'm not going to college,' it feels out of place in DeBakey."

DeBakey has a 100 percent graduation rate, said Perry, and all students are required to apply to at least three colleges or universities by December of their senior year.

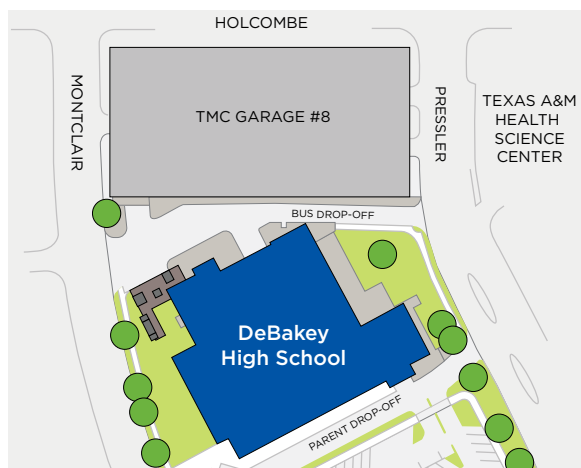
"If not 100 percent, then 99 percent go to college," said Perry. "All kids are accepted somewhere."

Despite the demanding classes, students said being immersed in a school full of talented, driven individuals is one of the best perks of attending DeBakey.

"You're in an environment with so many other motivated and determined people, so that just gives you the encouragement to work harder yourself and improve yourself," said rising senior Anushka Madhuvarshi.

"I think that's really what makes us stand out," added rising senior Kia Baeza. "Here, everything we focus on is academic—that's what you come to school





“Even if there was some bit of doubt in my mind that, ‘Oh, I’m not going to college,’ it feels out of place in DeBakey.”

— DAVID DOMINGUEZ  
Student at Michael E. DeBakey High School  
for Health Professions



**TOP ROW:** The design for the new five-story DeBakey High School building, to be completed in 2016 (Credit: WHR Architects); students study together in their junior year dental science class; a colorful display shows where each senior will attend college in the fall. **BOTTOM LEFT:** DeBakey High School’s new location is in the heart of the medical center.

every day for. School is actually for learning, which is what it really should be. It gives everyone the outlook that you’re going to be successful.”

DeBakey teachers Shannon Niaves and Marie Bielamowicz praised the caliber of students they encounter in their classrooms. Like many teachers at DeBakey, both Niaves and Bielamowicz worked in other health-related fields before teaching. Niaves’ background is in nuclear medicine and Bielamowicz is a chiropractor.

“I wouldn’t want to teach anywhere else. These kids are absolutely amazing,” said Bielamowicz. “It’s just been a wonderful experience to see what they can offer and it’s kind of renewed my hope in the future.”

DeBakey has very little teacher turnover, said Perry, which is largely a credit to the student body.

“The students are so good here, I think we’d be disappointed if we went anywhere else,” said Niaves.

One of the most unique aspects of the school is its close relationship with the Texas Medical Center.

By their junior and senior years, students are out and about in the medical center, shadowing surgeons, nurses, dentists, researchers—the full spectrum of health professions. For students, those hands-on experiences either confirm their interests or help them discover a new passion.

“Coming here, I thought I wanted to be a pediatric heart surgeon,” said recent graduate Taylor Waits, who will head to the University of Texas at San Antonio in the fall. “I want to be a pediatric speech pathologist now. Going to DeBakey helped me shadow a heart surgeon, before going to school and paying all this money to see that I don’t want to do it.”

Soon the Texas Medical Center-DeBakey partnership will grow even closer. After nearly 35 years in its current school building south of MacGregor Way, DeBakey will move to a five-story, state-of-the-art building currently under construction in the heart of the Texas Medical Center, by Pressler Street and Holcombe Blvd.

“Students will have the ability to walk to some of these institutions, and we will also have the opportunity to have those medical professionals come in on a more regular basis to provide outreach or contact in the medical field,” said Perry. “Medical professionals are busy, it’s hard for them to jump in the car and drive to another location. We’re hoping the students will have more immediate access.”

Faculty and staff say that closer access will only increase the benefits DeBakey students get from spending time with the health professionals at the Texas Medical Center—a unique experience students said they value immensely.

“Before shadowing I had no idea what I wanted to do,” said Baeza of her experiences in the medical center. “It gave me the opportunity to realize this is exactly what I’m going to be doing every day. I want to do something I love with my life.”

Thanks to DeBakey, students are able to get a head start on discovering their passions. ■



**ROBERT M. EURY, PRESIDENT OF CENTRAL HOUSTON, SAT DOWN WITH TEXAS MEDICAL CENTER EXECUTIVE VICE PRESIDENT AND CHIEF STRATEGY AND OPERATING OFFICER WILLIAM F. McKEON TO SHARE HIS THOUGHTS ON THE CITY'S PUBLIC TRANSPORTATION, AND HOW PASSIONATE LEADERS AND COLLABORATION HELPED GIVE SHAPE TO DOWNTOWN HOUSTON.**

**Q** | Can you start by telling us about your background?

**A** | My mother was an elementary school teacher, grew up in the Bluegrass region and attended the University of Kentucky. She graduated in three years and then went to Columbia. She arrived in New York City at the time of the 1939 World's Fair and lived at the International House. This opened her mind to big cities.

She was engaged to my father, who grew up in Louisville. Dad was a businessman investing in small properties. We had modest means and were staunch Methodists. My parents ultimately worked for the church where my wife, Gayle, and I grew up. My dad had instinctive leadership skills, which I learned. I think my mother's experience in New York had some

impact on me. Although, the love of building really came from my mother's father, who had little formal training but was an excellent builder.

