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Medical Center

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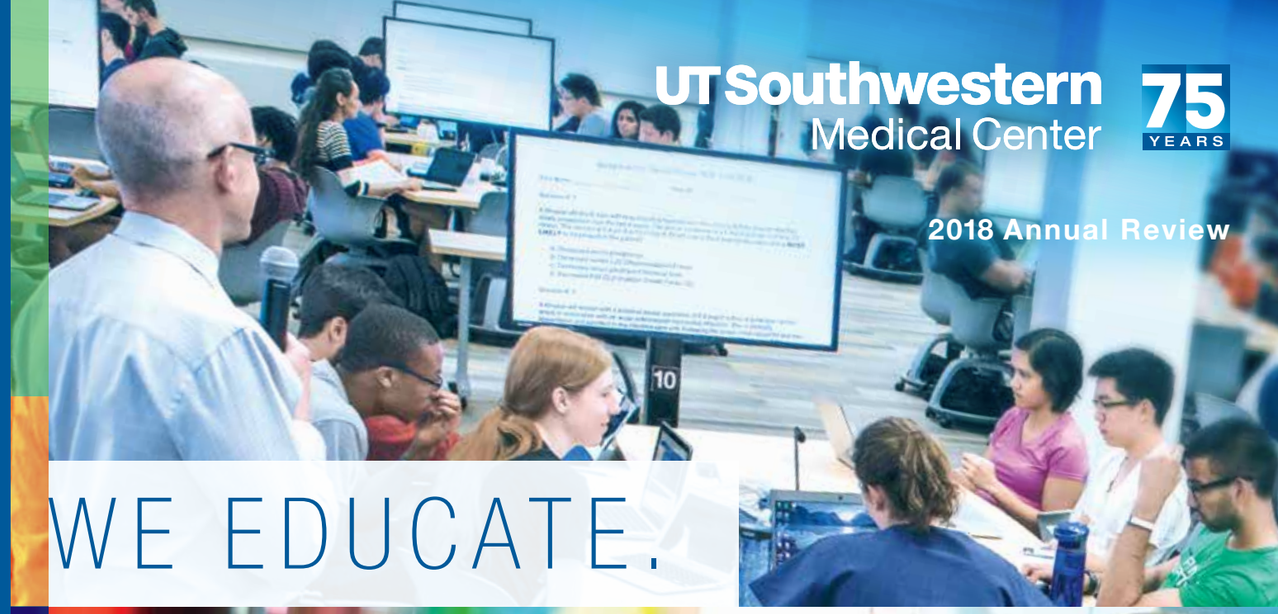
UT Southwestern Medical Center 75 YEARS

2018 Annual Review



WE EDUCATE.

WE DISCOVER.

WE HEAL.

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President Daniel K. Podolsky, M.D.

Executive Vice President for Institutional Advancement Marc Nivet, Ed.D., MBA

Assistant Vice President for Communications Mark Lane

Director, Institutional Communications Debbie Bolles

Editors Debbie Bolles, Carol Marie Cropper, Alfred Marucci, Rachel Stowe Master, Ronnie Rittenberry, Amy Stumbris

Writers James Beltran, Debbie Bolles, Carol Marie Cropper, Cathy Frisinger, Remekca Owens, Sharon Reynolds, Russell Rian, Amy Stumbris, Heather Svokos, Patrick Wascovich, Deborah Wormser

Photographers Brian Coats, David Gresham, Mei-Chun Jau

Director of Creative Services Shayne Washburn

Director of Interactive Media and Web Services Tom Mathews

Web Services Jonathan Maedche

Director of Digital and Social Media Kristen Holland Shear

Digital and Social Engagement Sherleen Mahoney, Dawn Maxwell

Administrative Logistics Kaitlyn Burkig, Kathy Watson

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Innovations in medical care this past year included testing a new type of immunotherapy to fight cancer, implementing more surgical techniques that are less invasive, and editing genes to research a cure for a type of muscular dystrophy.

In pursuit of scientific breakthroughs 24

Game-changing research underway at UT Southwestern in 2018 included identification of the point at which a protein turns toxic and leads to Alzheimer's disease, a global initiative to map human brain cells, and use of cryo-electron microscopy to determine the atomic structure of important molecules.

