

TMC | PULSE

THE OFFICIAL NEWS OF THE TEXAS MEDICAL CENTER SINCE 1979 — VOL. 36 / NO. 8 — JUNE 2014

Tackling Tropical Diseases

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*Once thought to affect only developing countries,
neglected tropical diseases are threatening
populations in the Gulf Coast region.*



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URBAN LIVING

ISABELLA PLACE



From the \$430's

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WOODLAND PARK VIEWS



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Tackling Tropical Diseases

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CHESTER KOH, M.D., DIRECTOR OF PEDIATRIC ROBOTIC SURGERY AT TEXAS CHILDREN'S HOSPITAL, AND ASSOCIATE PROFESSOR OF UROLOGY AT BAYLOR COLLEGE OF MEDICINE, TALKS ABOUT THE POTENTIAL FOR PEDIATRIC ROBOTIC SURGERY, AND THE PROGRAM THAT HE AND COLLEAGUE PATRICIO GARGOLLO, M.D., PICTURED ABOVE, HAVE BUILT ON A FOUNDATION OF PASSION AND EXPERIENCE.

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

It continues to amaze me how new technologies are being adopted and adapted to help physicians improve the quality of care for their patients. From the technologies being implemented within the hospitals—like the pediatric robotic surgery program that you will read about in this issue of TMC Pulse—to remote monitoring and information sharing, the innovations in the field of health care are setting a truly exciting stage for the future.

We are increasingly seeing a focus on connectivity. If patients are connected to their physicians, and their physicians to each other, the team can base care and treatment decisions on relevant, tangible information.

As a cardiothoracic surgeon, I know well the value of communication in helping maintain those connections. Especially for patients that require multiple physicians and specialists, the process of sharing the most current patient records can be daunting. Looking to new platforms for sharing electronic medical records, as is being done by the local non-profit Greater Houston Healthconnect, we see hospitals and physicians actively retrieving their patients' files from a growing network of care providers within the Texas Medical Center, and across the Houston region and the state of Texas.

It is also exciting to see the growing interest in mobile medical devices, particularly those that allow patients to be monitored from the comfort of their own homes. Researchers here within the Texas Medical Center are actively working on technologies that have the potential to change the way we think about the delivery of care. Imagine allowing a cancer patient to wear a wireless bracelet, like many of the fitness devices available today, that can remotely monitor their body temperature and other physical symptoms of their disease, and share that information with their physicians in real time.

I believe we are not too far from having these types of platforms more widely available, connecting physicians and patients in a more proactive approach to care and treatment. We are already seeing promising new capabilities, like the new melanoma screening app, created by a University of Houston professor, to give rural physicians or global health care providers a way to provide skin cancer screenings for underserved populations.

As is often the case, the driving force behind these technologies is the passion and purpose of individuals dedicated to improving patient care. They are changing the future of medicine, and it is inspiring to see so many collaborating and innovating here in our own community.

A handwritten signature in black ink that reads "Robert C. Robbins". The signature is written in a cursive, flowing style.

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Think muscles, joints and bones.

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

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

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



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

Center Left: 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.

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A Vision for Health Policy

Texas Medical Center names new Health Policy Institute director, ushering in a new era of programmatic collaboration

BY ALEX ORLANDO

In the current landscape of health policy and health care reform, experience underscored by a collaborative mindset is a necessity. Furthering the efforts to fulfill a long-range master plan for programmatic collaboration in health policy, clinical trials, regenerative medicine, genomics, and life science innovation, the Texas Medical Center announced the appointment of Arthur Garson, Jr. M.D., MPH, to serve as director of the newly formed Texas Medical Center Health Policy Institute.

“Dr. Garson’s insight, expertise, and visionary leadership make him the ideal selection to direct our Health Policy Institute,” said Robert C. Robbins, M.D., president and chief executive officer of the Texas Medical Center. “Having developed policy and drafted legislation, Dr. Garson is the perfect person to help the Texas Medical Center emerge as a world-leading health center. We are delighted to welcome him back to Houston.”

The Texas Medical Center’s Health Policy Institute will focus on fundamental health policy issues important to Houston, the state, the nation, and beyond, including topics such as public health advocacy, health care delivery models, health care funding, patient quality outcomes, patient safety and health ethics. As director, Garson will develop and implement the institute’s strategic vision, managing the operations and funding in support of that objective.

“At a basic level, the Texas Medical Center Health Policy Institute will revolve around creating approaches to health policy that are unique to both Houston and Texas” explained Garson. “We want to take some of those approaches that might be piloted here and make them available nationally, and even internationally. The vision of the institute, as determined by the strategic planning committee and I, is to go from local to international.”

“[Garson] was always at the forefront of policy and innovation; he became very much involved in developing new ways to administer health care,” said Jack Sweeny, chairman of the Houston Chronicle. “He always had a love of the public policy side of health care, considering ways that costs could be lowered and innovations in affordable health care could be achieved. He even established a rapport with our editorial board and I was publisher at the time, so I helped him get his work published.” Sweeny and Garson have cultivated a close friendship for over two decades, ever since Garson oversaw the heart surgery of Sweeny’s 11-year-old son at Texas Children’s Hospital.

Previously, Garson served as the director of the Center for Health Policy at the University of Virginia (UVA), where he was also a professor of Public Health Sciences and Public Policy. Until 2011, he served as executive vice president and provost of UVA, where he was responsible for overseeing the university’s 11 schools and a \$1.3 billion academic budget. As provost, Garson recruited 7 of the 11 deans throughout UVA and established the Batten School of Leadership and Public Policy. UVA’s Center for Health Policy provided Garson with a foundational model for what he hopes to achieve at the medical center. “In an interesting way, it wasn’t dissimilar to our aims at the Texas Medical Center. It was all about fostering discussion and stimulating collaboration.”

“Utilizing expertise across our member institutions will enable the Texas Medical Center to develop policy solutions for the benefit of all,” added Garson. “We will seek collaborative strategies with external organizations while advancing health policy across the medical center. The institute will fund research and teaching programs, some of which are aimed at educating the public.”



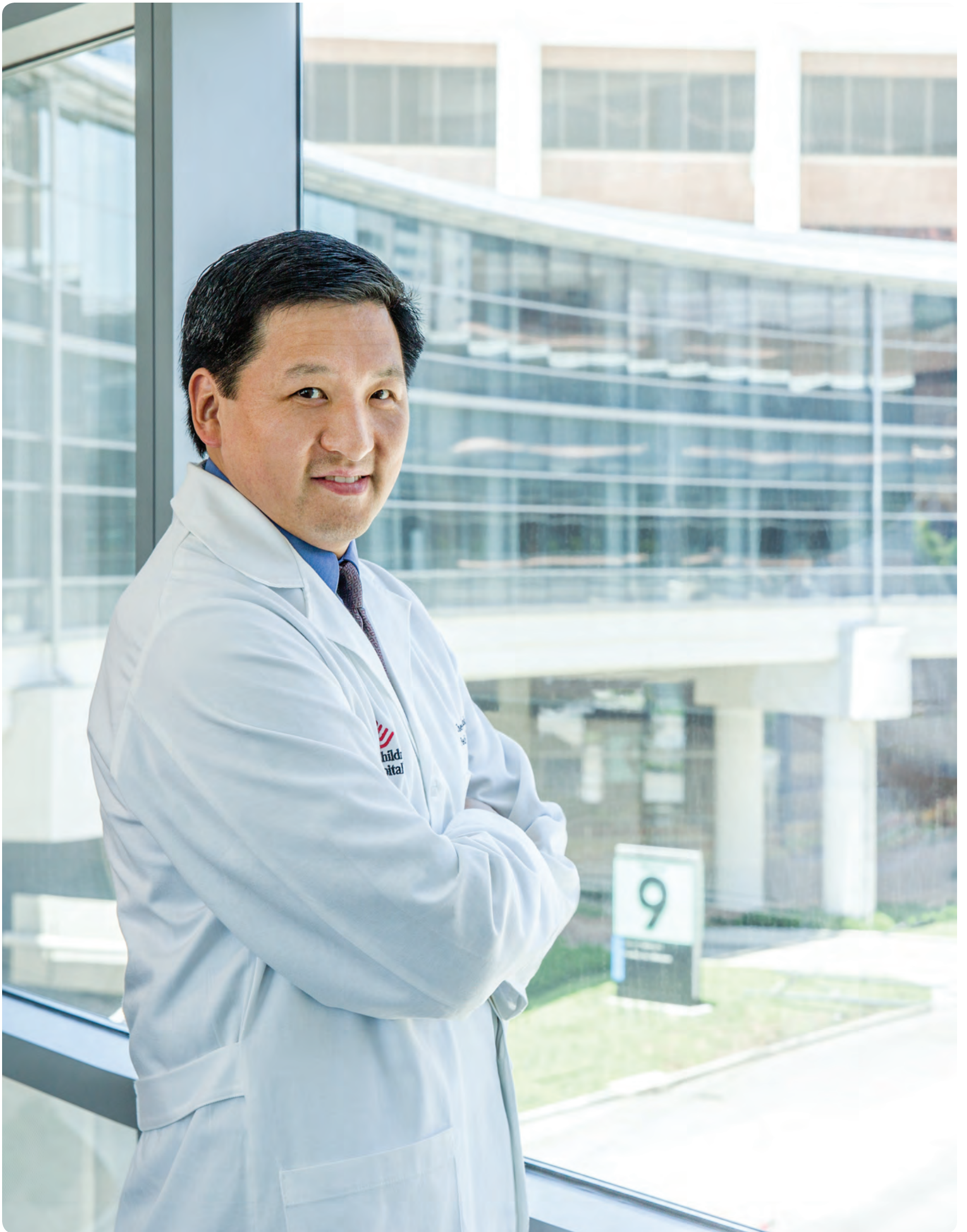
(Credit: Scott Dalton)

“When this group decides to sink its teeth into a particular problem, it will be able to create solutions for incredibly diverse groups of people.”

— ARTHUR GARSON, JR. M.D., MPH
Director of the Texas Medical Center Health Policy Institute

According to a non-profit organization based in Texas, health policy broadly describes the actions taken by governments—national, state, and local—to advance the public’s health. The roughly 20 percent increase in life expectancy across the United States is due to public health measures that affect individuals. Examples include seat belts, smoking regulations and immunizations, and such currently approaching issues as the MERS epidemic. Health care policy, in particular, deals with the organization, financing and delivery of health care services, ranging from training of health professionals to administering public programs like Medicare and Medicaid.

At some level, health policy influences each of the 54 member institutions within the Texas Medical Center. “This is the single most varied group of institutions in the world in one place, and we have the opportunity to tap on the wide ranging interests of our community,” said Garson. “I suspect that there isn’t an area of health policy, in either the U.S. or internationally, that someone within the medical center isn’t interested in. When this group decides to sink its teeth into a particular problem, it will be able to create solutions for incredibly diverse groups of people.” ■



CHESTER KOH, M.D., FACS, FAAP, DIRECTOR OF THE PEDIATRIC ROBOTIC SURGERY PROGRAM AT TEXAS CHILDREN'S HOSPITAL, AND ASSOCIATE PROFESSOR OF UROLOGY AT BAYLOR COLLEGE OF MEDICINE, SAT DOWN WITH TEXAS MEDICAL CENTER EXECUTIVE VICE PRESIDENT AND CHIEF STRATEGY AND OPERATING OFFICER WILLIAM McKEON TO TALK ABOUT ROBOTIC SURGERY, PEDIATRIC MEDICAL DEVICES, AND THE COLLECTIVE EXPERIENCE UPON WHICH HE AND HIS COLLEAGUES ARE BUILDING AN EXCEPTIONAL PROGRAM.

Q | Can you tell us about your formative years and how you got into medicine?

A | I was born and raised in Los Angeles, California. I would say that my first thought about wanting to become a doctor probably came from my pediatrician, Dr. Romans. I always loved going to the doctor because it was Dr. Romans and even when he gave me a shot. So I think that I was always destined to enter a pediatric-related field in medicine like pediatric urology.

I attended a great junior high and high school that is now called Harvard-Westlake in N. Hollywood, California, and then UC Berkeley as an undergraduate where I majored in mechanical engineering, so I think that's where the science background came from. I had always been interested in building things and putting things together. I thought about becoming a doctor, but I wanted to take the safe route and went for the engineering degree. An engineering co-op after my third year at UC Berkeley, where I worked for Dow Chemical in Walnut Creek, California, allowed me to obtain some hands-on engineering experience.

Even with the science background, I also knew that I liked the patient care aspect of medicine because it is so rewarding. So I've been attempting to put the two fields (engineering and medicine) together for my whole career to date. So, here I am.

Q | Have you had any mentors throughout your career?

A | I consider myself to be very lucky to have had a lot of great mentors, all of whom have shown me the value of hard work in their careers. Some examples are: at Tufts University School of Medicine in Boston, Dr. Grannum Sant, who was my urology chairman when I was a medical student, who also has had a long career in the pharmaceutical

industry; Dr. Donald Skinner, my chairman at USC during my urology residency; and Dr. Alan Retik, one of the great leaders in pediatric urology, who was my chairman at Boston Children's Hospital/Harvard Medical School during my pediatric urology fellowship.

For robotic surgery, I give thanks to Dr. Craig Peters at Children's National Medical Center in Washington D.C. for teaching me about the new field of pediatric robotic surgery while we were at Boston Children's, as well as Dr. Inderbir Gill, a true pioneer in minimally invasive and robotic surgery who succeeded Dr. Skinner as chairman at USC. He is a very driven, focused, and accomplished surgeon and academic physician. I feel that I have been blessed with the opportunity to work with so many great mentors.

Q | What was it about robotic surgery and pediatrics that inspired you?

A | Robotic surgery gives us the ability to do what we already know how to do with open surgery, except now we can do so in a minimally invasive fashion, and I think that's the key advantage of the technology. This is especially important in our field of pediatric urology where we have many reconstructive procedures for our small patients. We have been doing laparoscopic surgery for many years, where we can easily remove damaged or diseased tissue, and we can try to fix things using conventional laparoscopic surgery, but it requires a completely different skillset from what we have learned through open surgery. So finally the technology has caught up to this with robotic surgery, where we can now do the same surgical maneuvers that we perform with our hands, but now we can do them through tiny incisions with the robot. So for many procedures in pediatric urology, the need for large incisions is quickly going away, especially for

“ Finally the technology has caught up to this with robotic surgery, where we can now do the same surgical maneuvers that we perform with our hands, but now we can do them through tiny incisions with the robot. ”

internal organs like the kidney, where we previously needed to make large and painful incisions just to get to the organ. We no longer have to do that. The ones who truly benefit are the kids. They are going home faster to be with their families, and the parents don't have to take too many days off from work since they are only spending one night in the hospital instead of two, three, four, or more. They have much smaller scars and therefore less need for pain medications, which helps them to recover faster. Because of these, we believe that all kids who can benefit from robotic surgery should receive it.

Q | You built out a substantial robotics program at USC. Tell us a little bit about that and what drew you here to Texas Children's to do the same at the Texas Medical Center.

A | In pediatrics, it is a reality that we have to partner with our adult colleagues, as pediatrics will always involve a smaller population than the adult world. At USC, I had the opportunity to partner with top-notch innovative adult surgeons like Dr. Gill, as well as his partners, Dr. Mihir Desai and Dr. Monish Aron, who came with him from Cleveland Clinic to USC, where they brought a world of minimally invasive and robotic surgery experience.

“ Currently, most devices are built for adults and somehow either miniaturized or adapted for pediatrics. But I think that many of us in the pediatric device field would love to see more focus on the pediatric first model, where devices are designed and implanted with the pediatric patient in mind, and not just an adaptation of the adult product. ”



I was able to partner with them to help build our robotic and minimally invasive experience for children, because of what they had done in the adult world. It's a partnership that I greatly cherished.