It now seems phenomenal to me that very early on in life I knew what I wanted to do. I remember in junior high school we had a unit on vocations. You had to think about what you wanted to be. I said I wanted to be an architect, so I had to interview an architect. The gentleman I interviewed gave me terrific advice. He said, 'Work on the most challenging subjects you can take—math and science. Don't worry about whether you can draw or not. You can go to night school and learn how to draw.' So I did. He gave me a little coaching on the best schools. The School of Design, Architecture, Art & Planning at the University of Cincinnati was strongest in the region. I applied

and was accepted. Cincinnati has an excellent co-op program that dates back over a century. I received a six-year professional degree, a B.S. in Architecture.

I graduated from University of Cincinnati and continued working a couple of years at the University of Louisville. Then Don Williams, my colleague who hired me at U of L, was recruited to lead the creation of a new urban research center affiliated with the Rice School of Architecture. Two years later, this opened the opportunity for me to attend graduate school at Rice and have a role in the new center. At that time, Rice had a master's degree in urban design, and I could see my interests were headed in that direction. We moved to Houston in 1974. I will never forget...we had a Texas flag on the front of the Ryder truck. Our families thought we were coming back home after I



“For the past 15 years, you can feel the momentum pushing towards more coordinated and predictable planning. I do not see that resulting in zoning, by any stretch of the imagination, but I do think it is time to focus on creating vibrant districts and livable neighborhoods.”

finished at Rice. That was 41 years ago! I don't think you could ever enter Houston through better doors than Rice University. It was an amazing place, and Rice Center for Community Design + Research was equally remarkable. In the early '80s, Rice Center was asked by community leaders to envision the creation of an entity to begin to think about the future of downtown and the central city. These leaders were beginning to realize that while downtown had 10 million square feet of new offices under construction, its future was not as secure as one would think. Of course, they were not thinking of the oil bust yet to come, they were thinking about downtown's competitive position in a region that was rapidly building multiple centers of employment. Rice Center helped them envision this new organization, and they committed to its formation. When they recruited someone to organize it, my name got on the list. With a number of outstanding business and civic leaders committed, I was hired to be the CEO and help to put it together.

We launched Central Houston in the spring of 1983. At the time, it was both exciting and challenging. I realized at the time I had the opportunity to work with wonderful people who were instant mentors. Talk about a learning experience—yes, I've been to graduate school at Rice, but it was like going back to graduate school because I had the incredible opportunity to learn from these wonderful corporate, civic and governmental leaders.

Central Houston, a nonprofit member organization, ramped up quickly with the large firms and civic entities as its members, a CEO board and the will to have impact. The issues were there to tackle starting with access. We were coming out of a period when Houston was strangling from congestion. I know you may laugh and say, 'What decade was that in?' Well, this was at a time which I think far exceeded what we experience today with congestion and getting around. METRO was a new entity at that point—only about four years old. So it was struggling to improve an outdated bus system and planning to build a rail transit system. METRO designed a heavy rail line that started about where the Hardy Toll Road at 610 is today and came through downtown/midtown and out the Southwest Freeway. A subway was proposed in downtown and midtown—priced at a billion dollars. Bonds for this plan were put before the voters in June of '83. They were voted down.

When the rail vote failed, METRO quickly began to build an excellent commuter bus system complete with park and ride lots and dedicated lanes. This has had a remarkable impact on the region's ability to get to downtown and the Texas Medical Center—the inner core of the city.

**Q | If you look back at the past 20-30 years of your career, what are the parts of the city, the icons, you were involved in building that you think had the largest impact on its brand or the way the city operates today?**

**A |** I find the use of the word icons somewhat amusing since back in the early days of Central Houston, these were just ideas. However, I think it's a fair word. Let's start with the evolution of the METRO system. We have always been a collaborator with METRO, especially in the early years. At the same time, we led the redevelopment of Buffalo Bayou to become Houston's waterfront amenity. There had been plans and some improvements made since the early 1900s, but there was no consensus to move forward with bold vision. We got a fresh start during the administration of Mayor Whitmire as a task force recommended the formation of Buffalo Bayou Partnership in 1986, and we moved on the first major piece of a master plan, Sesquicentennial Park, initially opened in 1989. I remember task force member Gerry Hines saying, 'We're going to develop this incrementally.' We didn't have the money, especially during the oil bust, to be able to build the envisioned plans all at one time. But his approach was on target as we now experience the physical transformation of Buffalo under the leadership of Buffalo Bayou Partnership. Even larger than this is the commitment of the Houston community to transform the region's entire bayou greenway system into a recreational and circulation asset. I think this has the potential to be incredibly impactful as a community that's attached to our cars suddenly recognizes there is another system for travel on our bicycles or feet.

Another piece of the redevelopment puzzle has been the construction of a set of civic gathering places, the stadiums led by our civic and governmental leaders over the past two decades. Our role was the early planning work—determining where we could locate a ballpark or arena and then securing the site. This was only possible with the leadership from the business

community. We were able to put funds together to secure the land at Union Station from the cooperating railroads that worked quickly with us. The vision was advanced by a referendum passed by a very narrow margin...a half of a percent. To now see what Minute Maid Park has done for that part of the central city, followed by Toyota Center a few years later, and more recently BBVA Compass Stadium, is truly gratifying.

When I started at Central Houston, Houstonians did not call the city's performing arts halls the Theater District. In the late '80s we helped to organize a coalition of the performing arts organizations and the city to envision the district as a civic place. Of course now the Theater District and the Museum District continue to grow and change as cultural hubs for the region.

We spent a lot of time over the years on a series of redevelopment projects. We worked with newly elected State Representative Garnet Coleman on legislation which allowed for state and local incentives to make financing our major convention center hotels possible, including the Hilton Americas and now the Marriott Marquis to open next summer. These huge properties are essential to support Houston's growing competitiveness as a convention and trade show destination. Also included among these projects was the conversion of the vacated Albert Thomas Convention Center to Bayou Place in the Theater District, and further down Texas Avenue the conversion of the historic Rice Hotel into residential lofts. Now when I count them up, there are dozens of projects in which we have been involved. Of course, these now will be complemented greatly by our downtown living initiative with nearly 20 residential projects in development.