Celebrating the past and creating the future 44

UT Southwestern celebrated its 75th anniversary last year, recognizing milestones that led to its success, initiatives that keep it at the forefront of innovation, and new growth opportunities on the horizon.

Serving the community and the state 54

UT Southwestern faculty, staff, and students reached out to impact the community to improve health care and advance science on multiple fronts, from directly assisting those affected by Hurricane Harvey to bringing the excitement of science to the public through events such as Science in the City.

Recognizing and honoring the people who are UT Southwestern 66

Groundbreaking research and outstanding clinical care led to several prestigious individual honors in 2018, shining a light on a year in which the University also mourned the loss of some legendary faculty members and key benefactors.

Dear Friends,

The year 2018 marked a momentous milestone for UT Southwestern – our 75th anniversary, which we celebrated with events and publications that both honored our past and looked ahead to our future. Thanks to the achievements of our faculty, enabled by the support of our friends and the state of Texas, over the past 75 years UT Southwestern has evolved from its origin as a small medical school housed in converted Army barracks to the UT Southwestern of today – a nationally and internationally pre-eminent academic medical center dedicated to education, discovery, and healing.

We are pleased to send you this UT Southwestern Annual Review for the 2017-18 academic year, which highlights current programs and activities we thought you would find especially interesting. Ultimately, the purpose of everything we do at UT Southwestern is to carry out our mission of promoting health and a healthy society that enables achievement of full human potential.

Much has changed at UT Southwestern over the past 75 years in the ways we have carried out our mission, but our mission itself is immutable – and our core values and commitment to education, discovery, and healing serve as the bridge linking UT Southwestern's past, present, and future.

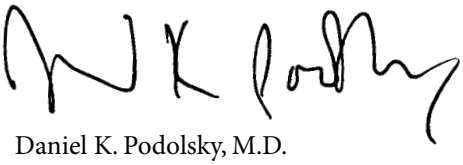
As you will see in this Annual Review, we are proud to be advancing medical care through innovation in new types of immunotherapy for cancer patients, through less invasive surgical techniques, and through the application of new genetic knowledge and technologies. At the same time, UT Southwestern faculty, working under the umbrella structure of the Peter O'Donnell Jr. Brain Institute, are pursuing breakthrough discoveries in Alzheimer's disease and are participating in an international initiative to map brain cells to better understand how healthy cells work and ultimately how to treat brain diseases such as autism and schizophrenia.

This May, the Medical School Class of 2019 will be the first class to graduate having completed all four years under the new curriculum, which is based on a stronger integration of the scientific and clinical components of medical education and emphasizes teamwork and new skills, such as quality improvement, to better prepare our students for the changing landscape of health care delivery. In support of the new curriculum – and to provide ongoing training opportunities for nurses, residents, fellows, and clinical faculty – we opened a state-of-the-art Simulation Center last fall. One of the largest in the country, it offers valuable opportunities for education and training in developing and honing diagnostic, surgical, and decision-making skills.

To support growth on all fronts, we continue to expand our clinical programs in Dallas, Fort Worth, and other North Texas communities; we opened a new clinical and academic building, West Campus Building 3, last August; and we are well along on the construction of a William P. Clements Jr. University Hospital third tower, which will be completed in 2020. In addition, consistent with the priority we are placing on the development of the Harold C. Simmons Comprehensive Cancer Center and the O'Donnell Brain Institute, we have been working intensively on plans for a new building on North Campus to house both of those programs, with a groundbreaking anticipated this spring.

UT Southwestern would not be the thriving, forward-looking institution it is today without the philanthropic support we have received from our friends in the Dallas community and beyond. On behalf of the entire campus community, I thank you for your generosity and commitment – past, present, and future.

Sincerely,



Daniel K. Podolsky, M.D.
President, UT Southwestern Medical Center

Advancing care through innovation

Pushing the boundaries of medicine to improve patient care – UT Southwestern clinicians excel at this mission. Whether modifying immune cells to fight cancer, editing genes in search of a disease cure, or surgically repairing an aneurysm with less invasive techniques, these efforts by our caregivers are saving lives and building hope.

Dr. Neelan Doolabh performs a revolutionary minimally invasive heart valve replacement surgery.

Simmons Cancer Center researchers part of CAR-T breakthrough

UT Southwestern cancer researchers are leading the way toward a possible cure for patients with difficult-to-treat acute lymphoblastic leukemia (ALL), the most common type of cancer in children.