With the Texas Medical Center, I see the same opportunities for partnership here. For example, in March, we hosted the third annual Pediatric Urology Robotic Surgery Hands-on Training Course here in Houston after the first two years were held in Northern California. Part of having a hands-on training course is that you need a lot of robots. It is not just watching videos and observing other people doing robotic surgery. You can best learn when you are at the robotic console. So we needed a place that has enough of these multi-million dollar robots (we used six), and the training center to support them, and that is right here in the Texas Medical Center at MITIE at Houston Methodist Hospital, which is next door to Texas Children's Hospital. With an esteemed panel of expert pediatric urologic robotic surgeons from across the U.S., as well as Texas Medical Center-based experts including Dr. Alvin Goh from Houston Methodist, an adult urologic robotic surgeon who served as co-director of the course, we were able to host pediatric urologic surgeons including surgeons from Japan, Turkey, Canada, and others from institutions here in the U.S., where they came to Houston and the Texas Medical Center for hands-on robotic training. That was the type of partnership that I was envisioning that we were able to bring to reality. And I think that's a great example of collaboration for Texas Children's, Houston Methodist, and Baylor College of Medicine, as well as the Texas Medical Center.

Q | You are about to surpass 100 robotic cases at Texas Children's Hospital. With all of the capabilities that you see today, what will the program look like in three years?

A | We will keep moving towards the next frontiers. We already perform multiple-site robotic surgery, but we would like to eventually move toward virtually scar-less surgery all through a single incision in the belly button. The belly button looks like a scar already, hence the virtually scar-less description. In addition, for pediatrics, we also need smaller instruments for our patients, but those that can still perform the required tasks. We are using instruments that have been designed for adult patients, but we need instruments that are designed with the pediatric patient in mind. Over time, we will continue to see the expansion of pediatric urology cases for which the robot can be used, with expansion to other pediatric specialties as well.

Q | Does moving to a single port require a complete revision of the triangulation approach that you use today?

A | It may, but technology may help surgeons to overcome this. Surgeons understand the need for triangulation with minimally invasive cases, and some of the prototypes of future instruments are fantastic, where multiple instruments are traveling through a single channel, but then expand to a multi-pronged instrument inside the body cavity that provides triangulation. This again leads to the dilemma regarding medical devices in children. A lot of these are being built for adults, and may not be adaptable for use in children. For example, the curved instruments and ports that we often used for single-incision surgery have a

fixed, built-in amount of curvature. In adult patients, these fixed articulation lengths are adequate when there is a lot of space in the body cavity. However, with pediatrics, you usually have a shorter working distance between the skin and, for example, the kidney. And if this curve is outside the body, you have lost all advantages of that instrument. We need new technology for single port and minimally invasive virtually scar-less surgery, but it should be adapted for children as well.

Q | Most parents wouldn't know whether a program has a robotics program or not. What advice do you have for parents looking for the right surgical program for their child?

A | Especially for pediatric patients, one feature can be surgical experience. Dr. Patricio Gargollo recently joined our pediatric urology division and together we have one of the largest pediatric robotic surgery experiences with over 500 robotic cases in children to date. However, this is only one factor. Surgery and especially robotic surgery, is a team effort, and the one guarantee that we can make is that the team at Texas Children's Hospital, which includes the nurses, the staff, and the rest of nearly 10,000-member family at the hospital, is dedicated to caring for children. This is reflected in everything that we do.

Q | Relative to other programs, that's extremely large. When you look at the top programs in the country, what kind of volume are they seeing?

A | Since pediatrics is a smaller world, a handful of places are going to reach 100 pediatric cases per year and usually at the larger children's hospitals, and it does take time to work up to that level. We've had a running start for our

program, since both Dr. Gargollo and I are bringing our previous experience to Texas Children's, and serve as its physician champions. The fact that we reached a hundred cases in such a short amount of time is not surprising, since we have done it before.

Q | Let's talk about technology. Industry does not put a lot of emphasis on pediatrics because of the lower patient volume compared to the adult market. Do you see potential within the Texas Medical Center for innovation in pediatric medical devices?

A | Having been one of the co-founders of an, FDA-funded pediatric medical device consortium—the Southern California Center for Technology and Innovation in Pediatrics—and near a large number of medical device companies, I see the same necessary elements that we had in Southern California here in Houston as well. It's not only the amazing energy, but also the amazing talent and experience. I think the difference is that each place has varying strengths. Some of the strengths that I've learned about here in Houston are NASA / Johnson Space Center, and engineers at associated companies such as Jacobs. But we also have the engineers associated with the abundance of oil and gas engineering technology. This complements the medical and scientific talent within the Texas Medical Center, all next door to each other. There are great minds at work in Houston.

So we have a lot of talent here, but there is also the commercialization drive. One only needs to open the Houston Chronicle on a daily basis to learn about the growing number of startups and new companies.

While physicians, nurses, and allied health professionals are identifying unmet needs in the hospital after experiencing the shortcomings of the current medical products, with all of the local talented engineers, I see example after example of working partnerships. That's what I see here at the Texas Medical Center. You have top-notch universities and hospitals, all next door to each other. And then you have experienced people in town who can take prototypes to the commercialization process, get that product manufactured and then bring them into the clinics. I think that's what we all want to see,

the finished medical device that is helping patients.

I agree with the call by the FDA for more focus on pediatric medical devices. We know that the pediatric medical device pipeline is a broken one. The pediatric medical device market lags the adult market by ten years. I think that many of us in pediatrics realize that we need a different approach to pediatric devices, because we know that the usual pathway for adult devices doesn't seem to work in pediatrics. So we want to be able to take the expertise and experience that we see in the adult market, and

bring it to pediatrics. Currently, most devices are built for adults and somehow either miniaturized or adapted for pediatrics. But I think that many of us in the pediatric device field would love to see more focus on the pediatric first model, where devices are designed and implanted with the pediatric patient in mind, and not just an adaptation of the adult product. It appears that the solution may lie in academics, where the pediatric device projects must be further developed before advancing to the next stages.

Often the financial hurdles due to the smaller market in pediatrics hinder many of these pediatric projects. However, my hope is that many follow the examples of successful pediatric device companies out there that enjoy the pediatric space because it's not a crowded field. They have found their niche and they are happy to be in a smaller market for which they are the dominant player, as opposed to going into an adult market like the cardiovascular market, which is quite crowded.

Q | How have you been adjusting to Houston since your move from Los Angeles?

A | I would just say it has been exciting—the amount of activity, the hustle and bustle. I think one thing you realize

here is that the sky is the limit. People have the resources, they have the will, they have the experience and just the drive to move very quickly. And especially with all of these institutions in the Texas Medical Center, they appear to spur each other to do their best. So they are always trying to think about what the next best step is. Then they have the resources to act upon them, and finally quickly advance to the next frontier and be ready for the frontier beyond that.

Q | Any closing thoughts?

A | I see this as a great time for Texas Children's and the Texas Medical Center. It's a time of major expansion. We are expanding into more areas to support the population growth. We are hiring great people, who are bringing their talent to Houston and into the medical center. Dr. Patricio Gargollo is one example of that. He and I are working together to build a pediatric robotic surgery program that is really unique, that builds upon our previous experiences and is quite complementary. He will take the robotic field and especially the reconstructive field in pediatric urology to new heights. It's part of a world class program, which is part of a world class hospital and medical center and in a world class city. It is an exciting time to be here. ■



“ We are hiring great people, who are bringing their talent to Houston and into the medical center. Dr. Patricio Gargollo is one example of that. He and I are working together to build a pediatric robotic surgery program that is really unique. ”



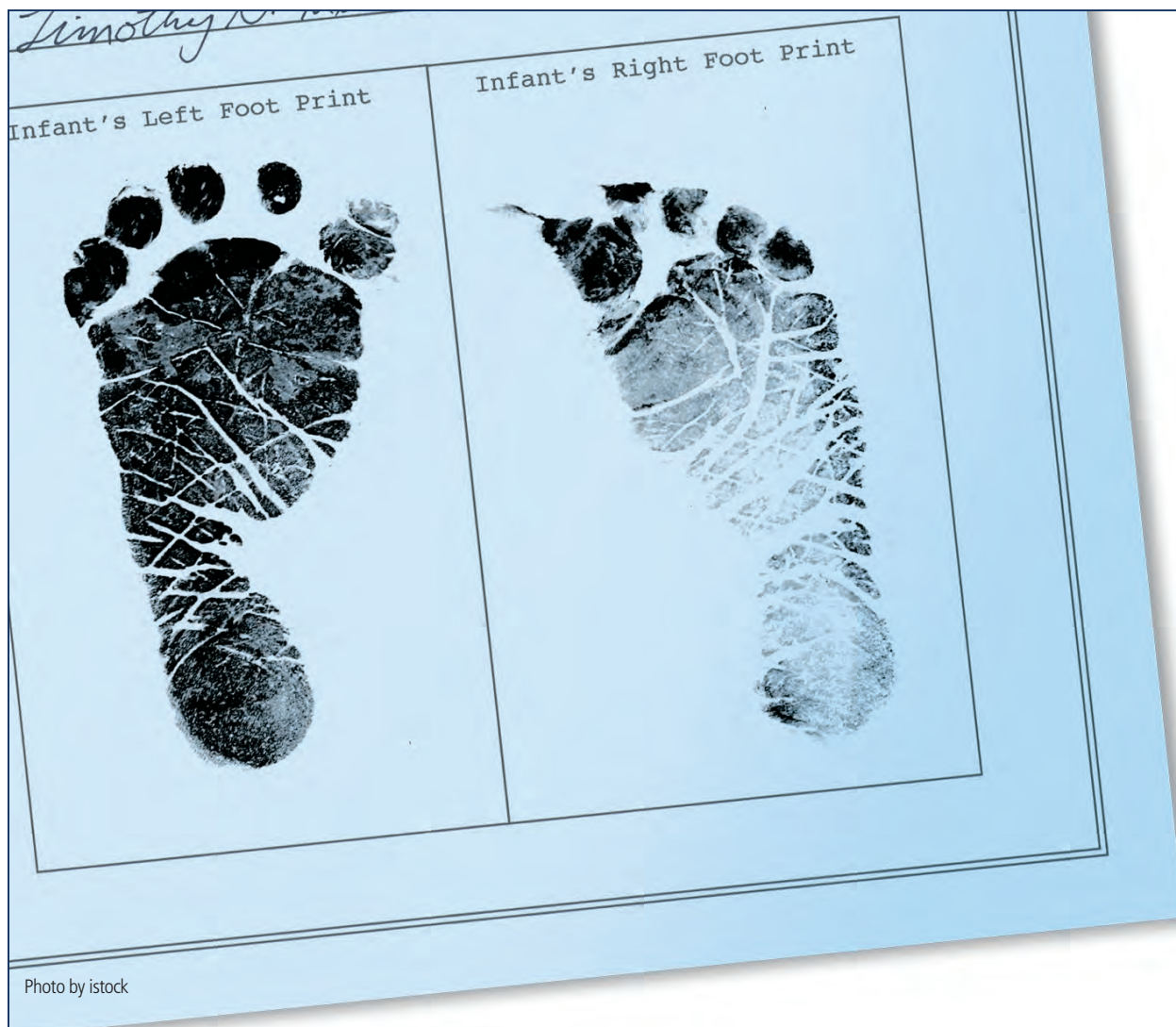
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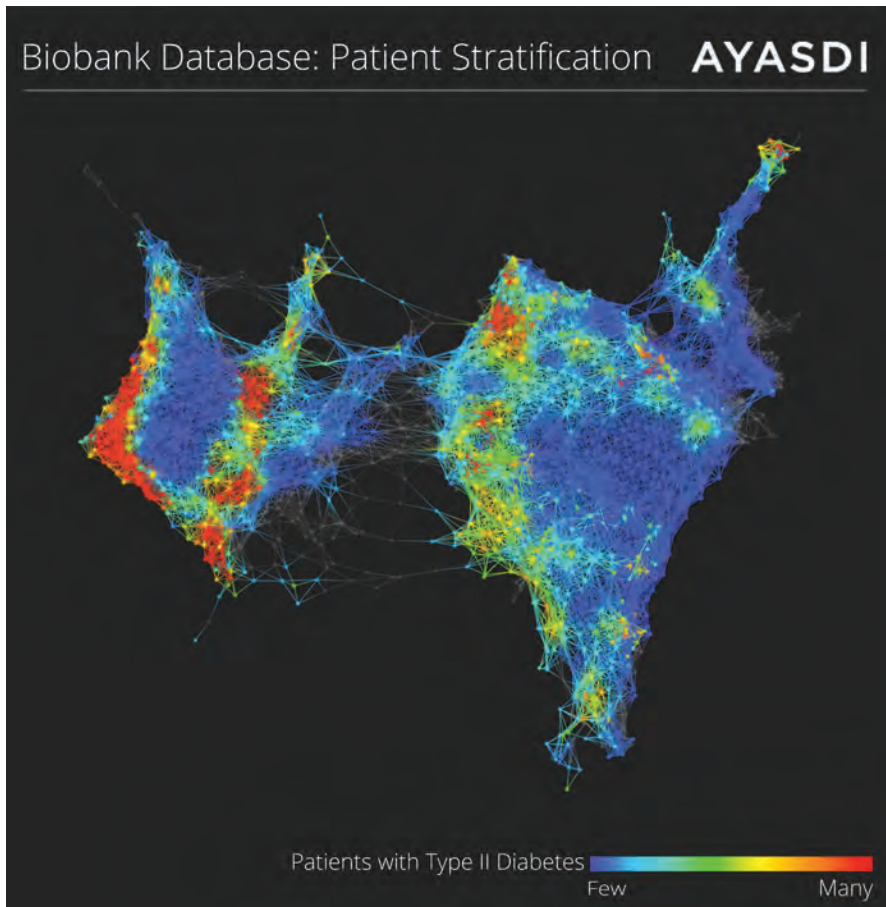
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Illuminating Data

Topological data analysis helps identify patterns, relationships in medical data

BY ALEX ORLANDO



Mount Sinai utilized Ayasdi Cure—which uses machine learning and topological data analysis—to analyze over 20,000 patient medical records paired with genetic data. Because Ayasdi’s approach is query-free, and can automatically map relevant data points based on hundreds of algorithms, Mount Sinai was able to gain new breakthrough insights that can dramatically impact how Type 2 Diabetes patients are diagnosed and treated. (Photos by: Ayasdi)

The sheer volume of data in our world has been expanding exponentially. Analyzing large, complex sets of data has become a necessity in understanding everything from the wealth of information derived from social media to data obtained from analysis of the human genome. From the office of the White House to every pharmaceutical and health care organization in the world, data is the key strategic asset that has the potential to change the way that we provide patient care, cure diseases and save lives. In 2011, McKinsey & Company estimated that, “If U.S. health care were able to use big data creatively and effectively to drive efficiency and quality, more than \$300 billion in value would be created every year.”

With an annual patient volume that exceeds 7 million and a vast,

rich network of research enterprises, the Texas Medical Center is a prime contender for a revolutionary approach to data analysis. In keeping with their endeavors to create a world-class center for complex data research and operational excellence in medicine, the medical center has selected Ayasdi, a startup company from Palo Alto, California that uses topological data analysis to quickly glean meaning from big data, as part of its vision to revolutionize patient care, translational medicine and clinical research.

In 2012, the health care industry amassed over 500 petabytes (a unit of data measurement) of health care data; this number is on the trajectory to grow to 25,000 petabytes by 2020. Although we have figured out how to store, manage and process data, the ability to derive insights from that information has not changed much in the last 30 years. In most cases, organizations rely on labor-intensive, hypothesis-based analytical approaches that exclude anyone without advanced degrees in computational mathematics and statistics. With exponential data growth estimates and increased data complexity, new data analysis techniques like Ayasdi’s will be integral to finding breakthroughs and innovations from health care data.

“We regard this partnership as a tremendous opportunity,” said Gunnar Carlsson, Ph.D., co-founder of Ayasdi and professor of mathematics at Stanford University. “The Texas Medical Center has an enormous variety of very sophisticated institutions. It provides the perfect place to use our software because of the sheer volume of data being generated. The scientific potential of their research enterprises is unparalleled.”