When the Brown Foundation, the Kinder Foundation and Mayor Bill White saw an opportunity to change underutilized green space and parking lots near the George R. Brown Convention Center into a major urban park, we assisted with its development. The park's design was driven by a strong vision of a highly programmed space that would attract users from all over the region while serving an increasing number of downtown residents. Indeed, Discovery Green is a success beyond our expectations drawing over a million visitors per year. When we put all of these development initiatives together, we are beginning to experience the excitement of a highly transformed urban place.



“This city still operates like a much smaller city than we are today. It is very open. People know and respect each other. Sometimes I become frustrated when I compare Houston to other major cities with far more history. I tend to forget that in development years, our city is really young.”

**Q | Do you find that urban sprawl is a challenge as an architect and urban planner for this city?**

**A |** Citizens generally call all of our urbanized area ‘Houston’ even if you live in The Woodlands or Bellaire. That is a hugely important part of our mindset. However, the physical distance between many citizens is challenging. They live in their own circles of activity. So there is a circle in Katy, there is a circle out in the energy corridor, there is a circle in Fort Bend County and one up in The Woodlands. In this context, I believe that the circle representing the central city is really a large triangle which includes uptown, downtown and the Texas Medical Center. This is the emerging core of the region. Many may not perceive this because the transportation grid does not readily connect these nodes. Over the next 50 years I see it growing like Manhattan did in the early 20th century. While it may never catch up to New York’s density, we will see a density and size of buildings that may be surprising.

**Q | Do you feel there is great support now? Are we becoming more thoughtful about city planning?**

**A |** I definitely do. I think there has always been a large group of people in the community, including those in real estate development, that believe we do need to guide and coordinate where we develop. For the past 15 years, you can feel the momentum pushing towards more coordinated and predictable planning. I do not see that resulting in zoning, by any stretch of the imagination, but I do think it is time to focus on creating vibrant districts and livable neighborhoods. That’s what redevelopment authorities and management districts are working towards. They are working on places that are far more pedestrian friendly. If I had my one wish for Houston, it would be to have excellent

sidewalks. If I considered running for mayor (and I am not planning to), I would campaign on a single platform: build sidewalks. It drives me nuts to see how disconnected we are and then to think about the enormity of the job to fix this situation. For a citizen to be able to walk even in places where it should be a no-brainer should be a given in raising our city’s livability.

There is a groundswell for better planning within the City of Houston. With an incorporated area comprising 627 square miles, the city needs to manage its destiny within this huge region. We are always faced with the assumption that if you are for planning, you must be for zoning. These are totally different things—planning, as I see it, is about managing our city. I am thrilled to see the initial stage of the city’s effort to prepare a general plan—Plan Houston is making progress. It is focused on the policy level for now. Over time it will drive the strategic initiatives in the city. This will happen in the next mayor’s term and beyond. Give credit to Mayor Parker; she got it off and running so that the city can be run in a more business-like way.

**Q | What are some projects—looking forward to the next five to 10 years—that excite you?**

**A |** First of all, I am really excited about TMC3. I think it is such a dramatic step forward for the Texas Medical Center to move towards this place of collaboration. Like most people, I have found the medical center to be difficult to comprehend and then navigate. I am enthralled by the concept of beginning to build a city with all of the institutions included as opposed to each institution building its own city without particularly good connections between. One asset of the medical center is that it is dense. This provides an environment that supports walking and transit use because it is not an easy place to drive around. One thing that I foresee in TMC3 is the creation of a livable center.

A livable center is a place where one is spending far more of his or her time than just working or learning, where you are really doing most everything. I would describe a livable center as a place with multiple dimensions of activity: a place of work, a place to visit, a place to live, a place you can recreate, a place you can shop, a place you can be entertained, a place you get together with friends and can, frankly, live your entire life if you really wanted to. I am seeing a strong trend towards more livable centers in Houston. I wish that we had the corner on the market for such places downtown, but we don’t. In fact, if anything, I think we are trailing a bit. We have a vision, but plenty of work to get there. It is challenging because we are dealing with transforming a physical environment that

is almost 180 years old. But with TMC3, you have green field conditions that allow you to build a livable center from the ground up.

As I look ahead to the future of the city, it is very clear that we have a growing younger population that does not have the same attachment to their cars. I seem to hear daily about someone who is living without a car. They are making thoughtful choices about where they live, where they work, where they shop so they don’t absolutely have to have a car, or they may have a car and rarely use it. In downtown it is clear you could go a week and probably never touch your vehicle, and you would have pedestrian or transit access to everything you wish to do.

Another part of this is recreation. Folks who do not put much value on what is happening along Houston’s bayous are missing something because of the growing importance of having a place where you can recreate. This does require extensive space. As we work on the North Houston Highway project, we are looking for new public spaces that might be possible as I-45, I-10 and I-69 are reconfigured. In a dense urban core we are always looking for opportunities for new parks and green spaces.

**Q | Do you have any closing thoughts?**

**A |** This is a great city to be in. It is a place where we can get things accomplished with relative simplicity. In comparison to other major cities, I realize how unique this is. In other cities, layers of institutions, interests and positions result in a more challenging environment for getting things done. This city still operates like a much smaller city than we are today. It is very open. People know and respect each other. Sometimes I become frustrated when I compare Houston to other major cities with far more history. I tend to forget that in development years, our city is really young. We have a long way to go. You have to use your imagination to look back at a New York or Boston to appreciate what they were like at our stage of city development. Yet, I find it very exciting to be a part of the transforming process in a dynamic young city where one can make a difference.