In a pathbreaking study published last year in the *New England Journal of Medicine,* researchers from UT Southwestern's Harold C. Simmons Comprehensive Cancer Center and others found that genetically modified immune cells can be harnessed to treat children and young adults when ALL recurs or does not respond to therapy. The study demonstrates the effectiveness of CAR-T (short for chimeric antigen receptor T-cell) therapy, which uses modified immune cells.

> "It was gratifying to be part of this pioneering effort using a genetically modified version of the patients' T-cells to attack their cancer cells." – *Dr. Ted Laetsch*

In acute lymphoblastic leukemia, the bone marrow makes too many white blood cells. With approximately 3,500 new cases a year in children, it is the most common childhood cancer, according to the National Cancer Institute.

In the global trial, 75 young patients who had a form of treatment-resistant ALL received CAR-T therapy. Of those, 81 percent went into remission – an impressively high success rate. All of the participants had previously relapsed or failed to respond after standard therapy.

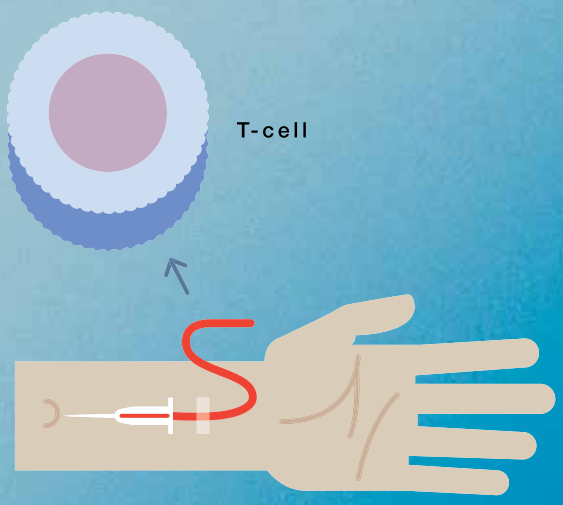
Based on those promising early results, the U.S. Food and Drug Administration in August 2017 approved the use of CAR-T therapy for patients age 25 and under suffering from relapsed or difficult-to-treat ALL. A year later, in August 2018, the European Commission approved the therapy.

"This is a new frontier in cancer treatment," said Dr. Ted Laetsch, Associate Professor of Pediatrics with the Simmons Cancer Center and lead investigator on the study.

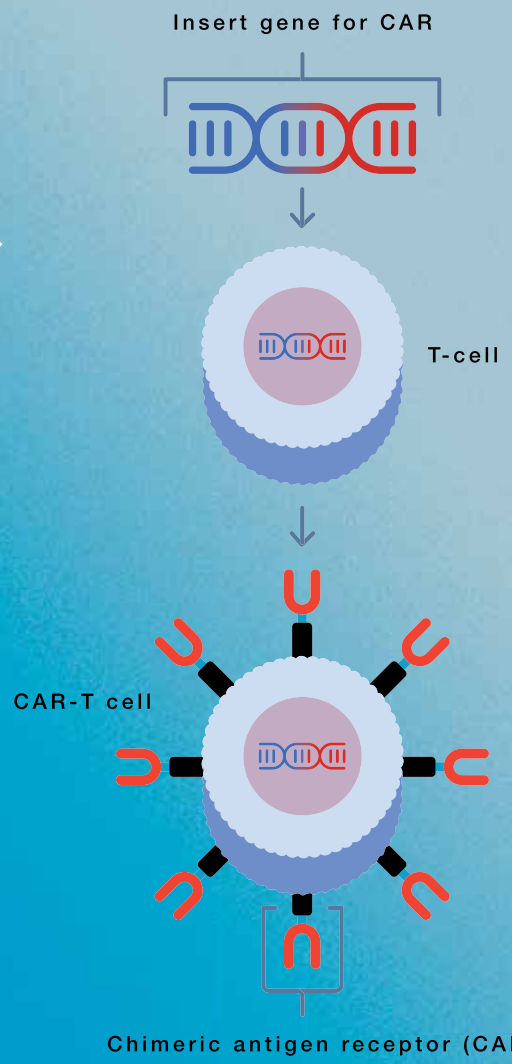
Dr. Laetsch is now providing CAR-T treatment at the Pauline Allen Gill Center for Cancer and Blood Disorders at Children's Health for young patients whose leukemia did not respond to therapy or who have relapsed more than once. Dr. Laetsch is an unpaid consultant for Novartis, which makes the CAR-T drug for ALL.