Ayasdi’s software is based on topological data analysis, which visualizes relationships between data points

as two dimensional shapes made up of interconnected nodes. The nodes represent the subjects under analysis, whether they are a dataset of breast cancer tumors or statistics of players from the Miami Heat—the team leverages Ayasdi’s software to analyze basketball data in order to make smarter match up decisions. The most similar nodes will cluster together, with lines drawn between them, while dissimilar nodes will be separated into different shapes. The idea is that emergent patterns, like loops, forks, or separated clusters, will reveal meaningfully different subpopulations in the dataset.

“Think of studying data like looking for a hammer in a dark garage,” explained Carlsson, who specializes in a branch of mathematics called topology, the study of shape. “If you have a flashlight and point it at the ceiling, or in the corner, it’s not very likely that the narrow beam of light will illuminate your target. If you were able to turn on the light in the garage, your eyes would be drawn to the hammer and maybe a bucket of nails in the corner you hadn’t noticed. The idea is to visualize the data in order to see the whole statistical landscape, generating questions accordingly. It’s the Jeopardy method of data analysis: answers first.”

Topology, the subset of mathematics that focuses on the study of shapes, dates back to the 19th century, but scholars were writing treatises on the subject for over a century beforehand. While topology has existed, in a theoretical sense, since the 1700’s, Carlsson pioneered the applied use of topology to solve complex, real world problems beginning in the mid 1990’s. In the early 2000’s, this work led to \$10 million in research grants, courtesy of the National Science Foundation (NSF) and the Defense Advanced Research Projects Agency (DARPA) to study the application of

topological data analysis to problems of interest within the U.S. government. Based on the success of these efforts, Carlsson, in conjunction with two other Stanford mathematicians, Gurjeet Singh, Ph.D., and Harlan Sexton, Ph.D., founded Ayasdi in 2008.

This past January, the medical center and Ayasdi conducted a data analysis “boot camp,” where data scientists and researchers from around the medical center were introduced to the Ayasdi topological data analysis platform. The boot camp was the first step taken to introduce the Ayasdi software to the member institutions.

“Ayasdi offers an innovative technology that demonstrates new relationships in data that might otherwise go unnoticed,” said Paul Klotman, M.D., president and chief executive officer at Baylor College of Medicine. “It further enhances our ability to convert complex medical data into actionable knowledge.”

The goal of the training session was to entice research teams in the medical center to submit project ideas that would be considered for sponsorship on the Ayasdi platform. With sponsorship, teams would have access to the knowledge and experience of the award winning Ayasdi data science team to assist in the analysis of their data. Drawn from a pool of 12 submissions from various member institutions, three teams have been awarded the full support of the Ayasdi research team.

Andrew Futreal, Ph.D., a professor of Genomic Medicine at The University of Texas MD Anderson Cancer Center, describes the goal of his study as, “discovering key patient-centric ‘factors’ that impact outcome.” Futreal’s study will be conducted with the help of Joseph Petrosino, Ph.D., assistant professor of Molecular Virology and Microbiology at Baylor College of Medicine. Alok Madan, Ph.D., MPH and his team were selected for their research among adult and adolescent psychiatric patients during and after hospitalization, a collaborative effort between The Menninger Clinic and Baylor.

Erik Boerwinkle, Ph.D., professor at The University of Texas Health Science Center at Houston, and his team were also selected for their work on whole genome sequence analysis of

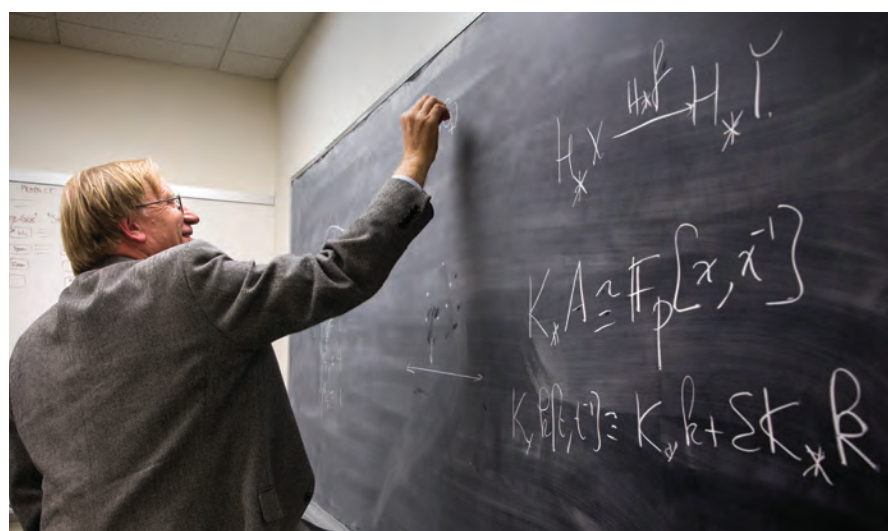
cardiometabolic phenotypes, an effort to understand the genetic basis of health and disease.

The remaining submissions that were not selected for sponsorship will also have access to Ayasdi’s software, with the support of Texas Medical Center’s in-house data scientist, equipping them to make significant strides in their areas of research. Deriving knowledge from data with a non-biased, fact-based approach will be critical to allowing the medical center and its member institutions to leverage a greater quantity of their data to solve difficult and disparate problems.

“We’re honored to work with a world-class organization like Texas Medical Center to target some of the most challenging diseases and conditions and to accelerate breakthroughs in health care and life sciences,” said Gurjeet Singh, co-founder and CEO at Ayasdi. “We are excited to enable TMC with a new approach to discover knowledge about leukemia, heart disease, traumatic brain injury, post-traumatic stress disorder and many more.”

This past May, Ayasdi stood head and shoulders above the competition as the grand prize winner of both awards at Bio-IT World 2014, where more than a hundred companies set up booths to showcase the myriad applications of IT and informatics to biomedical research and the drug discovery enterprise. They were the only company to be recognized for both an innovative solution, Ayasdi Cure, and for that solution’s key role in a breakthrough medical discovery. The new Ayasdi Cure application is designed to help pharmaceutical and biotech companies accelerate the drug discovery process.

“Texas Medical Center is entering a new era in our evolution where member institutions are exchanging ideas and sharing insights and resources to accelerate discovery to advance care,” concluded Robert C. Robbins, M.D., president and chief executive officer of Texas Medical Center. “Specifically, we’re focused on five areas—health policy, stem-cell research, clinical trials, genomics and innovation—and data is the key to revolutionizing all of them.” ■



“The idea is to visualize the data in order to see the whole statistical landscape, generating questions accordingly. It’s the Jeopardy method of data analysis: answers first.”

— GUNNAR CARLSSON, PH.D.

Co-founder of Ayasdi and
Professor of Mathematics at Stanford University



TOP: Gunnar Carlsson, Ph.D. BOTTOM: From left to right—Gurjeet Singh, Ph.D., Gunnar Carlsson, Ph.D., and Harlan Sexton, Ph.D., founded Ayasdi in 2008 to commercialize their research in topological data analysis.



(Credit: Michael Stravato)

HOUSTON PARKS BOARD EXECUTIVE DIRECTOR ROKSAN OKAN-VICK TALKS ABOUT HOUSTON'S GREEN SPACE, AND HOW A HUNDRED-YEAR-OLD PARKS PLAN IS INSPIRING EFFORTS THROUGHOUT THE CITY.

“ People generally don't remark that Houston is a beautiful city, but I see Houston as very beautiful. Every city has its own beauty, and finding that, working that and making that an asset to the city is very important. ”

Q | Tell me a bit about your childhood and where you spent your formative years.

A | I am one of those diversity people that is talked about so much in Houston. I was not born here, but some say I got here as fast as I could. Though that really wasn't deliberate, it was totally coincidental. I grew up in Istanbul, Turkey. And actually went to a school of architecture there, at a very prestigious university. But very quickly, thanks to my family's encouragement—which I needed because in the late 70s, life was a little different, particularly in a country like Turkey—I applied to universities in the U.S., not knowing what the country was like, where I was going. I liked a lot of different universities, and Rice University was the one that gave me the largest scholarship and stipend, so I ended up here.

I wanted to do my masters here, so I ended up coming and really falling in love with Houston. When you are young, the world is just lovely and there is nothing you cannot do. So I ended up making Houston my home for a variety of reasons, and finished the school of architecture and stayed here. But having the formative years of my life in a city like Istanbul had an impact on how I viewed the urban context.

The rich, dense, historically significant urban fabric of Istanbul taught me that the urban context means a lot in a city. Even though I was trained as an architect and I practiced many years as a traditional architect, I always understood that you cannot just build a building without understanding everything else that is going on around it. So I think wanting to understand the bigger picture certainly had an impact. And there were other things. Growing up in a family that is somewhat

different culturally, all of those mold you in terms of the kind of person you are. So hardworking, loyal, committed, all of those qualities come from family, whether you are here in Houston or somewhere else.

But coming here and gaining an understanding of the urban context Houston offered, was very interesting. People generally don't remark that Houston is a beautiful city, but I see Houston as very beautiful. Every city has its own beauty, and finding that, working that and making that an asset to the city is very important. So ultimately when a career opportunity provided an avenue back to a place where I could have an impact on that context, I jumped at it. Even though I still love traditional architecture—I follow trends and all of the wonderful happenings in architecture—my heart is now firmly directed toward shaping our city. You can impact so much more when you are dealing at the city scale. I consider myself lucky enough to be up to my elbows doing that right now.

Q | Did the culture of Istanbul, where East meets West, shape your architectural perspectives?

A | Most certainly. Interestingly enough, the Turkey of 1978, when I left it, was actually much more oriented to the West than the Turkey of today. You might not feel it in a city like Istanbul, but certainly the path that the current administration is pursuing is quite different from the Turkey that I grew up in. I don't want to make a judgment call. However, I am saddened by this path because it was a less divided, more informed community during the 24 years I was living there.

While the country you are born in and spend your formative years—in my

case Turkey—always occupies a very special place in your heart and soul, the country you have made home for much longer—in my case the USA—holds a similar, if not deeper place. I am lucky because I have two wonderful homes and am able to still go back and forth between the two. I cherish that. It's something that always stays with you.

Q | Many architects knew very early on in life that they were drawn to design and structure. Did you always see yourself working as an architect?

A | No. And I hear a lot of architects saying that they knew from childhood they were going to be architects. I had no idea. Because again, where I grew up and the schooling I had, you didn't have choices like you have in the United States. The number of choices you have here is incredible. It is very difficult to understand what I am about to tell you, but in Turkey, you would finish your high school years, go through some rigorous exams and you would get points. So you have, say 158 points, on the entrance exams to universities. And there were only a handful of really good universities.

I knew that I wanted to do something that helped people. That was a broad goal. The higher education commission gives you this little card that indicates the programs that match your number of points and the universities where you are entitled to register. A prestigious school of architecture in Istanbul, ITU, was one of those on my card, even though I had not thought extensively about architecture as a profession. As I was standing in line to select my program, a group of friends came by and excitedly said, 'We signed up for architecture at ITU, and we think it is much more exciting than anything else on your list.' That made my decision. I don't tell this story to a lot of people because it makes the choice seem so random. I want to be able to say I was always passionate about architecture. But the thing is that in a city like Istanbul, you take it for granted that architecture is rich. It has history. Maybe that had an impact on me, but it was also that I knew I wanted to do something that made a difference.

I totally fell in love with architecture. It was like a highly successful arranged marriage. It's a fabulous profession.

The education you get in architecture is exceptional. The practice of architecture is life-altering experience. I am surprised that more leaders don't come out of an architecture background, because of how you are taught to work, and the practice. And it's a tough profession to excel in. And it gives you some terrific skills. Occasionally I will return to Rice University and I will talk to the students about the profession, which actually wasn't a course at Rice when I was there. The curriculum was focused heavily on design and the creative process.

You always thought you were this magic creator coming out of Rice, and you hit the job market and you are in a firm running blueprints on a machine and you wonder, 'where is the magic?'

So I think it is nice now that they are providing professional classes where people come and talk to you about not only the profession of architecture, but of the way I have gone, off on my own road. Yes, I am an architect, but there are other ways to practice and to bring your skills to the city you love.

Q | How did your career move from the classic architecture to what you are doing now at the Parks Board?

A | That is something that I have thought about a lot. Graduating from architecture school, you get a job, and the job is traditionally in an architecture office. And that is actually quite fascinating. You get involved in all of these projects which involve a lot of different people, a lot of different clients in a lot of interesting places—very rewarding. At one point after I had my daughter, I opened my own business. That proved to be difficult because cash flow became an issue. Some months you are good, some months are not so good. So when I was approached by the Hermann Park group, and they said they needed someone to oversee the capital projects, I thought that was very attractive. So I joined them to start building all of their capital projects and shortly after, I became their executive director. During my years at the Hermann Park Conservancy I met Laurie Olin, who is a world renowned landscape architect, urban planner, who helped us do a lot of the planning and thinking about Hermann Park. And talk about magical...he was probably the most magical person I have met

in terms of his ability to think through things and then suddenly crystalize it on paper, and then make the same thing happen on the ground. So under his influence, I started moving away from traditional architecture, and started going into the parks/urban design world. I have since stayed there as well as in the private non-profit world. A non-profit world is a slightly different arena to work in, as is the municipal government where I spent a couple of years after my work at Hermann Park.

I was the director of Parks and Recreation for the City of Houston for a period of two, very educational, years. You see life from a very different angle and you understand the bureaucracy involved, and why it is there, and you understand the checks and balances and all of the political maneuverings that happen there. After those two years, I came back to the non-profit arena with the Parks Board, and I have stayed here since. The beauty of where I am is it just allows me to do things like the bayous greenway projects and the projects that very few people in this country are lucky enough to be involved in.

Q | Please tell us more about the history of the bayous greenway program.

A | A lot of people don't know what a bayou is. It is a slow-moving waterway. Our bayou corridors are beautiful and collectively represent very special happenings in Houston. There is no other city of our size and our growth that has this kind of beauty in the midst of it, crisscrossing across the whole city. So, for the purpose of equitable distribution, as we started acquiring lands and building trail segments along the bayou corridors at the Parks Board, we also remembered a plan established more than 100 years ago. In 1912, Arthur Comey—a well-respected urban planner and landscape architect, was commissioned to come to our city and do a general plan, part of which was a plan for the parks system. That was quite forward thinking of our city leaders at that time. A hundred years ago, Houston was much smaller, but Comey laid out the vision of creating continuous greenways along our bayou corridors since he believed they were the most significant natural resource our city was blessed with. I read his book again recently and

the vision that the gentleman put forth, remains amazingly valid today. As we grow our city exponentially, we must take advantage of these beautiful ecological corridors. So once we realized the huge opportunity of completing Comey's plan to create an equitable distribution of green spaces, the stars suddenly lined up.