Houston is a great place. For newcomers I find it may take them a little bit of time to really appreciate the place. I always call it the one-year test—at the end of one year, you either love it and you won’t leave, or you don’t like it and you’re gone. The wonderful thing is that the ones who love it far outnumber the ones who don’t and leave. ■

For the full interview, visit [TMCNews.org](http://TMCNews.org)





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# HEALTH POLICY IN THE FUTURE

BY

ARTHUR GARSON JR., M.D., MPH

*Director of the Texas Medical Center Health Policy Institute*

STEPHEN H. LINDER, PH.D.

*Associate Director of the Texas Medical Center Health Policy Institute and Director of the Collaborative Policy Grant Program*

**NEW TMC HEALTH POLICY INSTITUTE GRANTS WILL SUPPORT COLLABORATIVE RESEARCH TO IMPROVE HEALTH OF TEXANS THROUGH POLICY CHANGE** | The TMC Health Policy Institute has just announced a \$750,000 grant program to support collaborative health policy research among TMC member institutions.

Health policy broadly describes the actions taken by governments—national, state and local—to advance the public’s health. Approximately 20 percent of the increase in life expectancy is due to public health measures that affect individuals—such as seatbelts, smoking regulations and immunizations. Health policy requires a range of legislative and regulatory efforts at the local, state, national and international level—not just by elected officials but by a number of bodies including state medical and nursing boards. Health care policy is that piece of health policy that deals with the organization, financing and delivery of health care services. This includes training of health professionals, providing an adequate health care workforce, overseeing the safety of drugs and medical devices and overseeing public programs like Medicare and Medicaid. These regulations, such as payment policy, ultimately affect commercial insurance and employers as well.

Health policy research provides evidence to support policy, such as providing data to improve the efficiency of Medicaid or developing data to support

innovative ways to provide incentives for quality or new models to deliver health care.

One of the major functions of the Health Policy Institute is to support collaboration among TMC members in ways that have not been done before and in ways they could not do alone. Under the rubric of “money moves mountains,” the TMC grant program will help oil that process. Institutions wanting to “go it alone” need not apply.

There are two types of grants. The first is \$250,000 for a pilot grant in preparation for larger national funding; at least three TMC members must collaborate. The second grant is \$150,000 for at least two collaborators, or \$200,000 for at least four collaborators to develop policy research & development or impact grants. Such a grant could research newer methods to assess health care manpower needs

(e.g. How do we know if there are enough cardiologists in a rural county?) and then propose policies for dealing with the findings.

The National Institutes of Health and the Agency for Healthcare Research and Quality are the major funders of research in health care. They rarely fund such fundamental research aimed at actual policy change. For outstanding research to produce results, multi-institution work such as this grant program will fill a much-needed void.

At the end of the one-year grant period, we expect several lasting collaborations will have been established, making use of the greatest strength of the entire Texas Medical Center—the ability to produce what one cannot do alone for improvements in health. ■

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# An Experiential Education

*During an eventful day at the Houston Methodist Institute for Technology, Innovation and Education, 300 high school students got a glimpse of life in medicine*

BY ALEX ORLANDO



**LEFT:** Over 300 high school students coming from 23 different states across the country, as well as Guam, Puerto Rico and China—came to MITIE as part of the National Youth Leadership Forum on Medicine. **ABOVE:** Lectures and video presentations provided an overview of different surgical specialties.

White surgical gloves contrasting vividly with her crisp, black blazer, rising high school junior Samantha Lane steadied her hands as the cauterizing instrument effortlessly sliced through the skin of the chicken breast. Holding the surgical needle drivers as prompted (“like a pencil”), Lane began delicately sewing the skin together—with trepidation at first, but her widening smile provided a window into her increasing confidence. As the incision closed, her peers from high schools near and far—all in professional attire—breathed similar sighs of satisfaction from around the room.

Over 300 high school students participating in the National Youth Leadership Forum (NYLF) on Medicine came to the Houston Methodist Institute for Technology, Innovation and Education (MITIE) to experience a prospective career in medicine firsthand. Hailing from 23 different states across the country, as well as Guam, Puerto Rico and China, the students spent the day immersed in a wide range of surgical techniques and technologies.

“The whole concept behind the National Youth Leadership Forum on Medicine is to expose the students to different kinds of career options and different fields of medicine to really give them a firsthand experience,” said Lois Bracey-Barnes, high school STEM academy director at Envision, an experiential education organization that runs the NYLF and other programs developed to help students cultivate leadership, scholarship and career skills. “Going to medical school is a huge commitment, so it’s really about trying to give them that exposure to ensure that they really are interested in that career.

Upon arriving at MITIE, the students divided into two groups; half of them filed into the auditorium for a series of lectures and video

presentations. From a brief overview of the training capabilities at MITIE—where surgeons are brought in from around the nation to hone their skills in new surgeries, devices and techniques—to a presentation chronicling pathways towards a medical career, the students were immersed in possibilities.

“We show them a bunch of entertaining surgery videos in different fields, because I think everybody, deep down, likes to see stuff like that,” said Albert Y. Huang, M.D., surgical fellow at MITIE. “This year, we had a video where we show them a C-section to expose them to the world of OB-GYN, some appendectomies to showcase bread and butter general surgery practices, and even a brain tumor removal and a hip replacement.”

“It’s been incredible getting to see all of the different fields,” said Lane, a student at Langham Creek High School. “I’m not sure exactly what I want to do yet, so this helps you see what you’re interested in studying or doing, which is pretty cool.”