CAR-T cell therapy

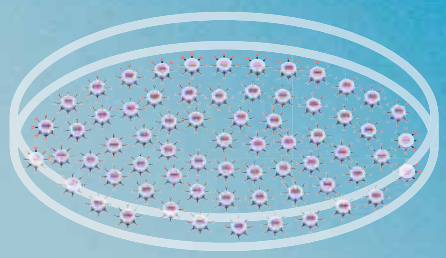
Get blood with T-cells from patient



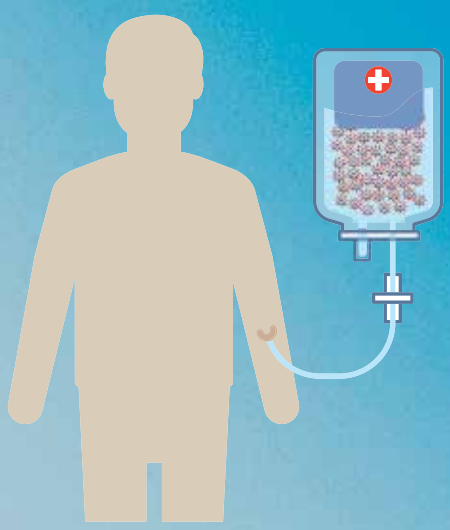
Create CAR-T cells that react to cancer cells