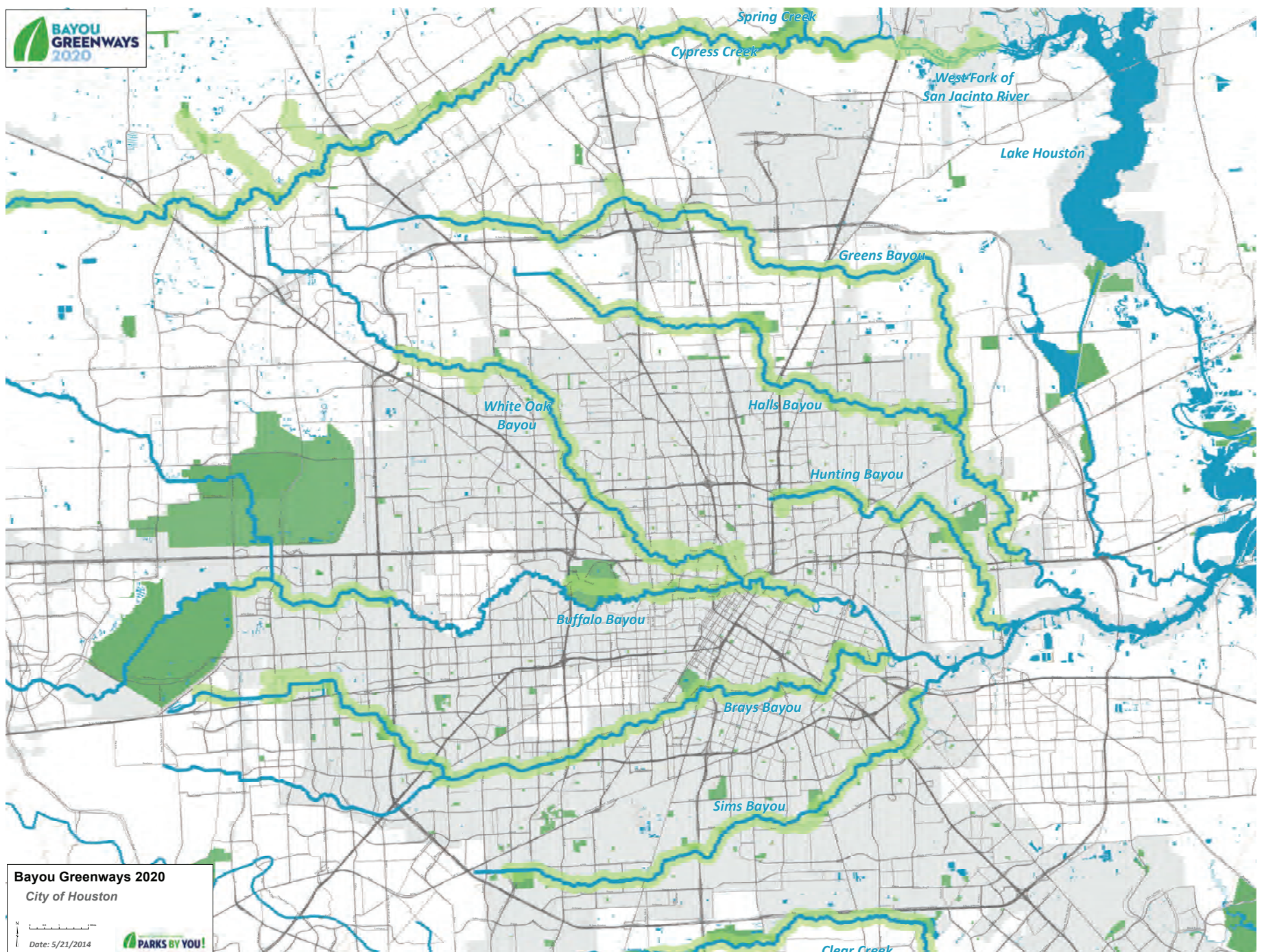
Leadership was supportive and there was a lot of sentiment in the community that these are assets that we need to value, which wasn't necessarily appreciated thirty-five years ago when I came to Houston. But over the thirty-five or more years I have been here, I have seen a change in the way we the community embraces this city. So, with this fresh perspective, along with leadership commitment, and our board, we crafted a grand program along the greenways. Our foundation idea from Comey set a hundred years ago, makes even more sense today.

We had a bond election in late 2012. Prior to the bond election, we embarked on a significant campaign to educate the citizens, and it passed with the highest margin of all other bond referendums in the city. It surpassed all other bond elections with an approval rating of 68.2 percent—a very rewarding outcome. We now have a pretty strong mandate, and have already privately raised more than \$75 million to match the \$100 million of bond funds dedicated to the greenways in the city of Houston. There is no turning back. It is a long-term initiative, and once it is done, we will experience Houston very differently.

Q | How is Houston changing as a result of Bayou Greenway program?

A | Hopefully people will drive less. Hopefully as soon as visitors land here, for whatever reason, they will be made aware of the opportunities to jump on a bike, jog or walk along the scenic bayou corridors. The difference will be you will have connected green spaces, parks, nature areas, along all of the major bayou corridors in the city. You will have virtually unlimited access. This is really critical. And they will feel inviting and safe. "Safe" is a very tricky word to use, so I use it very carefully. Because what makes places like these greenways safe is the level of use.

“As we grow our city exponentially, we must take advantage of these beautiful ecological corridors. So once we realized the huge opportunity of completing Comey’s plan to create an equitable distribution of green spaces, the stars suddenly lined up.”



(Credit: Houston Parks Board)

The more use you have, the more safe it is perceived to be. And perception is usually 80 percent of the challenge. The majority of the landscapes you will see, with few exceptions, will be native. They will be enhancing the natural habitat of those ecological corridors, so you will be able to enjoy the respite that they will provide. You will have a continuous green corridor, which connects the diverse neighborhoods and activities we have along the bayous. They weave together disparate but wonderful pieces. Think about Brays Bayou. On the lower end of the channel, you start at the Port of Houston, which is number one in the world for tonnage. You travel thorough the historically significant east end neighborhood, with all of its industry. You go through the historically significant Gus Wortham golf course, then U of H, additional historical neighborhoods. And then you land at the Texas Medical Center. So you are now able to experience these diverse places, which you wouldn't have a chance to otherwise experience without this green connection that feels comfortable and inviting. So being able to make those connections throughout our city is, I think, one of the terrific things about the bayou greenways, in addition to the ecological features.

Q | Can you describe the oversight responsibilities of the Parks Board?

A | The Parks Board has been around for 38 years now. It was formed by Mayor Hofheinz, with the intent of creating an entity that looked after the interest of private donors who wanted to contribute to the city's parks system. There was a lot of interest; in fact, a lot of our parks have come through the Parks Board, but those potential donors just didn't feel comfortable giving their assets or their money to the city. So they formed the Parks Board, and as years went by, its influence grew, primarily because a lot of private citizens—Houstonians—decided to gift large parks to the city. Quite quickly, the Parks Board becomes the entity through which the city started forming its large green spaces.

Well over half of the city's park land has come through the Parks Board. Either through acquisition or through donations. So it has grown over the

years to become the primary private non-profit partner to the city to grow, improve and protect the park lands within the city.

Particularly in the last ten years, we have grown exponentially for a variety of reasons, both board related and staffing related. We are now the major overseer, planner, doer of the city's parks system, in tandem with the City of Houston. A lot of private money comes through the Parks Board, and the Parks Board has right of entry to every public space in the city of Houston, which means we can go in and make improvements or buy land—all on behalf of the city. Private citizens cannot just go into a public space and make improvements.

We do all of that throughout the city, and we are particularly focused on equitable distribution of amenities and green spaces. For example, parks like Hermann Park, Memorial Park and Buffalo Bayou Park—I am naming the three jewels of our system—have their own very effective boards. So they don't need our help. But JC Park in Northwest Houston, for example, doesn't have such a resource. So the Parks Board helps with improvements to those parks that may not have that kind of stewardship that tend to them. And the greenways pretty much fall into that category, because, for all practical purposes, they are also the park lands for some of those neighborhoods through which they meander. As of July 1st of this year, the parks board will also be in the maintenance business on the bayou greenways. So in addition to raising private funds to help build greenways, we will also be entrusted with maintaining those corridors.

The key is to do this all efficiently. To make the dollar go much further, by leveraging every single dollar we have and making it work for us, for those who fund us.

Q | The Texas Medical Center represents one of the largest pieces of real estate in the city. How can we maximize that opportunity relative to the green space?

A | One thing that I have found very heartening is that part of the TMC vision is to create a park-like setting for the Texas Medical Center. And it seems like such a no-brainer. Brilliant ideas

are usually like that, they are so simple, but you just have to get there. What's important about that is being able to navigate in a setting that may not be the most pedestrian friendly. It compounds that feeling of frustration and fear. In terms of the urban context, the TMC has a large footprint, and getting larger by the day.

How do you take it to the next level and make it shine in a way that it hasn't before? In a way that is much more inviting. I think it will help tremendously in transforming the image of the Texas Medical Center. There is great synergy there. I think if we can continue to work with your team on the land that happens to traverse through your campus, it can be something of joy and beauty and interest to you. That's one part of the relationship, but what I would also like to focus on is that there is something of joy and beauty and interest in the Texas Medical Center, that needs to be one of those very special places where you pause. Just stroll around in this very special "neighborhood". Take a break. Not only when you need to see a doctor, but as a place to enjoy in Houston in its own right.

Q | When you think about our city now and in five years from now, is it your hope that Houston is known as one of the most green and connected cities?

A | The way we have grown has been very spread out. And Houston was not known for its mixed-use kind of living. But that is changing. And it is changing more rapidly now than ever, and there's no going back. So, millions more people are going to come here, and the changes are being driven by the "creative class," the "new intellectuals." This new and younger workforce is demanding that. They could live and work anywhere, especially the best and the brightest. And we want the best and the brightest to live and work and contribute to Houston's future. We want to attract them, we want to keep them, including the ones who are home grown. What we are finding is that the quality of life, the quality of place is pretty significant to those folks who are deciding if they should go to Austin, Los Angeles, or come to Houston. So what I believe will happen is as we transform these greenways, life is

going to get richer and richer along those corridors.

So I fully expect if we are having this conversation years from now, that it will be a very different fabric in the city of Houston and a good amount of it will be attributable to the greenway development that is underway here.

Q | How do you handle the work-life balance?

A | I have been a workaholic ever since I can remember being me. When I married my husband, he knew that well. When you have children, you focus on them. And to some extent, they drive your schedule. And now that my daughter is an adult, both my husband and I love what we do and can spend even more time doing that. When people call you a workaholic, it is almost like it's a dirty word. It's not. What's wrong with that? You spend so much time in your life working or practicing your profession; it's a crying shame if you aren't enjoying it.

And I think part of my role, as I get older, in my profession, is to help younger ones push out to the great beyond—push those limits. Working hard is not necessarily to the exclusion of a healthy family or social life. I still fully enjoy time with my family and friends. It all can work together just wonderfully.

Q | Any closing thoughts that you would like to share?

A | I would really encourage Houstonians, young and old, to get involved in the public realm. Get involved in the community. Think about giving a little back. Because I firmly believe that while making a wonderful living, you can feel really, really good about public service. The great things you can do are endless, whatever your passion is. Get involved and give a little. It is very rewarding, and it also opens you up to a whole different slice of the community. I think that's a life-enriching experience, and it is something you can do for the rest of your life. ■



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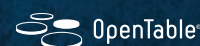
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Tackling Tropical Diseases

The National School of Tropical Medicine at Baylor College of Medicine partners strategically to combat tropical disease, one vaccine at a time.

BY AMANDA D. STEIN



Peter Hotez, M.D., Ph.D. right, and Maria Elena Bottazzi, Ph.D., serve as the dean and associate dean, respectively, of the National School of Tropical Medicine at Baylor College of Medicine. (Credit: Terry Vine Photography)

“ We call them tropical diseases, but it is really a misnomer. They are diseases of poverty. The tropical and subtropical climate is a component of it, but poverty is the overriding determinant. ”

— PETER HOTEZ, M.D., PH.D.
Founding Dean of the National School of Tropical
Medicine at Baylor College of Medicine

Diseases of poverty.

That’s a more fitting name for neglected tropical diseases, according to Peter Hotez, M.D., Ph.D., founding dean of the National School of Tropical Medicine at Baylor College of Medicine. They are diseases that contaminate bathing and drinking water, cling to the feet of children playing barefoot in dirty streets, and are carried thousands of miles by ticks and mosquitos. They not only linger in places of poverty, but also seem to cause poverty. And Hotez’s team intends to do something about them.

“Over a billion people in the world suffer from neglected tropical diseases, and about 1.3 billion people live on no money. That includes 1.65 million families in the United States that live on less than two dollars a day,” said Hotez.

“We call them tropical diseases, but it is really a misnomer. They are diseases of poverty. The tropical and subtropical climate is a component of it, but poverty is the overriding determinant.

“Many of these tropical infections are not like infections you typically think of. These tend to be chronic, debilitating conditions—things like leprosy, or hookworm, or schistosomiasis,” he continued. “Sometimes people have these diseases their entire lives, making them too disabled to work, so they lose income. Or these diseases actually reduce child intelligence and cognition. They shave IQ points off of kids, so they lose future wage earnings. And this has actually been shown. So these are major forces that actually trap the bottom billion in poverty.”

(continued page 22)

Profiles of Neglected Tropical Diseases

The National School of Tropical Medicine at Baylor College of Medicine, together with its Sabin Vaccine Institute, Texas Children's Hospital Center for Vaccine Development and other programs based in the Tropical Medicine section of the Departments of Pediatrics and Internal Medicine (Infectious Diseases), has an active portfolio of products and research devoted to addressing the world's most important neglected tropical diseases.

Hookworm Disease

An estimated 440 million people are infected with hookworms.



What is it?

Half-inch long parasitic worms that feed on human blood and cause intestinal blood loss leading to anemia.

Where is it found?

Hookworm can be found worldwide, commonly in areas with warm, moist climates. Today, hookworm disease is one of the leading causes of anemia in the poorest countries of Africa, Asia and the Americas. It is one of Africa's leading maternal and child health problems—an estimated 7 million pregnancies in Africa are complicated by hookworm disease.

How is it spread?

Hookworm is transmitted through contaminated soil.

What is being done about it?

Through support of the Gates Foundation, Dutch Government and a new European Union-supported HOOKVAC Consortium, a new recombinant protein-based vaccine has been developed by the Sabin Vaccine Institute PDP, which is now in phase one clinical trials in Brazil and soon to enter clinical testing in Gabon, in collaboration with the Albert Schweitzer Hospital. Through additional support from the Michelson Medical Research Foundation, efforts are underway to expand the vaccine to cover all of the three major intestinal helminth infections. Rojelio Mejia, M.D., is working to develop new diagnostics for intestinal helminth infections.

Schistosomiasis

More than 250 million people suffer from schistosomiasis.



What is it?

A blood fluke (parasitic worm) infection. There are two forms of the disease—intestinal schistosomiasis that also affects the liver, and urogenital schistosomiasis.

Where is it found?

Most of those infected live in either sub-Saharan Africa or Brazil. Female genital schistosomiasis is now considered one of Africa's most common gynecologic conditions and a major co-factor in Africa's AIDS epidemic.

How is it spread?

Schistosomiasis is often found in areas of the world with poor sanitation, where swimming or bathing water may be contaminated.

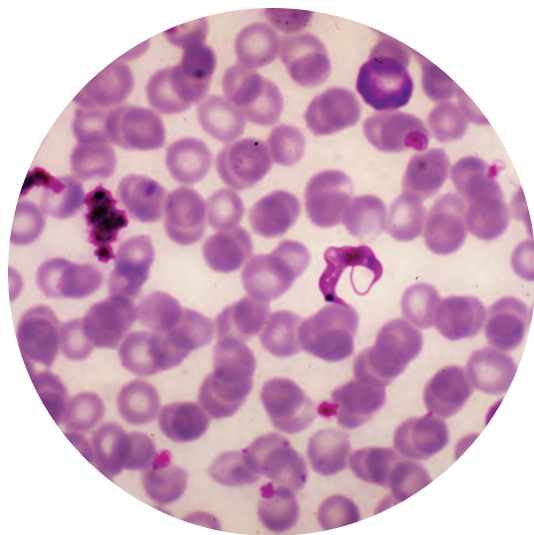
What is being done about it?

A new schistosomiasis vaccine has also been developed at the Sabin Vaccine Institute and Texas Children's Hospital Center for Vaccine Development, through support from the National Institutes of Health, Texas Children's Hospital, the Michelson Medical Research Foundation, and the Mort Hyman and Blavatnik Family Foundation. The vaccine will soon undergo clinical testing at Baylor College of Medicine's Vaccine Trials Evaluation Unit.

(Photos by Center for Disease Control)
(Content contributed by Peter Hotez, M.D.)

Chagas Disease

Chagas disease causes an estimated \$800-900 million in economic losses in the U.S. annually.



What is it?

Chagas disease is a parasitic protozoan infection transmitted by a blood-sucking insect known as the “kissing bug.”

Where is it found?

Roughly 7-8 million people are believed to be infected with Chagas Disease worldwide, with the majority living in Latin America. The Center for Disease Control (CDC) estimates that more than 300,000 of those persons live in the United States.

How is it spread?