While their peers were inundated with information downstairs, the other 150 students rotated through a series of simulation and training stations. In one room, a high-tech mannequin, dubbed “SimMan,” acted as a surrogate patient, croaking out complaints and replicating poor vital signs to simulate an artificially stressful environment. Down the hall, students precariously navigated tubes through both intubation and endoscopic simulators. Next door, the da Vinci surgical robot took others through training modules that evoked

“The whole concept behind the National Youth Leadership Forum on Medicine is to expose the students to different kinds of career options and different fields of medicine to really give them a firsthand experience.”

— LOIS BRACEY-BARNES

*High School STEM Academy Director at Envision*



virtual reality video games. Adjacent to the suturing station, students methodically maneuvered laparoscopic instruments to move brightly colored objects around pegs. Reminiscent of a carnival game, the practice is part of MITIE's training process for minimally invasive surgery.

"We've broken it down to very basic tasks," Huang explained, outlining the protocol for practicing surgeons training at MITIE. "If you can demonstrate proficiency in these specific types of movements, then we know when you're in the operating room and need to do a similar motion with real tissue, you're capable of doing it in a safe manner. It helps with just using the instruments, holding them the correct way, and becoming a bit more ambidextrous."

Conceived as a resource for health care professionals seeking to maintain excellent clinical skills and stay abreast of technological developments in their fields, MITIE leverages its resources every day to help practitioners refine their technique.

"If I want to learn a new way of doing a surgical procedure, I can read about that in an article or in a book, go and hear a talk about it, watch a video, or even go and see it live," noted Brian J. Dunkin, M.D., medical director of MITIE and chief of endoscopic surgery at Houston Methodist Hospital. "Even then, there's a cognitive disconnect where I've got the knowledge about it, but there's this leap between that and being presented with the challenges that the technical exercise requires. There's no substitute for rehearsal."

"You wouldn't read about being a violin player and never practice the violin," he added. "You'd certainly never read a new piece as an accomplished player and not rehearse that before getting in front of an audience. It's the same thing in our profession. We shouldn't be running off to the operating room to try something without being thoughtful about how we introduce that. We want the kids to get a little bit of flavor for the fact that this stuff isn't just born and innate—you have to spend a lot of time learning to do what we do."

Over the course of nine days, the students participating in the NYLF Medicine program had the opportunity to visit several institutions throughout the Texas Medical Center, including Baylor College of Medicine, The University of Texas Health Science

Center at Houston (UTHealth) Medical School, Texas A&M Health Science Center and the University of Texas Medical Branch at Galveston (UTMB). The sheer scope of their immersion into different aspects of a career in medicine left a lot to consider.

"What they should think about doing is spending some of their own time to immerse themselves in the field," said Huang of any students considering embarking on a career in medicine. "Whether that's finding a friend or family member that's a physician, or even just going to a hospital or doctor's office to shadow somebody. Find somebody that you can follow around and see what it's really like, day-to-day. If you're passionate about anything, you should naturally try and seek out people who have done it and hear directly from them. I think that's what really makes a difference."

For students like Lane, the benefits of their experience extend far beyond the tangible skills they sampled at MITIE. "Today, I'll be leaving with some techniques and know, 'OK, this is what I'm going to have to do to become what I want to be,'" she said. "Not only does this program teach you medical things and give you experience, it teaches you how to be more social and have people skills if you don't have those."

"I know we're skewed towards surgery, but I hope the kids leave with a better understanding of what medicine's like, a little bit of a generalized thought plan on the steps they need to go through to be successful, and maybe take away some tips on how to do their own personal exploration into these fields," said Huang. "You plant the seed of an idea of a hospital that's not some inaccessible thing—you can actually go in and find somebody to be a mentor and talk to them. This is the step that breaks that invisible wall."

"As a high school student, I never thought about stepping foot inside of a hospital unless somebody was sick," he added. "Now these kids can walk into a hospital and see that there's somebody interested in taking them under their wing. From the hands-on experience and training to getting to talk to people who have gone through it themselves, that's what I hope they realize and see through all of this." ■



“We want the kids to get a little bit of flavor for the fact that this stuff isn't just born and innate—you have to spend a lot of time learning to do what we do.”

— BRIAN J. DUNKIN, M.D.

*Medical Director of the Houston Methodist Institute for Technology, Innovation and Education*



TOP/BOTTOM RIGHT: Students simulate intubating a patient—the process of inserting a breathing tube into the trachea. MIDDLE/LOWER LEFT: Using the same surgical techniques as health care professionals, students practice suturing on chicken breasts.



**HELEN COHEN, ED.D.**, professor, Department of Otolaryngology – Head and Neck Surgery at Baylor College of Medicine, delivered the prestigious Eleanor Clarke Slagle Lecture during the annual meeting of the American Occupational Therapy Association in April of this year. The lectureship followed her recognition as the recipient of the 52nd annual Eleanor Clarke Slagle Lectureship Award, which is given yearly to one member of the American Occupational Therapy Association in honor of their scholarship and contributions to the field of rehabilitation.



**DEREK L. CURTIS** has been named chief nurse officer of Harris Health System's Lyndon B. Johnson Hospital. Curtis is a 21-year nursing professional who most recently worked as a nurse executive for Michael E. DeBakey VA Medical Center Houston, where he oversaw 455 staff and 166 inpatient beds. Curtis' career in nursing began in the U.S. Army, where he worked for 12 years in various capacities, including stints at the Brooke Army Medical Center in San Antonio, Korea and Kuwait. He has a bachelor's degree in nursing from the Medical College of Georgia, a master's degree in information management from Webster University in San Antonio and is currently completing his doctorate degree in nursing practice executive leadership at American Sentinel University in Colorado.



**W. BLAKE HAREN, M.D.**, returns to The Menninger Clinic as medical director of the adult division. An associate professor of psychiatry and behavioral sciences at the Menninger Department of Psychiatry and Behavioral Sciences at Baylor College of Medicine, Haren previously held a faculty position at Menninger from 2012 to 2014. He is board certified in psychosomatic medicine and psychiatry and board eligible in internal medicine.