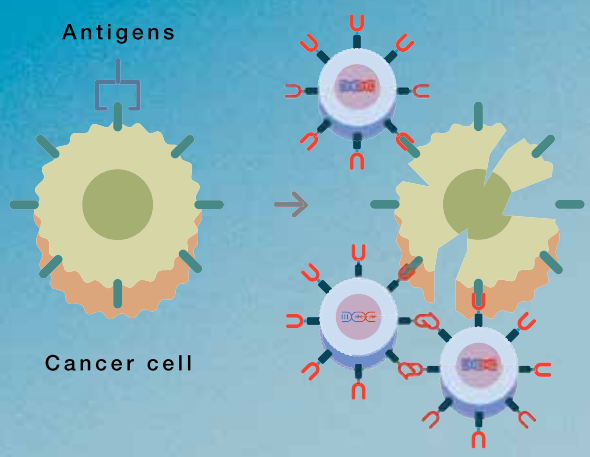
Grow many CAR-T cells



Inject CAR-T cells into patient



CAR-T cells attack cancer cells



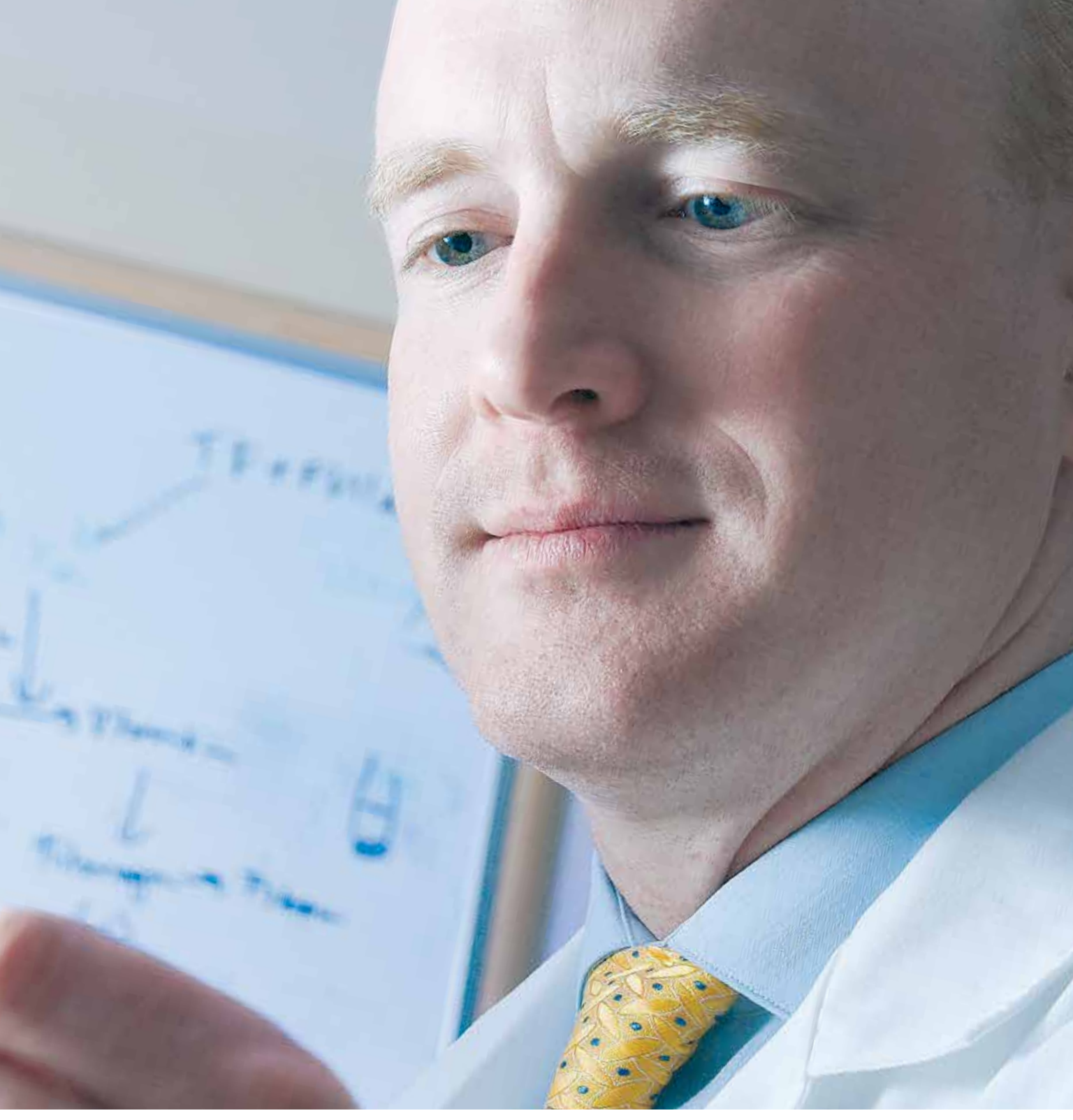
How to join a CAR-T trial

Adult multiple myeloma patients interested in participating in UT Southwestern's CAR-T multiple myeloma trial can call 214-645-HOPE (214-645-4673) and ask for Julie Zuckerman.

Those interested in CAR-T cell therapy for ALL can call the Pediatric Oncology and Hematology Clinic at 214-456-2382.

"It was gratifying to be part of this pioneering effort using a genetically modified version of the patients' T-cells to attack their cancer cells, and to see such positive results for so many patients," Dr. Laetsch added. "While most children with ALL respond well to chemotherapy, the patients in this trial were patients whose cancer had returned, and they desperately needed an alternative."

In cases where ALL does not respond well to traditional chemotherapy – or the cancer returns – subsequent rounds of chemotherapy are effective less than half the time, Dr. Laetsch said.



Dr. Ted Laetsch uses genetically modified immune cells to treat cancer in young leukemia patients – giving new hope to children via a promising method called CAR-T.

In the future, even more cancer patients may benefit from this revolutionary form of immunotherapy. Dr. Larry Anderson, Associate Professor of Internal Medicine, is enrolling adults in a phase two clinical trial of a CAR-T cell therapy for multiple myeloma (another bone marrow cancer that is currently incurable) at the Simmons Cancer Center, one of only nine study sites in the U.S. and a top enroller. UT Southwestern has also joined a select group of medical centers providing CAR-T therapy for adult patients with relapsed large B-cell lymphoma, an aggressive cancer that starts in immune system cells.

First-of-its-kind cancer drug targets genetic abnormality

A new drug being tested at UT Southwestern is showing remarkable success treating cancers of many types in patients who have a specific gene fusion in the cancer cell.

The clinical trial demonstrates the power of using genetic information to develop tailored, more effective disease treatments – a hot area in biomedical research known as precision medicine.

This first-of-its kind drug, larotrectinib, zeroes in on a chromosomal abnormality related to the *TRK* gene that is found in many different types of cancers. Studies published last spring in *The Lancet Oncology* and the *New England Journal of Medicine* found the drug effective in 93 percent of pediatric patients tested and a 75 percent response rate in adult patients.