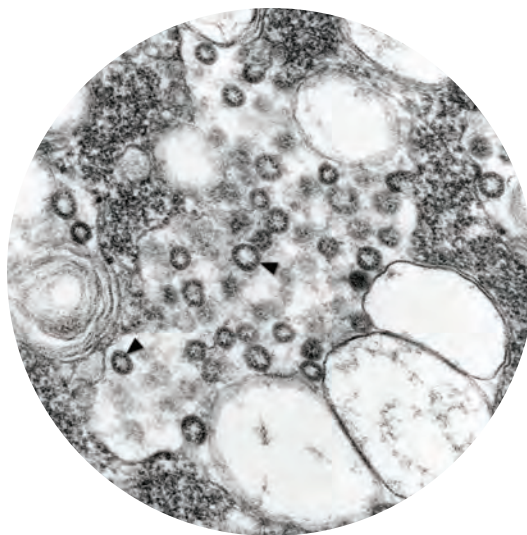
Infection is most commonly spread through contact with the feces of an infected “kissing bug.”

What is being done about it?

The National School of Tropical Medicine treats Chagas disease patients at its Tropical Medicine Clinic, in collaboration with Harris Health System. A team of epidemiologists headed by Kristy Muray, DVM, Ph.D., is working with the Baylor Cardiovascular Research Institute to determine the extent of the disease in the Houston area and adjoining regions of Southeast Texas. The Sabin Vaccine Institute and Texas Children’s Hospital, in collaboration with the Southwest Electronic Energy Medical Research Institute and the Carlos Slim Health Institute, is developing an innovative therapeutic vaccine now undergoing preclinical testing.

Severe Acute Respiratory Syndrome (SARS)

In 2003, a reported 8,098 people worldwide became sick with SARS.



What is it?

Caused by the SARS coronavirus, it emerged out of South China and caused a highly lethal epidemic in 2002-03. The most common symptom of SARS is a high fever, followed by body aches and discomfort. Most patients also develop pneumonia.

Where is it found?

During the epidemic, the illness spread to more than two dozen countries in North and South America, Europe and Asia. There have been no known cases of SARS anywhere in the world since 2004.

How is it spread?

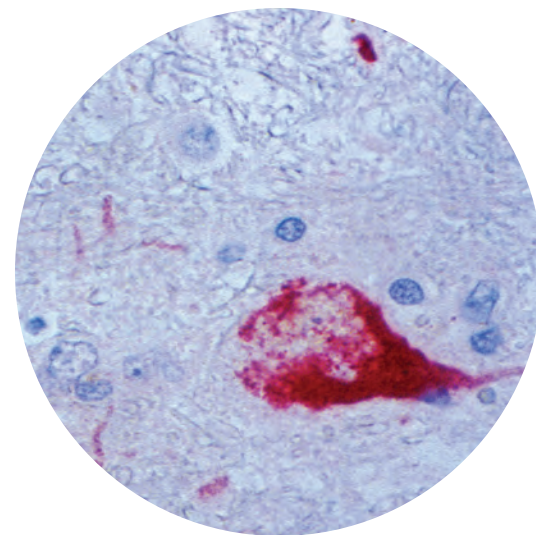
SARS is most commonly spread through human-to-human contact, often in the form of respiratory droplets, from coughing or sneezing.

What is being done about it?

The Sabin Vaccine Institute and Texas Children’s Hospital Center for Vaccine Development—in collaboration with a consortium that includes The University of Texas Medical Branch at Galveston, the New York Blood Center, and Walter Reed Army Institute of Research—is developing a new receptor binding domain recombinant SARS vaccine, potentially for stockpiling in the event of a biodefense emergency.

West Nile Virus

In 2013, 48 states within the U.S. reported cases of West Nile Virus, according to the CDC.



What is it?

West Nile Virus (WNV) can cause neurological disease and death. Symptoms include fever, headache, fatigue, aches and swollen lymph nodes. Approximately 80 percent of infected individuals will not show any symptoms.

Where is it found?

It is commonly found in Africa, Europe, the Middle East, North America and West Asia.

How is it spread?

West Nile Virus is most often the result of being bitten by an infected mosquito.

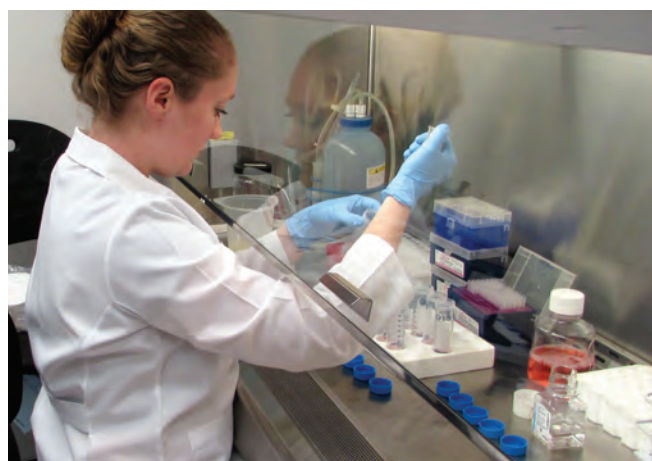
What is being done about it?

Murray’s group in the section of pediatric tropical medicine has identified a new chronic kidney disease among people with chronic persistent West Nile Virus infection. Her group is working this summer to determine the full extent of West Nile Virus and Dengue Fever in Houston, as well as a third new arbovirus infection known as Chikungunya. In parallel, scientists in the vaccine development group are working to develop a therapeutic WNV vaccine for chronic renal disease sufferers through support of a grant from the Houston-based Chao Family Foundation.

DEFINITION

Arbovirus Infection

Viruses transmitted by arthropods, such as mosquitoes and ticks.



The National School of Tropical Medicine at Baylor College of Medicine is actively working on developing vaccines for neglected tropical diseases, which affect over a billion people worldwide. (Credit: Baylor College of Medicine)

For years, Hotez and his team have envisioned the Texas Medical Center as being the ideal place for expanding and creating novel strategic collaborative research efforts dedicated to addressing those issues of global health. So when the opportunity arose, following a conversation with Texas Children's Hospital Physician-in-Chief Mark Kline, M.D., and Baylor President Paul Klotman, M.D., for the establishment of a new school dedicated to researching and addressing neglected tropical diseases, Hotez, then the chair of Microbiology, Immunology and Tropical Medicine at George Washington University, didn't hesitate.

His George Washington University colleague and vice-chair, Maria Elena Bottazzi, Ph.D., was the natural pick to join him as associate dean of the new school. Together, the pair, along with twelve experienced researchers who also relocated to join the team, established the National School of Tropical Medicine.

This endeavor was also made possible by the strategic partnership between Baylor, Texas Children's Hospital and the Sabin Vaccine Institute, for which Hotez also serves as president. The Sabin Vaccine Institute relocated its Product Development Partnership (PDP), which is one of only 16 PDPs globally and the only one located in an academic medical center and in the state of Texas. Hotez and Bottazzi serve as director and deputy director, respectively, for the Sabin PDP. They also serve as professors of pediatrics and molecular virology and microbiology, and Hotez holds the Texas Children's Hospital endowed chair in tropical pediatrics.

"Dr. Hotez and his team at the Texas Children's Hospital - Sabin Vaccine Institute Center for Vaccine Development are working to prevent some of the world's biggest medical scourges, diseases like hookworm and schistosomiasis that literally affect hundreds of millions of individuals globally," said Kline. "The potential of this absolutely novel work to impact the lives of many of the world's poorest and least fortunate children cannot be overstated."

“ When the dengue epidemic occurred in Houston, Dr. Murray found that not a single case was diagnosed by physicians. Physicians are not getting trained in most U.S. medical schools about these diseases...Because they have always been thought of as problems unrelated to the United States. In fact, we find they are very much related. ”

— PETER HOTEZ, M.D., PH.D.

Modeled after the Liverpool School of Tropical Medicine, and the London School of Hygiene and Tropical Medicine, the National School of Tropical Medicine has a fourfold mission, centered around research, training, clinical activities and public policy.

While often found in tropical regions, where weather and environment allow disease to spread by way of insects, soil or contaminated waterways, the diseases Hotez and his team work with are not exclusive to any one region or climate.

“People often think of these as sub-Saharan African diseases, but what we are finding is that the world has changed,” said Hotez. “These are not just diseases of Africa, or developing countries. This whole concept of developing versus developed countries, I like to say ‘That’s your father’s global health.’ That’s not the way it is anymore. It’s wherever you have poverty. It doesn’t matter if that poverty is in Southern Mexico, Northern India, Northern Brazil, or the Gulf Coast of Texas. This is where you find tropical diseases.

“We have a particular emphasis on diseases of the poorest regions in the western hemisphere. Not exclusively, though. We do projects in Africa and Asia, but particularly in Latin America,” he added. “It is an important area of emphasis. In fact, the largest number of people living in poverty live in the state of Texas, so we have now found a substantial burden of tropical diseases here in the United States, in the Gulf Coast.”

When addressing treatment and prevention of neglected tropical diseases like Schistosomiasis, caused by parasitic worms that affect 250 million

people outside of the United States, it often comes down to doing the work that many pharmaceutical companies will not.

“The vaccines that we are developing are vaccines for the poorest people in the world,” said Hotez. “Industry is not going to make these vaccines because they only affect people of extreme poverty. So it is really science for the poor. We make the vaccines that the drug companies can’t make or won’t make.”

“No one else is making these vaccines because products developed for the poorest populations in the world generally have no commercial return on investment,” added Bottazzi. “So usually those who really can commit to support those populations are either groups in the nonprofit sector, or the governments or the population itself.”

Through the PDP model, the Sabin Vaccine Institute and Texas Children’s Hospital Center for Vaccine Development and the National School of Tropical Medicine are actively working on a number of vaccines for some of the major “diseases of the poor,” including a human hookworm vaccine, now in clinical trials in Brazil and soon in Africa, a schistosomiasis vaccine that is about to start clinical trials, and new vaccines for Chagas disease, Leishmaniasis and Severe Acute Respiratory Syndrome (SARS).

“A lot of university-based vaccine institutes call themselves vaccine institutes because they do immunology with an interest in vaccines,” said Hotez. “What’s unique about us is we actually make the vaccines, and transition them from discovery, into the clinic. We are doing everything that a small to mid-size biotech company would do, but in

the non-profit arena.”

Beyond developing vaccines, the National School of Tropical Medicine has core faculty working on other major areas of tropical medicine. Major programs in the epidemiology of vector-borne and zoonotic diseases, for example, are headed by Kristy Murray, DVM, Ph.D., an associate professor in the department of pediatrics where she is also associate vice chair for research. Murray’s group has made important discoveries that include the first identification of epidemic dengue fever in Houston, a new renal disease syndrome that results from West Nile Virus Infection, and the transmission of Chagas disease in southeast Texas. In addition, Rojelio Mejia, M.D., and others are leading efforts for the development of new diagnostics for parasitic infections.

In the area of training, the National School of Tropical Medicine provides a unique Diploma in Tropical Medicine for physicians, physician assistants and medical students to recognize and understand how to identify and treat these diseases. Given the ease of international travel, it is critical that physicians have the skills to help isolate or possibly stop the spread of tropical diseases, particularly those transmitted through human contact.

“Part of this arose out of the fact that when the dengue epidemic occurred in Houston, Dr. Murray found that not a single case was diagnosed by physicians,” explained Hotez. “Physicians are not getting trained in most U.S. medical schools about these diseases—how to recognize them, how to diagnose them, and how to manage, treat and prevent them. Because they have always been thought of as problems unrelated to

the United States. In fact, we find they are very much related. So we are really trying to expand our collaborations to include a lot of major universities in the area.”

Collaboration and strategic partnerships are crucial to the success of the school. From running the Tropical Medicine Clinic and Travelers Clinic in conjunction with the Harris Health System and Baylor Clinic, to working with international researchers and governments on jointly developing vaccines, the tropical medicine team recognizes the incredible power of partnerships. They take that same approach in tackling issues of health policy. They are, among many other projects, currently working to introduce new legislation to Congress around tropical disease, and the distribution of packages of medicine that have so far reached over 250 million people worldwide.

Hotez and Bottazzi hope to leverage these kinds of allies and resources to help carry their mission even further. “I am so grateful to the vision of Dr. Mark Kline, Baylor College of Medicine President Dr. Paul Klotman, Texas Children’s Hospital Chief Executive Officer Mark Wallace, and Sabin Vaccine Institute Board Chairman Mort Hyman,” said Hotez.

“Our school is at the forefront of global health innovation, and the future looks very promising for tackling tropical diseases,” added Bottazzi. “Together with our strong partnerships within the Texas Medical Center, we will be able to serve as global health accelerators and bring new knowledge, new interventions and renewed access to care to the people in need, locally and around the world.” ■



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Game On

High-Tech Peg Measures Cerebral Palsy Patients' Dexterity

BY ALEX ORLANDO



LEFT AND FAR RIGHT: The DeXcellence device, invented by senior engineering students at Rice University, tracks the dexterity of cerebral palsy patients through their ability to move a Bluetooth-enabled cylinder through a series of tasks.

MIDDLE: Sonia Garcia, a senior at Rice University, guides Brandon Sierra, a patient at Shriners Hospital for Children, Houston, through tasks intended to measure his dexterity. (Credit: Jeff Fitlow/Rice University)

On one side of the board, patients are tasked to move a small peg, comfortable enough for a 3-year-old to hold, over a hurdle and center it on the bulls-eye shaped target. On the flip side is a set of paths that the patient tracks with the peg, tracing across designs and shapes reminiscent of a coloring book. In spite of an exterior that resembles a game board rather than a clinical evaluation tool, there's some serious intent behind a device designed by Rice University students to test the abilities of cerebral palsy patients.

At the heart of the DeXcellence platform is a simple peg—packed inside, there are enough electronics

to inform a nearby computer, tablet or other Bluetooth-enabled device of how the cylinder is moving through space. In tandem with a board that directs the patient's movements, the cylinder sends a steady stream of data to the computer. That data is analyzed by the design team's software to give a therapist a clear picture of a patient's progress in occupational therapy.

The DeXcellence device is the work of five Rice seniors who designed it at the Oshman Engineering Design Kitchen as their capstone project in collaboration with Shriners Hospital for Children, Houston, and Rice advisers Gary Woods, a professor in the practice of computer technology in the Department of Electrical and Computer Engineering, and Eric Richardson, a lecturer in bioengineering.

A synthesis of high and low technology, the Rice students' efforts would complement the device that inspired them, a therapeutic evaluation tool known as a Functional Dexterity Test (FDT). A simple, low-tech pegboard that only quantifies the speed of hand dexterity, the FDT doesn't provide any data about the patient's quality or fluidity of movement. Gloria Gogola, M.D.,

pediatric upper extremity surgeon at Shriners, who has worked with Rice's engineering program for several years, suggested that the team look into ways to quantify movement.

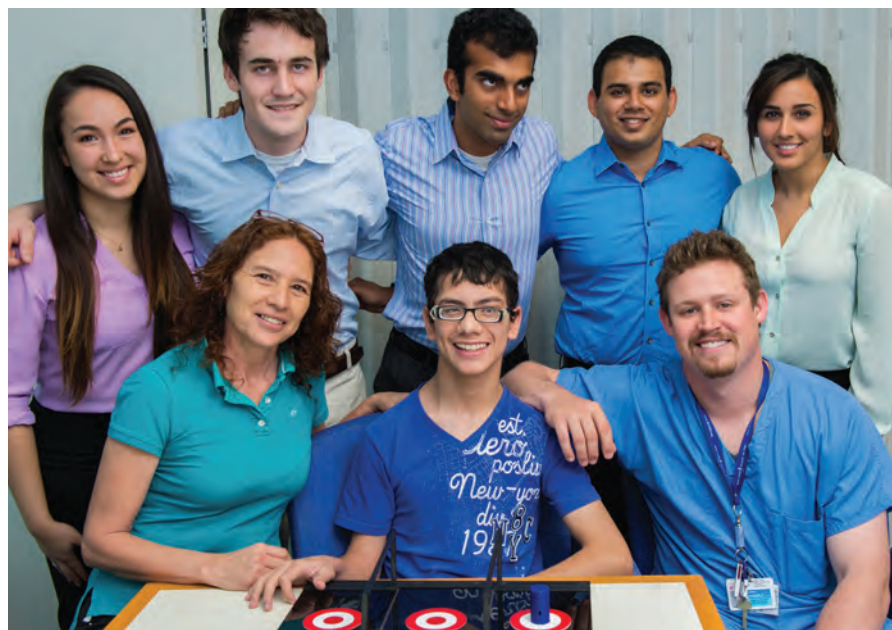
"There's a huge gap in technology for the evaluation of movement patterns in [patients with] cerebral palsy," explained Gogola. "At one end, we have clinical exams that are all visual, even relying on videotape exams to catch more subtle movements. The next step up in technology is Shriners' high-tech motion analysis lab. This project aims for something in the middle—the peg the patient moves through the test provides a phenomenal output of data. They put a whole motion analysis lab in a peg!"