**LARRY I. LIPSHULTZ, M.D.**, professor of urology at Baylor College of Medicine and chief of the Scott Department of Urology's Division of Male Reproductive Medicine and Surgery, is the recipient of the 2015 F. Brantley Scott Award of Excellence. A leading expert on men's health and a well-known authority on abnormalities of male reproduction, erectile dysfunction and male hormone production, the award recognizes Lipshultz's vast contributions to the field of urology.



**CARLOS MORENO, M.D.**, the C. Frank Webber, M.D. Chair in Family Medicine at The University of Texas Health Science Center at Houston (UTHealth), was awarded the F. Marian Bishop Leadership Award at the 48th STFM Annual Spring Conference in recognition of enhancing the credibility of family medicine in an academic setting. A tenured professor of family medicine, Moreno is actively involved in the teaching of medical students and residents and maintains an active clinical practice with UT Physicians while attending at Memorial Hermann-Texas Medical Center. Moreno is a past president of the Society of Teachers of Family Medicine and is a nationally recognized leader in family medicine.



**STEPHANIE PARKER, R.N.**, project manager for the Mobile Stroke Unit at UTHealth Medical School, has been recognized by the Houston Chronicle as one of greater Houston's Top 10 Nurses of the Year. Parker began working at the Memorial Hermann-Texas Medical Center neuro intensive care unit in 2000 and joined the UTHealth Medical School's Department of Neurology 11 years later, where she was recently charged with bringing the UTHealth Mobile Stroke Unit to fruition.



**SANJAY PATEL, M.S.**, staff perfusionist and clinical instructor at Baylor St. Luke's Medical Center, Texas Heart Institute School of Perfusion Technology, was named the American Society of Extracorporeal Technology (AMSECT) government relations liaison for the State of Texas. Patel received his Master of Science degree in microbiology from Sardar Patel University and later earned a certificate in perfusion technology from the Texas Heart Institute School of perfusion technology.



**JAIR SOARES, M.D.**, the Pat R. Rutherford, Jr. Chair in the Department of Psychiatry and Behavioral Sciences at The University of Texas Health Science Center at Houston (UTHealth) Medical School, director of the UTHealth Center of Excellence on Mood Disorders, executive director of the University of Texas Harris County Psychiatric Center, and chief of psychiatry at Harris Health Lyndon B. Johnson Hospital and Memorial Hermann-Texas Medical Center, has been named co-editor-in-chief of the Journal of Affective Disorders. He specializes in bipolar disorder, depression, brain imaging and psychopharmacology.



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## Neuroscientists Decipher Brain's Noisy Code

By analyzing the signals of individual neurons in animals undergoing behavioral tests, neuroscientists at Rice University, Baylor College of Medicine, the University of Geneva and the University of Rochester have deciphered the code the brain uses to make the most of its inherently “noisy” neuronal circuits.

The human brain contains about 100 billion neurons, and each of these sends signals to thousands of other neurons each second. Understanding how neurons work, both individually and collectively, is important to better understand how humans think, as well as to treat neurological and psychiatric disorders like Alzheimer's disease, Parkinson's disease, autism, epilepsy, schizophrenia, depression, traumatic brain injury and paralysis.

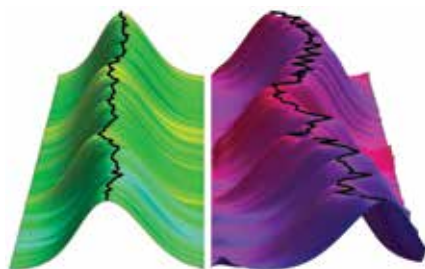
“If the brain could always count on receiving the same sensory response to the same stimulus, it would have an easier time,” said neuroscientist Xaq Pitkow, Ph.D., lead author of a new study in *Neuron*. “But noise is always there in the brain: studies have repeatedly shown that neurons give a variety of responses to the same stimulus.”

Pitkow, assistant professor of neuroscience at Baylor and assistant professor of electrical and computer engineering at Rice, said “noise” can be described as anything that changes neural activity in a way that doesn't depend on the task the brain wants to accomplish.

Not only are neural responses noisy, but each neuron's noise is correlated with the noise in thousands of other neurons. That means that something that affects the output of one neuron may be amplified to affect many more. Because of these correlations, it is extraordinarily difficult for scientists to accurately model how small groups of neurons will affect the way a person or animal reacts to a given stimulus.

Given both these correlated responses and the inherently noisy nature of neuronal signals, scientists have struggled to explain a seeming paradox that was first observed in experiments more than 25 years ago.

“When neuroscientists first analyzed the output of individual neurons,



*These green and purple hills represent the average activity for many neurons in two different brain regions. These neuronal activity patterns will differ from time to time, even in response to exactly the same sensory stimulus, and those differences set the limit for how well the brain can sense things. (Credit: Xaq Pitkow/Rice University)*

they were surprised to find that the activity of just a single neuron sometimes predicted behavior in certain tasks,” Pitkow said.

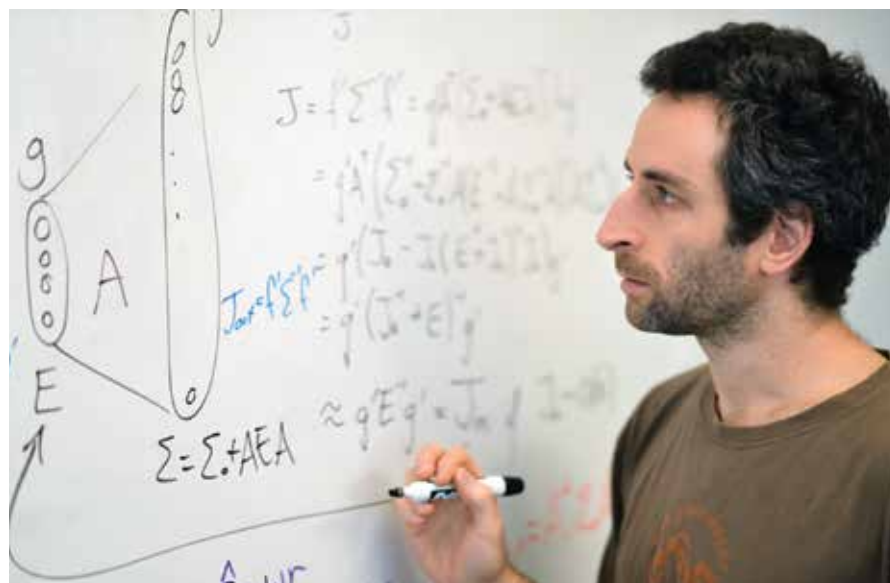
This perplexing find has turned up in numerous experiments, but neuroscientists have yet to explain it.

“A lot of people have studied this and offered up different kinds of models that make all sorts of assumptions,” Pitkow said. “By integrating all of those ideas and applying some analytical techniques, we found there were two different ways this could happen.”

He said one possibility is that many neurons are sharing the same information, processing it independently and arriving at the same answer. The other possibility is that each neuron is using different information and casting its vote for a slightly different answer but the brain is doing a poor job of coming to a consensus with the different votes.

“The first model is a bit like trying to find a needle in haystack, and the second is like trying to find a needle on a clean floor while looking backward through a pair of binoculars,” Pitkow said. “Each piece of straw looks like a needle, which makes the haystack test very difficult. On the other hand, a needle should really stand out on a clean floor, but it will be hard to find with a bad searching method.”

In each case, the neurons are correlated with one another, “but in the first instance the noise correlations can



*Neuroscientist Xaq Pitkow, Ph.D. (Credit: Agapito Sanchez Jr./Baylor College of Medicine)*

never be removed, and in the second they could and should be removed but they're not,” Pitkow said. “And each of these scenarios has very different consequences for the brain's code, how it represents information. In terms of information theory, if the brain has a lot of information and it is not doing a good job of using it, there are very different implications than if all the neurons are correlated and they're all informative in the same way.”

To determine which of these scenarios is at play in the brain, Pitkow and colleagues developed two mathematical models, one for each scenario. The models described how information and noise would flow through the network in the two opposing cases.

The team tested each model against the activity of single neurons in monkeys that were undergoing perceptual tests to measure how accurately they could perceive slight movements to the left or right. The experimenters found that some neurons predicted the animals' guesses about whether they were moving left or right.

“When we examined the output, we found that the monkeys' brains were not throwing away information,” Pitkow said. “They were using each neuron's information very effectively. And we also saw that even though there were many neurons involved, the guess of any individual neuron was only slightly worse than the animal's actual guess

during the test. These two pieces of evidence together indicate the neurons mostly share the same information.”

But if every neuron is doing the same processing, why have so many? It's an obvious question, Pitkow said, but it's beyond the scope of what he and his colleagues could address in the current study.

“We didn't explore the value of redundancy in this study, but we are very interested in that question,” Pitkow said. He pointed out that the vestibular sensors, the part of the inner ear dedicated to the sense of balance, contain only about 6,000 of the brain's 100 billion neurons. Even those few thousand might be redundant, which would mean that the rest of the neurons they contact also are redundant.

“One intriguing possibility that we are looking into is that redundancy allows the brain to reformat information and approach complex problems from many different angles,” he said.

The research was supported by the National Institutes of Health, the McNair Foundation, the McDonnell Foundation and the Swiss National Science Foundation. Study co-authors include Sheng Liu of Baylor, Dora Angelaki of both Baylor and Rice, Gregory DeAngelis of the University of Rochester and Alexandre Pouget of the University of Geneva. ■

— Jade Boyd, Rice University



# Traditional Pap Smear Soon to be Thing of the Past

Human papillomavirus (HPV) genotyping has a potential role in primary screening of cervical cancer. It could replace the traditional pap smear, according to experts at Baylor College of Medicine.

Although pap tests have worked well over the past 70 years, there are downsides, said Matthew Anderson, M.D., Ph.D., assistant professor in the department of obstetrics and gynecology at Baylor.

“During a pelvic exam the doctor has to be able to scrape cells directly from the area of the cervix where cancer is most likely to originate, and it’s potentially uncomfortable,” he said. “In some Harris County communities as many as 10 percent

of women have never been screened for cervical cancer.”

About 20 years ago it was discovered that HPV is the cause of most cervical cancers, and every type of this cancer expresses the components and transcripts of the viral DNA.

“It is now possible to test for these viral components and transcripts,” Anderson said. “Right now it’s used to decide whether or not a woman has atypical cells that can’t be clearly classified.”

These results are used to determine whether patients need continued evaluation or no evaluation.

According to Anderson, this data suggests it can be used under other contexts as well.

“For example, if you have a patient with low grade or early stage pre-cancer, there’s some data to suggest you may be able to use the information obtained with viral testing to decide whether or not the patient needs a colposcopy, or a microscopic examination on the cervix, after a low-grade abnormal pap,” he explained.

HPV genotyping is currently offered as co-testing done with a pap smear.

“This could be the more sensitive and effective route for screening,” Anderson said. “It has been suggested that it might be possible to screen women, especially over age 30, for cervical cancer using genetic tests for HPV alone, rather than having to do the traditional pap test.”

“Ideally, it would be great to find ways to use this test to help women who have never been screened or are reticent to be screened by traditional methods,” he said.