"There's nothing comparable that we encountered," said electrical and computer engineering major Vivaswath Kumar, a member of the team along with Sonia Garcia (bioengineering), Shaurya Agarwal (mechanical engineering), Allison Garza (mechanical engineering) and Andrew Schober (bioengineering and computational and applied mathematics).

"The DeXcellence device completely reimagines the way that pegs

“This device could be used in any situation where dexterity, or the fine motor movements of the hand, needs to be tested. The ultimate goal is to better understand these disease processes so we can better understand and treat our patients.”

— GLORIA GOGOLA, M.D.
Pediatric Upper Extremity Surgeon at
Shriners Hospital for Children



were being used in traditional dexterity tests—using time as a metric for success is pretty rough and imprecise,” added Kumar. He explained that the team installed an inertial measurement unit within the peg, which tracks patient motion, as well as a Bluetooth chip to transfer the motion data to be displayed visually on a graphical user interface. The quality of movement of the motion path is the new metric for success—an important factor in determining whether the patient needs more therapy or more surgery.

For mechanical engineering major Allison Garza, working with kids made the accessibility of the DeXcellence device an essential factor in the design process. “If you look at the design, you have targets on one side, because kids can really easily associate targets with being able to land as close to the center as possible,” she said. “It was the same with the trace paths—kids all know about tracing lines, and the bright color scheme of using red on black makes it very vibrant. It’s all about presenting it to patients not as a scary tool, but as something that’s fun. For them, it’s a game.”

“I think the possibilities for this are

enormous,” said occupational therapist Dorit Aaron, former president of the American Society of Hand Therapists and a Shriners volunteer. “The device is different from the original FTD in the sense that it requires both gross motor as well as fine motor movements to accomplish the task. They have to manipulate the peg and they have to move it in space. That gives us information about the shoulder and elbow motion as well as the digits, and we can track it in the computer.”

The students worked hard to present a polished project. “We have the motion-capture technology with the peg, we have the exam itself, we built the software in the computer and we have the charger for the peg,” Agarwal said. “That’s what we set out to do. We wanted to give them the entire solution; not one part of it, but everything they needed to conduct an exam.”

The team’s success was recognized by all who watched the DeXcellence team demonstrate it at Rice’s annual George R. Brown Engineering Design Showcase and Poster Competition, at which the team won the grand prize of \$5,000 in April. The team also placed second in the International Student

Design Showcase at the University of Minnesota’s Design of Medical Devices conference in April.

To cap off their recognition and success, the team was thrilled to see their device in action. A week before graduation, the students gathered at Shriners to observe as Brandon Sierra, 15, put the device through its paces. Sierra underwent surgery on his right arm in April to help him improve motion in the arm that had been hindered by hemiplegic cerebral palsy.

Although the team will be parting ways after graduation, their device stands as a testament to interdisciplinary teamwork. “We had worked previously together in other classes and, fortunately, our professors paired us together,” said Kumar. “We had four different engineering majors on our team—I can’t think of collaboration more interdisciplinary in my experience at Rice. Four majors within one five person team is pretty out there.”

The project between the five students reflects the larger scale institutional collaboration between Rice and Shriners. “A device like this shows the power of the synergies that can happen between institutions like

“A device like this shows the power of the synergies that can happen between institutions like Rice and Texas Medical Center. You’ve got a treasure trove of resources at Rice in the engineering field, and you have a treasure trove of clinically minded professionals at the medical center.”

— VIVASWATH KUMAR
Rice University Electrical and
Computer Engineering Student, ‘14

Rice and TMC,” said Kumar. “You’ve got a treasure trove of resources at Rice in the engineering field, and you have a treasure trove of clinically minded professionals at the TMC. We’re very thankful for both the support of Rice University and at Shriners. This project is very applicable to a wide variety of patients, which is something that drove us to make it better and better.”

Gogola envisions a future for the Rice invention extending beyond cerebral palsy therapy, capitalizing on the rich pool of resources within the medical center. “This device could be used in any situation where dexterity, or the fine motor movements of the hand, needs to be tested,” she said. “It could be used to evaluate patients being treated for stroke, Parkinson’s, spinal cord injuries, trauma—any situation where the ability to use their hands is affected. The potential for wider collaboration within the Texas Medical Center is massive. The ultimate goal is to better understand these disease processes so we can better understand and treat our patients.” ■

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Treating the Tiniest Patients

New Neuro-NICU Program offers specialized care for babies suffering from neurological complications

BY AMANDA D. STEIN



Baby Morris was the first to be treated in the new Neuro-NICU Program at Children's Memorial Hermann Hospital. He has since been given a clean bill of health. (Credit: The Dunford Family)

Children's Memorial Hermann Hospital recently announced their new Neuro-Neonatal Intensive Care Unit (Neuro-NICU) Program, the first of its kind in Houston, with five new amplitude-integrated EEG (aEEG) machines, and a highly-trained staff of nurses and physicians. The unit will be equipped to care for newborn babies suffering from neurological complications.

"Timing is critical when it comes to these cases and we strongly believe that with access to this cutting-edge clinical technology, we will be able to deliver a higher quality level of care to this very specific neonatal patient population, faster than ever before," explained Nicole Francis, clinical director of Neonatal Services at Children's Memorial Hermann Hospital.

The unit's new technology allows staff to monitor the tiny patients' brain activity in real time, for more than

“Timing is critical when it comes to these cases and we strongly believe that with access to this cutting-edge clinical technology, we will be able to deliver a higher quality level of care to this very specific neonatal patient population, faster than ever before.”

— NICOLE FRANCIS

Clinical Director of Neonatal Services at Children's Memorial Hermann Hospital

24 hours if needed, unlike a regular EEG machine, which is only capable of short-term monitoring of the brain's spontaneous electrical activity.

"This around-the-clock, uninterrupted monitoring system will allow for the delivery of faster, better data which will lead to faster, more accurate diagnoses and, therefore, speedier treatment options provided by our team of expert pediatric neurologists and neurosurgeons," said Dr. Gretchen Von Allmen, director of the Pediatric Epilepsy Program at Children's Memorial Hermann Hospital and assistant professor at UTHealth Medical School.

Children's Memorial Hermann Hospital has also long had the capability for whole-body cooling, which lowers the body temperature of babies suffering from hypoxia, relieving stress on the brain, and saving brain cells.

"The community is really good about referring babies here in under six hours so that we can initiate our cooling therapy," said Francis. "Outlying hospitals are good about getting the babies here because they know we have this technology. So for the community, this Neuro-NICU Program should mean an extra layer of protection, extra monitoring, and hopefully improved outcomes for the babies."

The Neuro-NICU team was immediately put to the test, when a baby was brought in on their first day of operations. Baby Morris was believed to be suffering from birth asphyxia, from complications with the umbilical cord during delivery. For oxygen-deprived babies, monitoring and treatment must begin within six hours of delivery to reduce damage to the brain.

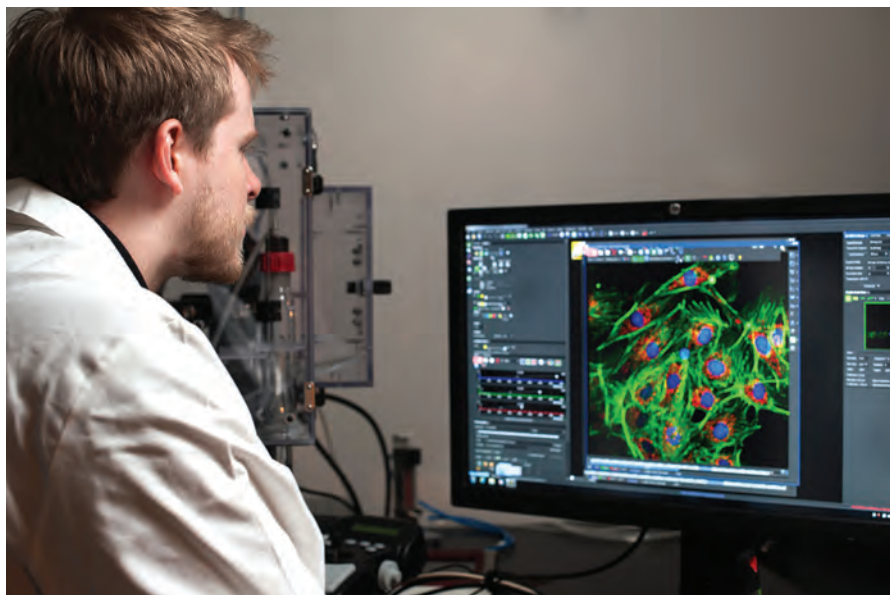
Thankfully, after careful monitoring in the Neuro-NICU, Morris was given a clean bill of health. But for the team behind the program, it reinforced their mission, and the need for the training and technology to respond quickly to possible neurological complications.

"As one of the first hospitals in the nation to use whole-body hypothermia for newborns suffering from birth hypoxia, our team has been leading the way in research and technology in the field of neuro-neonatology for many years," said Susie Distefano, chief executive officer of Children's Memorial Hermann Hospital. "Now with the addition of our new 24-hour Neuro-NICU monitoring program, we are continuing to refine and speed medical treatment for these complex cases by improving upon the already advanced level of care we have available to these tiny patients, delivering the best possible results." ■

Beyond Bench to Bedside

Texas A&M partners to unlock the mysteries of environmental health through team science

BY ALEX ORLANDO



Members of the Center for Translational Environmental Health Research (CTEHR) are focused on translating research advances in environmental causes of disease to improve detection, prevention and management of diseases induced or worsened by environmental exposures. (Credit: Texas A&M Health Science Center)

The environment influences our health in ways that we might not anticipate—through exposures to physical, chemical and biological risk factors and through related changes in our behavior in response to those factors. Globally, nearly one quarter of all deaths and disease can be attributed to the environment. A multidisciplinary research team led by Cheryl Lyn Walker, Ph.D., with the Texas A&M Health Science Center Institute of Biosciences and Technology (IBT) and College of Veterinary Medicine and Biomedical Sciences, along with partners from across Texas A&M and the Texas Medical Center, is committed to altering that staggering statistic. Together, they have created an unprecedented, cross-institutional initiative known as the Center for Translational Environmental Health Research (CTEHR).

“Our number one aim is to provide the Texas Medical Center with a focal point for environmental health research,” said Walker, professor and director of the Texas A&M IBT and director of CTEHR. “The medical center has so many incredible, world class research enterprises, but there has never really been a nucleus for those involved in environmental health. We’re intent on changing that.”

Recently named by the National Institute of Health (NIH) as the newest National Center of Excellence in Environmental Health Science, the center will serve as the cornerstone for integrated environmental health research, translation of research advances into practice and community outreach and engagement aimed at improving human health. One of only 21 centers of excellence in the country, CTEHR, which includes collaborators from across the Texas A&M University System, Baylor College of Medicine, and the University of Houston, is poised to lead the state and nation in better understanding the effects of the environment on human health.

The planning process to secure initial research funding from the National Institute of Environmental Health Sciences (NIEHS) spanned over a year and a half, crossing both institutional silos and town lines, as Walker and others reached out to various researchers whose work had the potential to significantly impact environmental health. Without exception, everyone they reached out to was eager to declare their interest.

“By the time we were ready to submit our grant application, we had over 65 people who wanted to be involved, and those 65 people had over \$80 million in independent grant support,” said Walker. “When we submitted the application, we actually had to ask some people to wait until we had

received funding to come on board. We came in the gate with about 35 members in our center. Now, we are opening up the doors to everyone; we’re excited to be bringing a lot of new members to CTEHR in our first year.” In their particular study section round, CTEHR tied for the top score with Harvard’s NIEHS Center for Environmental Health, which was founded in 1962.

The Center will bring together scientists from a wide array of fields, ranging from cell and molecular biology to biostatistics and engineering. Working towards a collective goal, the scientists will examine a number of environmental risk factors such as air quality, radiation, bacteria and lifestyle choices—diet and exercise, for example—to determine the link to disease in humans throughout the course of their lives.

Melissa Bondy, Ph.D., professor in the National Cancer Institute designated Dan L. Duncan Cancer Center at Baylor College of Medicine and associate director of the new center, is intent on advancing environmental research through emphasis on the human microbiome—the bacteria, single-cell organisms and viruses which colonize the body.

“For us, this center is a great opportunity because Baylor has been involved in environmental health research, with a major focus on the microbiome, for many years,” said Bondy. “To leverage that work collaboratively, sharing ideas and striving

“Our number one aim is to provide the Texas Medical Center with a focal point for environmental health research. The medical center has so many incredible, world class research enterprises, but there has never really been a nucleus for those involved in environmental health. We’re intent on changing that.”

— CHERYL LYN WALKER, PH.D.
Professor and Director at
Texas A&M Health Science Center Institute of Biosciences and Technology

“Through their combined efforts, the Center for Translational Environmental Health Research will harness the unparalleled scientific capabilities of this resource-rich location to promote new discoveries that could have the potential to save millions of lives worldwide.”

— BRETT P. GIROIR, M.D.

Executive Vice President and CEO of Texas A&M Health Science Center

towards seeing the whole picture rather than each individual piece, is invaluable.” Joseph Petrosino, Ph.D., associate professor of Molecular Virology and Microbiology, directs the Alkek Center for Metagenomics and Microbiome Research (CMMR), where researchers strive to identify the organisms that impact human health and disease.

Kjersti Agaard, M.D., Ph.D., associate professor of Obstetrics and Gynecology at Baylor, heads the PeriBank tissue repository, which collects perinatal samples from mothers and their children born at Texas Children’s Pavilion for Women and Ben Taub Hospital. James Versalovic, M.D., Ph.D., head of the Department of Pathology at Texas Children’s Hospital, is conducting research on how the microbiome affects intestinal diseases.

“Here in the Texas Medical Center,

we have all embraced the translational research paradigm which says that you have to get it from the bench to the bedside. It’s essential to translate those results to the patient themselves,” reflected Walker. “One of the things that our center does exceptionally well is to actually go to the next step, the community; we take it from bench to bedside to community.”

This novel approach will allow the center to accelerate the process of advancing basic scientific discoveries and translating them into treatment and prevention approaches for individuals at the highest risk for environmental disease, including vulnerable populations such as children and low socio-economic individuals. Through fostered resources and expertise, the center will enable individuals, communities and policy makers to make

informed decisions about environmental exposures and to mitigate environmental disease risks.

The Community Outreach and Engagement Core (COEC) of the CETHR is dedicated to improving environmental health science literacy. “One of our major goals is to provide objective, evidence based information for a variety of target audiences so that they can make informed decisions,” said Robin Fuchs-Young, Ph.D., professor in the Texas A&M College of Medicine, with a joint appointment at the Texas A&M IBT, and COEC director. “Sometimes, scientific results are complex and not easy to understand. Our job is to take research results and put them in a form that’s easily digestible and understandable for a variety of target audiences.”

That audience includes state legislators as well as regional policy makers. “The idea is to provide evidence based, research driven information in a useable form,” clarifies Fuchs-Young. “It’s not about trying to inject our opinions into policy or influence the decision making process. That’s a critical distinction.”

As an extension of her work with health policy, Fuchs-Young wants to enhance the environmental health

literacy of communities throughout Texas, furthering the center’s ultimate goal of promoting health and preventing disease. “We work with populations that are considered health disparity populations, where folks are disproportionately exposed to environmental contaminants and/or have low access to resources,” she said. “We interface with community leaders and key informants to assess the capacity of a community to deal with environmental health problems and to identify what their issues are and how to address them, often putting them in touch with policy makers. It’s a long term process.”

As part of this process, the Community Outreach and Engagement Core is committed to working within school systems, using education as another conduit to communicate with the overall population. “Science performed in a vacuum is of lesser impact than science that is translated to the public,” said Fuchs-Young. “One of the overall aims of our center, and the NIH as well, is to provide information about health promotion and disease prevention strategies for communities and their members to utilize in their decision making.”

The support of institutional leaders within the Texas Medical Center has been a driving force behind the scenes while center members focus on translating research advances to improve detection, prevention and management of diseases intensified by environmental exposure. “The assistance we received, all across the board, was absolutely tremendous,” said Walker. “It was another reason why we got one of the top scores in the study section. They appreciated that this was a multi-institutional center; Baylor was contributing to the success at Texas A&M and Texas A&M was contributing to the success at Baylor.”

“The TMC is the most important health-related district in the world; up until now, no entity has existed to lead the world-class research performed here in the area of human environmental health,” said Brett P. Giroir, M.D., executive vice president and CEO of Texas A&M Health Science Center. “Through their combined efforts, CTEHR will harness the unparalleled scientific capabilities of this resource-rich location to promote new discoveries that could have the potential to save millions of lives worldwide.” ■

Cheryl Lyn Walker, Ph.D. (Credit: Texas A&M Health Science Center)



Original Magna Carta and Only Known Copy of King's Writ United for First Time in U.S.

The Houston Museum of Natural Science

BY ALEX ORLANDO



(Credit: The Houston Museum of Natural Science)

An original edition of the Magna Carta, along with the only known example of the King's Writ, a letter from King John to the Sheriff of Gloucester dated June 20, 1215 A.D., announcing the signing of the Magna Carta, is currently on display at the Houston Museum of Natural Science (HMNS) from its home in Hereford Cathedral. The two documents are on display together on United States soil for the first time in their collective history.

The Magna Carta is considered to be Great Britain's most valuable export to the world and a model upon which the United States Constitution—among many other important world documents—was based. The Magna Carta continues to serve as the definitive document modeling basic civil liberties and is the source of many of the most fundamental concepts of law, including the very concept of a written constitution. In more than one hundred decisions, the United States Supreme Court has traced dependence on the Magna Carta for an understanding of due process of law, trial by jury of one's peers, the importance of a speedy and unbiased trial, and protection against

excessive bail, fines or cruel and unusual punishment.

"We are honored to be the museum with which Hereford Cathedral has elected to share this precious document with Houstonians and many others in Texas and the U.S.," said Joel Bartsch, president of the Houston Museum of Natural Science. "To be able to put on display and unite for the first time in the U.S. a copy of the Magna Carta and King's Writ, two documents that helped shape many other landmark documents including our U.S. Constitution, is a momentous occasion for HMNS."

This special, limited time exhibition, which runs from February 14th to August 17th, 2014, consists of two sections. The first section serves as an introduction to the Middle Ages, familiarizing visitors with various aspects of medieval life. Set against the backdrop of timelines and maps to situate when and where events occurred, patrons are treated to a visual and informational feast of different topics, ranging from hygiene (or lack thereof) to textiles to writing, complete with samples of parchment and a scribe's desk. Two mannequins, one dressed as a poor peasant boy and one as the boy King III, invite class comparisons while an extensive weapons portion, allowing visitors to lift a carefully rigged life-size jousting spear or take a glimpse at traditional armor, sheds light on the realities of medieval warfare. A brief video introducing King John and the Magna Carta sets the historical framework for the second section of the exhibit.

"The interactive elements really appeal to the younger visitors, and the tactile elements help provide them with a point of engagement," said Dirk Van Tuerenhout, Ph.D., curator of anthropology at the HMNS. "After all, we even have a life-size replica of a medieval toilet—what's not to love about that?"

The Magna Carta's history, as illustrated in the second part of the exhibit, is complex, part of the evolving

relationship between the monarchy and leading nobles of England during the preceding century. Following earlier charters issued by Henry I and Henry II, and decades of increasing conflict and civil war, the rebel barons of England, along with the Archbishop of Canterbury, Stephen Langton, and a number of bishops, forced King John to establish peace through the issuing of a new charter, at Runnymede, near Windsor, on June 15, 1215. The charter safeguarded certain rights, privileges and liberties of the clergy and the nobles, while also placing some limits on the power of the crown.

"When we knew these documents were coming our way, right in time for the 800th anniversary of the Magna Carta in 2015, we realized the importance of placing them in a larger context," explained Van Tuerenhout. "The second part of the exhibit sets up the chronology in a more refined manner." A wall of text emblazoned across the end of the room discusses the legacy of Magna Carta, specifically as it relates to the American Constitution.

"On both sides of the Atlantic we have come to see Magna Carta as an iconic milestone on the long road of human liberties and justice," said Canon Chris Pullin, Chancellor of Hereford Cathedral, who has overall management responsibility for the documents. "Many world leaders have been inspired by what it stands for, and we hope that this loan will strengthen the resolve of a new generation to safeguard the values of justice, peace and liberty." ■

General Information:
Houston Museum of Natural Science
5555 Hermann Park Dr.
Houston, TX 77030
www.hmns.org | 713-639-4629


MAGNA CARTA TIMELINE

1190–1300 *Magna Carta was the first document imposed upon a King of England by a group of his subjects, the feudal barons, in an attempt to limit his powers by law and protect their rights.*

The Magna Carta is considered to be Great Britain’s most valuable export to the world and a model upon which the United States Constitution—among many other important world documents—was based.

1190	King Richard the Lionheart joined the Third Crusade, leaving for the Holy Land never to return to England
1199	Prince John crowned King of England
1209	Pope Innocent III excommunicated John as a result of their conflict
1214	John recognized the authority of the Pope and made England a papal fief; High taxes to fight war and defeat by the French at the Battle of Bouvines resulted in dissatisfaction by the English Barons
1215	MAY 17: English Barons rebelled and captured Tower of London JUN. 15: Magna Carta sealed under oath by King John at Runnymede JUN. 19: Barons renewed oath of allegiance to John AUG. 24: Pope Innocent III annulled Magna Carta
1216	Barons rebelled again and invited a French invasion in May OCT. 18: John died of dysentery OCT. 28: Henry III, John’s son, age 8, succeeded NOV. 12: William Marshal Regent and Earl of Pembroke issued a revised version of Magna Carta
1217	French forces are defeated and forced to withdraw—second revision of Magna Carta was issued
1225	FEB. 11: Third revision of Magna Carta issued
1297	Edward I confirmed the Magna Carta. It remains in statute today

(Timeline Credit: The Houston Museum of Natural Science)



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ACCOLADES



DORA E. ANGELAKI, M.D., professor and the Wilhelmina Robertson Chair in Neuroscience at Baylor College of Medicine, has been named to one of the nation's most prestigious honorary societies—the American Academy of Arts and Sciences. It brings together some of the world's most accomplished leaders from academia, business, public affairs, the humanities and the arts. Angelaki's research focuses on multisensory integration that is needed for self-motion perception, spatial orientation and the control of movement. She has also been elected to the National Academy of Sciences.



WALT LOWE, M.D., chairman of the Department of Orthopaedic Surgery at The University of Texas Medical School at Houston and director of Memorial Hermann IRONMAN Sports Medicine Institute, has been recognized for his contributions to sports medicine by the American Physical Therapy Association (APTA). Lowe received the Jack C. Hughston Sports Physician Award from the APTA's Sports Physical Therapy Section. Lowe has been treating Houston's top professional and college athletes for more than a decade and is a team physician for the Houston Texans and Houston Rockets, as well as the University of Houston.



HAGOP KANTARJIAN, M.D., professor and Department of Leukemia chair at The University of Texas MD Anderson Cancer Center, received a lifetime achievement award for his dedication to research and clinical practice from Castle & Connolly Medical Limited. Kantarjian leads the nation's largest leukemia practice, a department known for its extensive participation and leadership in the development of new treatments through research and clinical trials. He holds the Kelcie Margaret Kana Research Chair and serves as associate vice president of MD Anderson's Global Academic Programs.



CESAR MALDONADO, PH.D., P.E., PMP, has been named chancellor of Houston Community College (HCC) by the HCC Board of Trustees. HCC conducted a nationwide search for the next leader of the institution by engaging a professional search firm and convening a diverse external group of 29 leaders, educators and students. Maldonado is an accomplished engineer, civic and business leader, and higher education administrator. Since 2008, he has served as president of Texas State Technical College (TSTC) in Harlingen. In 2011, he was also named vice chancellor for Institutional Effectiveness and Commercialization for the statewide TSTC System.



MARK W. KLINE, M.D., physician-in-chief at Texas Children's Hospital and chair of pediatrics at Baylor College of Medicine, was presented with the Program for Global Pediatric Research (PGPR) Award for Outstanding Contributions to Global Child Health 2014. The ceremony took place during the 2014 PGPR symposium in conjunction with the 2014 Pediatric Academic Societies/Asian Society for Pediatric Research Joint Meeting. Kline was chosen as this year's recipient based on his significant contribution to changing the global child health landscape through capacity building, leadership training and program implementation focused on revolutionizing the care of children with HIV/AIDS in developing countries.



MARTIN M. MATZUK, M.D., PH.D., director of the Center for Drug Discovery and vice chair of pathology and immunology at Baylor College of Medicine, has been elected to the National Academy of Sciences. Matzuk's research focuses on discovering the critical proteins and mechanisms involved in both normal and abnormal reproductive development. He is also a professor with the department of molecular and human genetics and co-director of the Medical Scientist Training Program (MSTP) at Baylor.



THOMAS G. KSIAZEK, PH.D., professor of pathology at the University of Texas Medical Branch (UTMB) and director of high containment operations for the Galveston National Laboratory, was recognized with a Lifetime Achievement Award at the 6th annual International Symposium on Filoviruses, which brings together experts from around the world to discuss advances in the diagnosis, treatment and control of Ebola and Marburg viruses. Ksiazek also directs the National Biodefense Training Center, which provides researchers with the skills necessary to work safely with deadly pathogens in high-containment laboratories.



FREDERICK A. MURPHY, PH.D., professor of pathology at the University of Texas Medical Branch (UTMB), was recognized with a Lifetime Achievement Award at the 6th annual International Symposium on Filoviruses, which brings together experts from around the world to discuss advances in the diagnosis, treatment and control of Ebola and Marburg viruses. Murphy was the co-discoverer of this group of deadly viruses. Prior to his arrival at UTMB in 2005, he served in a number of prominent positions at the Centers for Disease Control and Prevention, concluding his career as director of the National Center for Infectious Diseases.

HOUSTON METHODIST GRATEFULLY ACKNOWLEDGES GEORGE AND ANGELINA KOSTAS

THE NEW GEORGE AND ANGELINA KOSTAS RESEARCH CENTER for Cardiovascular Nanomedicine at the Houston Methodist Research Institute began operations recently after receiving a generous gift from George J. and Angelina P. Kostas. The gift is the largest philanthropic gift ever given in support of cardiovascular nanomedicine and could revolutionize the treatment of cardiovascular disease.

THE GROUNDBREAKING CENTER WILL FOSTER INTERNATIONAL COLLABORATION and bring together top laboratory and physician scientists from the Houston Methodist DeBakey Heart & Vascular Center and the Houston Methodist Research Institute Department of Nanomedicine to investigate how emerging technologies in nanomedicine can be used to heal damaged hearts and vascular tissue. This gift will fund an international annual meeting in Houston on cardiovascular nanomedicine that involves scientists worldwide in order to serve as a platform for the exchange of ideas.

THE KOSTASES, AMERICAN-BORN CHILDREN OF GREEK IMMIGRANTS, HAVE A LONG TRADITION OF PHILANTHROPIC GIFTS, including establishment of The George J. Kostas Research Institute for Homeland Security (2010) and The George J. Kostas Nanoscale Technology and Manufacturing Research Center at Northeastern University (2003) in Boston, George Kostas' alma mater. The George J. Kostas Research Institute for Homeland Security is a secure building at Northeastern University, Burlington Campus. Its mission is to conduct classified research to protect Americans in the face of 21st century risks. Northeastern awarded him in 2008 an honorary Doctorate of Sciences and the President's Medallion award.



**ANGELINA P. KOSTAS
AND GEORGE J. KOSTAS**

AFTER HIS RETIREMENT from Conoco in 1972, where he was manager of the Organo-metallics Division, he founded and has been president of TESCO (Techno Economic Services Inc.) for 30 years. Under his leadership, TESCO developed a revolutionary new process, based on his patents, termed "Xenoclad", which plates aluminum in an atomic form on metal substrates to render them resistant to corrosion. George Kostas was recruited in 1943, along with seven other engineers, to start and operate the first U.S. synthetic rubber manufacturing plant which was already being built in Baytown, Texas. In 1946, Kostas was appointed a member of the U.S. Research & Development Committee and served in this capacity until 1955 when the government decided to exit the synthetic rubber program.

ANGELINA, "LEA," A WOMAN OF DEEP FAITH, GRACE, AND WARMTH, and devoted lifelong member of Annunciation Greek Orthodox Cathedral, served as a member of the Philoptochos charitable society for 70 years, and board member for 40 years.

During World War II, Lea served as a spotter for enemy aircraft over the Houston area. Married for 62 years, George and Angelina are the parents of four talented daughters. The Kostas family has been generous supporters of the Annunciation and St. Basil's Greek Orthodox Churches of Houston. They built the St. George Chapel and then donated it to the Cathedral. St. Basil's church honored Mr. Kostas by naming the Education Center in his honor. In 2008, they honored Lea Kostas by naming the Auditorium in her honor.

THE KOSTAS CENTER WILL BE DIRECTED by Houston Methodist Research Institute President & CEO Mauro Ferrari, PhD, and the Heart & Vascular Center Medical Director Alan B. Lumsden, MD, who, along with the executive committee, will guide the center's development, approve new research initiatives and initiate collaborative ventures that will transform cardiovascular nanomedicine. The center's program and working group leaders include some of Houston Methodist's best nanotechnology researchers and cardiovascular physicians and surgeons, such as Guillermo Torre-Amione, MD, PhD, Elvin Blanco, PhD, Miguel Valderrábano, MD, John Cooke, MD, PhD, Ennio Tasciotti, PhD, William Zoghbi, MD, and Paolo Decuzzi, PhD. The groups are designed to work in sequence, a bit like runners in a relay race, to translate discoveries quickly into technologies for human clinical trials.

ONE POSSIBLE AREA OF INVESTIGATION is the use of non-toxic, silicon-based nanoparticles to dismantle and disperse the fatty plaques that often form along the inner sides of blood vessels. These plaques contribute to hypertension. When larger plaques are dislodged, they can cause blockages downstream, leading to heart attacks and strokes.

Team Performs Successful Open Fetal Surgery to Treat Rare Condition

Baby Cabellotrejo was born healthy last month at Texas Children's Pavilion for Women following a complex pregnancy that involved open fetal surgery. The announcement was made by the physicians at Texas Children's Fetal Center, who, early in the pregnancy, diagnosed baby boy Cabellotrejo with a very large lung mass, called congenital cystic adenomatoid

malformation (CCAM). Mom and baby were transferred from their hometown of Austin to Texas Children's Fetal Center in Houston, where a nationally recognized, multidisciplinary team of surgeons intervened with an open fetal surgery that saved the baby's life.

During the procedure, surgeons partially removed the baby from his mother's womb, opened the baby's chest and

removed the giant mass, returning him safely back into his mother's womb less than 30 minutes later. The fetal heart failure resolved, and the baby and mother subsequently recovered smoothly. Mom remained pregnant for over 11 weeks before she delivered her health baby boy.

To date, only two other centers in the world have been successful at treating this rare and complex medical condition, an abnormal growth of malformed lung tissue that is the result of abnormal organ development. The adenomatous overgrowth of terminal bronchioles and reduced number of normal alveoli may cause significant pulmonary effects. It is incredibly rare for these malformations to grow to such a large size as to lead to fetal heart failure, a condition that is very difficult to

treat prenatally. The fetus continued to deteriorate despite medical treatment.