Due to the HPV vaccination, smaller proportions of the population will get infected with the virus. Because of this doctors will only need to screen for the infection of HPV.

Anderson emphasized that this will allow physicians to directly focus their cervical cancer screening efforts on women who test positive for HPV. ■

— Julia Parsons,  
Baylor College of Medicine

# Sulfur Dioxide Emissions Have Decreased But the Air Pollutant Still a Concern for Asthmatics

Emissions of the air pollutant sulfur dioxide have been dramatically decreased during the past 30 years, but for some people, even a little inhaled sulfur dioxide may still be too much.

“Asthmatics are particularly sensitive to sulfur dioxide and can be more likely to suffer asthma complications, but scientists still don’t know exactly why that is so,” said Bill Ameredes, Ph.D., director of the Inhalation Toxicology Core Facility of the Sealy Center for Environmental Health and Medicine at the University of Texas Medical Branch at Galveston.

There are about 250 million people worldwide who suffer from asthma, according to the World Health Organization. Sulfur dioxide and other air pollutants may be associated with an increase in asthma complications, but how and why that is remains poorly understood, according to a paper Ameredes co-authored.

To better understand what was known about asthma and sulfur dioxide, Ameredes and researchers at UTMB and the University of Texas Health Science Center at San Antonio reviewed previously published studies. In a paper in April’s Environmental

Health Insights, the researchers found previous studies indicated that sulfur dioxide can lead to adverse effects in asthmatics even when present in very small amounts, and asthmatics may not be able to counter the inflammatory response in the lung as non-asthmatics can.

Sulfur dioxide is produced when fossil fuel is burned, when metal is extracted from ores and when gasoline is extracted from oil. According to Ameredes, due to federal emissions regulations, there has been an over 80 percent reduction in the amount of sulfur dioxide in the ambient air in the United States over the past 35 years.

But studies show that even when the amount of sulfur dioxide is below what can be detected by the sense of smell, it can have adverse effects for asthmatics, Ameredes said.

In high enough concentrations, at about five to 10 parts per million, sulfur dioxide can cause a burning sensation in the eyes and coughing. The rotten egg odor of sulfur dioxide can be detected at one to three parts per million. However, according to Ameredes, an asthmatic could start to experience airway irritation and difficulty

breathing with as little as 0.5 parts per million sulfur dioxide in the air.

“Thus, if you were an asthmatic, it would be possible that you wouldn’t even know that there is sulfur dioxide in the air,” Ameredes said. “You’d just be having breathing difficulties and coughing, but you would not be able to detect the odor, therefore wouldn’t know why you were having that experience.”

It could also be more difficult for asthmatics to stop or control an irritation and inflammation response

once it begins because of their inability to produce interleukin-10, a major anti-inflammatory cytokine, a protein released by cells, considered to be an “off-switch” that stops the inflammatory process, Ameredes said.

He added that scientists don’t yet understand why asthmatics lack the ability to make interleukin-10 and it is one of the many areas still requiring study. ■

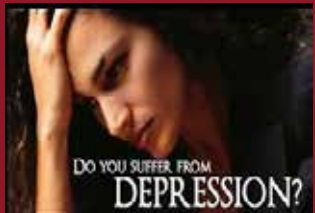
— Christopher Smith-Gonzalez, UTMB

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Wednesday, 6:00 p.m. – 7:00 p.m.  
University of St. Thomas, Welder Hall  
3812 Yoakum Blvd.  
romos@stthom.edu  
713-525-6978

6 **Live Webinar on Arachnoid Cysts**  
Thursday, 12:00 p.m. – 1:00 p.m.  
Children’s Memorial Hermann Hospital  
6411 Fannin Street  
childrens.events@memorialhermann.org  
713-704-6907

11 **Bayou Startup Showcase**  
Tuesday, 1:00 p.m. – 7:30 p.m.  
University of Houston  
University Center, Houston Room  
4800 Calhoun Road  
redlabs@bauer.uh.edu  
713-743-0907

12 **Natalie Artzi, Ph.D.: Understanding Complex Biological Environments Drives Multifunctional Materials Design for Cancer Therapy**  
Wednesday, 12:00 p.m. – 1:00 p.m.  
Houston Methodist Research Institute  
R2-306 Bookout Auditorium  
6670 Bertner  
events@houstonmethodist.org  
713-441-1261

15 **Practical Information on Resources, Genetics and Development for Parents of Children with Special Needs – sponsored by BCM and TCH for the Spanish speaking community**  
Saturday, 9:00 a.m.  
Talente Bilingue Houston  
333 S. Jensen Drive  
geneticevenings@bcm.edu  
832-822-4280

18 **The TMC Library Centennial – Celebrate History of the TMC and the Library**  
Tuesday, 12:00 p.m. – 1:00 p.m.  
The TMC Library  
1133 John Freeman Blvd  
mstevenson@library.tmc.edu  
713-799-7139

22 **Summer Shake-Off at the Health Museum**  
Saturday, 3:00 p.m. – 7:00 p.m.  
The Health Museum  
1515 Hermann Drive  
info@thehealthmuseum.org  
713-521-1515

25 **Peter Zhou, Ph.D.: Epithelial-Mesenchymal Transition in Breast Cancer Progression and Metastasis**  
Tuesday, 12:00 p.m. – 1:00 p.m.  
Houston Methodist Research Institute  
Boardroom R2-306  
6670 Bertner  
events@houstonmethodist.org  
713-363-9049

27 **Darrell G. Kirch, M.D.: Caring for Others and Caring for Ourselves in the Midst of Massive Transformation**  
Thursday, 4:00 p.m. – 6:00 p.m.  
MD Anderson Onstead Auditorium  
Basic Science Building, Floor 3  
1515 Holcombe Blvd.  
womenfaculty@mdanderson.org  
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