"Fetal surgery was the only hope for this baby boy who was sure to die without surgical intervention. The good outcome achieved in this case is the result of great teamwork, including the contributions by our expert fetal radiologists, cardiologists and maternal fetal surgery team. I am so pleased this baby has recovered fully and now has the hope of a completely normal life," said Dr. Darrell Cass, co-director of Texas Children's Fetal Center, and lead surgeon on this case. "Baby Cabellotrejo is a fighter and a survivor. We are ecstatic that his parents have delivered a healthy baby boy."

The open fetal surgery involved removing the mass, which had overgrown the left lower lung of the fetus. In order to reach the mass, the arm and part of the shoulder were extracted from the mother's womb. Time and precision are, of course, crucial in the success of this surgery. In addition to an expert operating room team and pediatric anesthesiologists, a multidisciplinary team of specialists led the surgery from Texas Children's Fetal Center.

"Texas Children's Fetal Center is one of only a few centers in the world capable of such a complex surgical intervention," Belfort says of his team. "We have acquired a team of experts from around the world who focus specifically on fetal surgery, all with top technical skills and a commitment to medical innovation, which makes our center one of a kind." ■

— Sarah Frankoff,
Texas Children's Hospital

“The good outcome achieved in this case is the result of great teamwork, including the contributions by our expert fetal radiologists, cardiologists and maternal fetal surgery team.”

— DARREL CASS, M.D.
Co-Director of Texas Children's Fetal Center



During the procedure, surgeons partially removed the baby from his mother's womb, opened the baby's chest and removed the giant mass, returning him safely back into his mother's womb less than 30 minutes later. (Credit: Texas Children's Fetal Center)

No Bioengineered Gut Bacteria, No Glory



Jeff Tabor, assistant professor of bioengineering at Rice University
(Credit: Jeff Fitlow/Rice University)

The motto “no guts, no glory” may need rewriting if Rice University synthetic biologist Jeff Tabor succeeds in his quest to help the Navy create an edible probiotic bacterium that can help protect sailors and marines from obesity and depression.

“Our goal is to engineer a new probiotic bacterium that can protect against

a common large-intestine disorder that causes obesity and depression,” said Tabor, assistant professor of bioengineering at Rice and the lead investigator on a new project funded by the Office of Naval Research (ONR).

A three-year grant from ONR’s Young Investigator Program will fund Tabor’s work, one of the first studies to

combine two of the hottest fields in the life sciences—synthetic biology and microbiomics.

Synthetic biologists like Tabor specialize in programming single-celled organisms like bacteria and yeast, much like one would program a robot. In particular, Tabor engineers bacterial sensors that can be used to detect a wide range of environmental information, including disease signals in the gut. By linking these sensors to synthetic genetic circuits—groups of interacting genes that carry out complex information processing—Tabor’s team can program bacteria for advanced autonomous behaviors. In his most recent work at Rice, he and his students created a toolkit of bacterial light sensors and optical hardware to bring both mathematical predictability and cut-and-paste simplicity to the world of genetic circuit design.

Probiotics—edible bacteria that improve health—are increasingly being used to treat diseases, but they have not yet become a major medical paradigm.

In his new ONR-funded research, Tabor plans to program probiotics for highly reliable disease prevention in people with different genetic backgrounds, diets and so on. Tabor’s team aims to do this by creating a network of genetic circuits that can sense, compute and respond to disease in a highly reliable way.

“There are about 10 times more bacterial cells in our bodies than human cells, and numerous studies over the past decade have found that these bacteria play important roles in obesity, immune function, depression and other health processes,” Tabor said.

Collectively, the trillions of bacteria in our bodies are known as the microbiome. Innovative studies over the past decade have found that a person’s microbiome contains more genetic information than the human genome. Increasingly, clinicians and scientists like Tabor are interested in finding ways to use the microbiome to treat disease and improve health. ■

— Jade Boyd, Rice University

Family Donation Funds Research for Rare Neurological Disorder

A rare and mysterious neurological disorder inspired the Wilsey family of San Francisco to fund researchers at the Jan and Dan Duncan Neurological Research Institute at Texas Children’s Hospital and the Department of Molecular & Human Genetics at Baylor College of Medicine to study and develop treatments for NGLY1 deficiency. The Wilseys’ daughter, Grace, is one of only 14 known children worldwide affected by the rare condition, which is characterized by a mutation in the gene coding for N-glycanase 1, an enzyme that is thought to help recycle defective products from a cellular assembly line. Children who lack this enzyme experience varying degrees of movement disorders, suffer from developmental delays, have liver and gastrointestinal problems and cry without producing tears.

After a lengthy saga of visiting with physicians across the nation searching for answers about Grace’s condition, the Wilsey family finally found the

answer after a meeting with Huda Zoghbi, M.D., Howard Hughes Medical Institute investigator and director of the Jan and Dan Duncan Neurological Research Institute at Texas Children’s Hospital. Zoghbi examined Grace and recommended a new test called whole genome sequencing, which helped identify Grace as the second child in the world diagnosed with NGLY1 deficiency. Experts at Texas Children’s Hospital and Baylor used the new test to decode the DNA sequence of her genome allowing them to identify abnormal genes. The technology helps patients and families understand the cause of neurologic diseases, as well as the risk of recurrence.

In Grace’s case, the testing provided researchers eight different genes, including NGLY1, and they began investigating the genes in order of the likelihood that they might explain her disease.

Matthew Bainbridge, Ph.D., post-doctoral associate in the Human Genome Sequencing Center at Baylor,

ultimately solved the mystery after scouring the medical literature and identifying another child with similar unusual symptoms, which were tied to an NGLY1 gene defect.

“Having the support and engagement of the Wilsey family was critical to solving this case and their ongoing efforts in patient-research advocacy will be paramount to solving more genetic diseases in the future,” said Bainbridge.

The research was published in a recent issue of the journal *Genetics in Medicine*.

“Whole genome sequencing has been a powerful tool in diagnosing some of the most challenging cases and we are increasingly finding patients with rare syndromes who have been through a battery of previous tests without a diagnosis,” said Richard Gibbs, Ph.D., director of the Human Genome Sequencing Center at Baylor.

Hamed Jafar-Nejad, M.D., in consultation with Zoghbi, is leading research efforts for NGLY1 deficiency at Baylor and the Jan and Dan Duncan

Neurological Research Institute (NRI) at Texas Children’s Hospital. The Baylor/NRI group is using fruit flies to understand the cellular and physiological defects caused by the loss of NGLY1 and to identify potential therapeutic targets for the disease. These studies are coordinated with those of a group of researchers around the world who are using biochemical, cell biological, mouse genetics and systems biology approaches to understand the biology of NGLY1 and the pathophysiology of NGLY1 deficiency. It is hoped that this multidisciplinary approach, which has been made possible by generous funds from the Wilsey family, will significantly expedite the progress of this project and will lead to the identification of a therapy for NGLY1 deficiency. ■

— Veronika Javor Romeis,
Texas Children’s Hospital

University of Houston Biomedical Engineer Works to Make Blood Transfusions Safer

A biomedical engineer at the University of Houston (UH) is working to develop highly innovative technology to make blood transfusions safer by separating well-preserved red blood cells from potentially harmful materials. His work is supported by a \$1.8 million grant from the National Institutes of Health.

While blood transfusions save millions of lives every year, there's strong evidence that transfusions of red blood cells stored in a refrigerator for prolonged periods of time can be dangerous or even deadly for some patients. The longer blood is in storage, the more potentially harmful materials, such as the anticoagulant-preservative solution that keeps blood cells alive during storage as well as cells themselves that have been irreparably damaged, build up.

"Therapeutically, there's absolutely no reason to transfer any of this into

the patient," said Sergey Shevkoplyas, Ph.D., associate professor of biomedical engineering with UH's Cullen College of Engineering. "The only thing you need to transfuse into the patient is well-preserved red blood cells. There's no point to giving you these other potentially toxic materials."

Shevkoplyas is working under an NIH Director's Transformative Research Award to develop a simple device to separate healthy, well-preserved red blood cells from all the other material in the blood bag just before transfusion.

The system Shevkoplyas is developing will consist of two tubes that feed into a plastic device just a few inches in size. One tube will send blood into the device, while another will send saline solution. In the first step, the saline will wash harmful particles and the storage solution off the healthy red blood cells. Next, the entire mixture will be sent



The system Shevkoplyas is developing will consist of two tubes that feed into a plastic device just a few inches in size. One tube will send blood into the device, while another will send saline solution. (Credit: Jake Brown, Cullen College of Engineering Communications Office)

through an array of precisely designed micro fluidic channels, where the shape, size and flexibility of healthy red blood cells will allow them to be separated from the particles, damaged cells and storage solution. At that point, the healthy red blood cells, along with saline acting as a transport medium, can be transfused safely into the patient.

"We're trying to fit as much of this

technology as we can into the existing paradigm of transfusion. We want to empower medical professionals at the scene to make the decision about using this system," Shevkoplyas said. "You cannot save people's lives without blood transfusions. We're just trying to make this life-saving procedure as safe as possible." ■

— Lisa Merkl, University of Houston

“ You cannot save people's lives without blood transfusions. We're just trying to make this life-saving procedure as safe as possible. ”

— SERGEY SHEVKOPLYAS, PH.D.

Associate Professor of Biomedical Engineering at the University of Houston's Cullen College of Engineering

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New Drug Boosts Immune System to Protect Against World's Deadliest Infectious Diseases

Researchers at the Texas A&M Health Science Center (TAMHSC) and the University of Texas MD Anderson Cancer Center have developed a new therapy to stimulate the body's natural immune system, thereby providing effective protection against a wide range of life-threatening infectious diseases. The drug, PUL-042, recently entered human clinical trials through Houston-based biotechnology company Pulmotect, Inc.

"The lungs are the point of entry for many viruses and bacteria. We hypothesized that activating the innate immune defense of the lungs might provide effective protection against a wide range of deadly pathogens," said Magnus Höök, Ph.D., regents and distinguished professor at the TAMHSC Institute for Biosciences and Technology, and co-founder of Pulmotect, Inc. "Based on our theory, we created a drug that stimulates the innate immune system, leading to rapid protection against many deadly lung infections."

Originally designed to prevent and treat respiratory infections, PUL-042 is an inhaled substance that offers intense, short-term protection against bacterial, fungal and viral pathogens by protecting the lungs against infectious diseases. Initially, the team focused efforts on prevention of pneumonia in cancer patients.

"Patients receiving chemotherapy are highly susceptible to life threatening respiratory infections, including pneumonia, while in their immune-compromised state," Höök said. "PUL-042 holds promise to protect these patients from deadly infection during their most vulnerable period, allowing for significantly higher treatment success."

Potential applications of the drug extend beyond cancer patients, reaching into the public and global health arenas. By bolstering the body's first line of defense, PUL-042 shows promise in the areas of biodefense, as well as the prevention of seasonal and pandemic influenza and other respiratory infections, such as those commonly suffered by asthmatic patients.

PUL-042 remains effective in a patient's system for three to four days and although short-lived, the protection is very broad with promising protective capabilities for a number of infections and pathogens that impact the health and safety of populations around the world.

The first human clinical trials are now underway, designed to assess the safety and tolerability of the inhalation solution. The next phase will include repeat dosing of the drug to expand protection and determine the efficacy in cancer patients. Depending on outcome of the trials, the drug could be available on the market in the next four to five years.

"A development seven years in the making, we are delighted to see the technology advancing into clinical trials, moving us one step closer toward our end goal: bringing this

protective therapy to the market to save lives and address a critical unmet need worldwide," Höök said. "Ultimately, this drug has the potential to alter our vulnerability to deadly epidemics and bioterror threats."

Founded in 2007, Pulmotect's technology is licensed by Texas A&M and The University of Texas MD Anderson Cancer Center. In 2012, the company received a \$7 million

grant from the Cancer Prevention Institute of Texas as well as several Small Business Innovation Research Grants from the National Institutes of Health. Additionally, Pulmotect, Inc. received an investment award from the Texas Emerging Technology Fund in 2009. ■

— Holly Lambert Shive, Texas A&M

“ We are delighted to see the technology advancing into clinical trials, moving us one step closer toward our end goal: bringing this protective therapy to the market to save lives and address a critical unmet need worldwide. ”

— MAGNUS HÖÖK, PH.D.

Director of the Center for Infectious and Inflammatory Diseases at the TAMHSC Institute of Biosciences and Technology



Magnus Höök, Ph.D., director of the Center for Infectious and Inflammatory Diseases at the TAMHSC Institute of Biosciences and Technology, has discovered a new lung protective therapy that could alter our susceptibility to a number of deadly epidemics. (Credit: Texas A&M Health Science Center)

June 2014

4 **Symposium on the Future of Cancer Science**
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tmchumbley@mdanderson.org
713-563-9637

5 **Evidence for Natural Killer Cell Dysfunction in Childhood Acute Lymphoblastic Leukemia**
Guest speaker Rayne Rouce, M.D.
Thursday, 8-9 a.m.
Texas Children’s Hospital, Feigin Center, 1st Floor, Conference Room A (C140.05)
mdharris@txch.org

6 **UTMB Pharmacology & Toxicology Student Summer Seminar Series: “Disruption of the Hippocampal GABAergic System in the *fgf12* -/- Transgenic Mouse Model”**
Presented by Tahani Alshammari, Graduate Assistant
Friday, Noon-1 p.m.
University of Texas Medical Branch - Galveston, Basic Science Auditorium, Rm 2.212
pwelsh@utmb.edu

10 **Patient-Centered Communication During Cancer Care: Preventing Breakdowns and Mitigating Harm**
Presented by Kathleen Mazor, EdD, professor of medicine, University of Massachusetts Medical School; assistant director, Meyers Primary Care Institute
Tuesday, Noon-1 p.m.
MD Anderson, Hickey Auditorium, Main Building, Floor 11 (R11.1400)
jmartine@mdanderson.org
713-563-1484

History of Infectious Disease in the Texas Medical Center
Presented by Daniel M. Musher, M.D., Department of Medicine-Infectious Disease professor
Tuesday, Noon-1 p.m.
One Baylor Plaza, Michael E. DeBakey Center
Tatara@bcm.edu
847-987-7751

10-12 **6th Annual Adolescent Sexual Health Course: From Talk to Action, Helping Teens Build Healthy Relationships**
Keynote address by Elizabeth Smart
Bayou City Event Center, 9401 Knight Road, Houston
713-500-9670
Rose.M.Betancourt-Trevino@uth.tmc.edu
713-348-4020

12 **I Will Survive: Hope in Motion—A Survivors’ Celebration of Life**
Guest speaker Bob Losure, former CNN Headline News anchor, author and cancer survivor
The Westin Houston Memorial City
amy.deutsch@memorialhermann.org
713-222-2273

23-28 **Disparities in Health in America: Working Towards Social Justice Workshop**
Provides participants with a comprehensive understanding of health disparities, of means to enhance health equity, and of the bio-psychosocial approach in addressing health disparities in minority and the medically underserved populations.
8 a.m.-6 p.m.
Prairie View A&M University College of Nursing, 6436 Fannin Street
Main Auditorium, 1st Floor, Rm. 134
bclark@naatpn.org
919-680-4000
www.naatpn.org

26 **Integrating Ethics into Everyday Teaching**
Thursday, 2-4 p.m.
One Baylor Plaza, Michael E. DeBakey Center, Room M319.01
lydia.garza@bcm.edu
713-798-4951



**United Way thanks these company leaders and employees
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United Way of Greater Houston is a leader and trusted partner in improving lives, tackling key community social issues and making a lasting difference. Thanks to your generosity, United Way is making a better Houston possible by embracing the entire circle of life and focusing on tough issues, like family financial stability, education and the quality of life for returning veterans.

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(Results as of print deadline)

Under the leadership of United Way Community Campaign Chair, Lynne Liberato, partner at Haynes and Boone, L.L.P., health care related campaigns contributed over \$1.7 million to support the United Way 2013-14 Community Campaign. We support the community health efforts of local hospitals and other healthcare organizations and strive to improve health care access.

For more information on how your health care organization can get involved, contact Fred Brieden at 713-685-2330 or fbrieden@unitedwayhouston.org.



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