"In some cancers, a part of the *TRK* gene has become attached to another gene, which is called a fusion. When this occurs, it leads to the *TRK* gene being turned on when it's not supposed to be, and that causes the cells to grow uncontrollably," explained Dr. Ted Laetsch, lead author of *The Lancet Oncology* study and Associate Professor of Pediatrics with UT Southwestern's Harold C. Simmons Comprehensive Cancer Center.

Larotrectinib targets *TRK* fusions and blocks *TRK* receptors, Dr. Laetsch said. It is not an effective treatment for patients who lack the *TRK* fusion gene. A next step in the research is a clinical trial involving a similar drug for those patients who developed resistance. Dr. Laetsch is the national leader for that clinical trial in children.

Among those benefiting from the study at UT Southwestern and Children's Health is 14-year-old Briana Ayala of El Paso, pictured here. Three years ago, Briana was diagnosed with a tumor wrapped around the major artery in her abdomen.

Her hometown surgeons said it would be too dangerous to operate, so Briana's family took her to Children's Medical Center Dallas, where UT Southwestern Professor of Surgery Dr. Stephen Megison removed most of the tumor.

When it started to grow again, Dr. Laetsch sent the tumor for genetic testing and found it had the *TRK* fusion, meaning larotrectinib might help.

Today, Briana is back in school, playing with her dog Goofy and the family's seven parakeets – and dreaming of a future in fashion in New York.

Credit: Juan Pulido, Children's Health

UT Southwestern researchers making headway toward DMD cure

Researchers in the Hamon Center for Regenerative Science and Medicine are diligently working toward the goal of testing their gene-editing treatment for Duchenne muscular dystrophy (DMD) in humans – and potentially saving the lives of those diagnosed with this fatal, incurable disease.

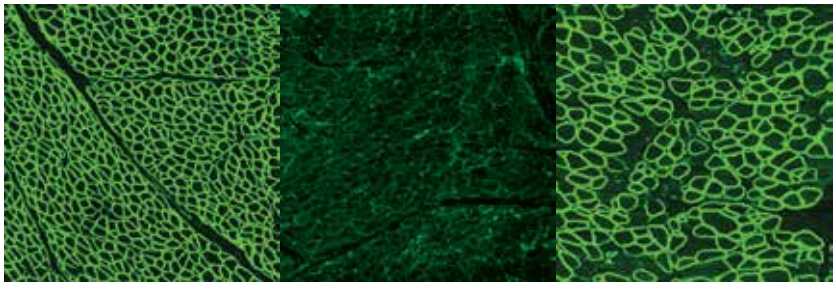
Already, the UT Southwestern research team led by Dr. Eric Olson, Director of the Hamon Center, has reported success treating DMD in human heart muscle cells, mouse models, and dogs.

A new biotechnology company called Exonics Therapeutics Inc. has licensed the technology from UT Southwestern and is working with Dr. Olson to further optimize his findings in hopes of winning government approval for clinical trials within a few years. (Dr. Olson is the scientific founder of and a consultant for Exonics Therapeutics, launched in 2017 to advance and commercialize research from his laboratory. He also has license and investment interests with the company.)

If successful in humans, the treatment developed at UT Southwestern would be a godsend to the 1 in 5,000 boys born with the mutation that causes DMD. This form of muscular dystrophy primarily affects boys and stems from defects in the gene that makes the dystrophin protein needed for proper muscle function. The defects lead to degeneration of skeletal and heart muscles, often forcing patients into wheelchairs and, after chest wall muscle loss, onto respirators. Most patients die by age 30.

UT Southwestern scientists developed a simpler gene-editing technique that uses the groundbreaking method known as CRISPR to target and edit the genetic defects that cause DMD. The UTSW technique could potentially correct a majority of the 3,000 types of mutations that cause DMD with a single cut at strategic points along the patient's DNA, Dr. Olson said.

Illustration courtesy of Ernesto del Aguila III, NIH



Scientists used CRISPR gene editing to halt the progression of Duchenne muscular dystrophy (DMD) in dogs. The images illustrate dystrophin (in green) in a healthy diaphragm muscle (left), absence of dystrophin in a dog with DMD (center), and restoration of dystrophin in dogs treated with CRISPR (right).

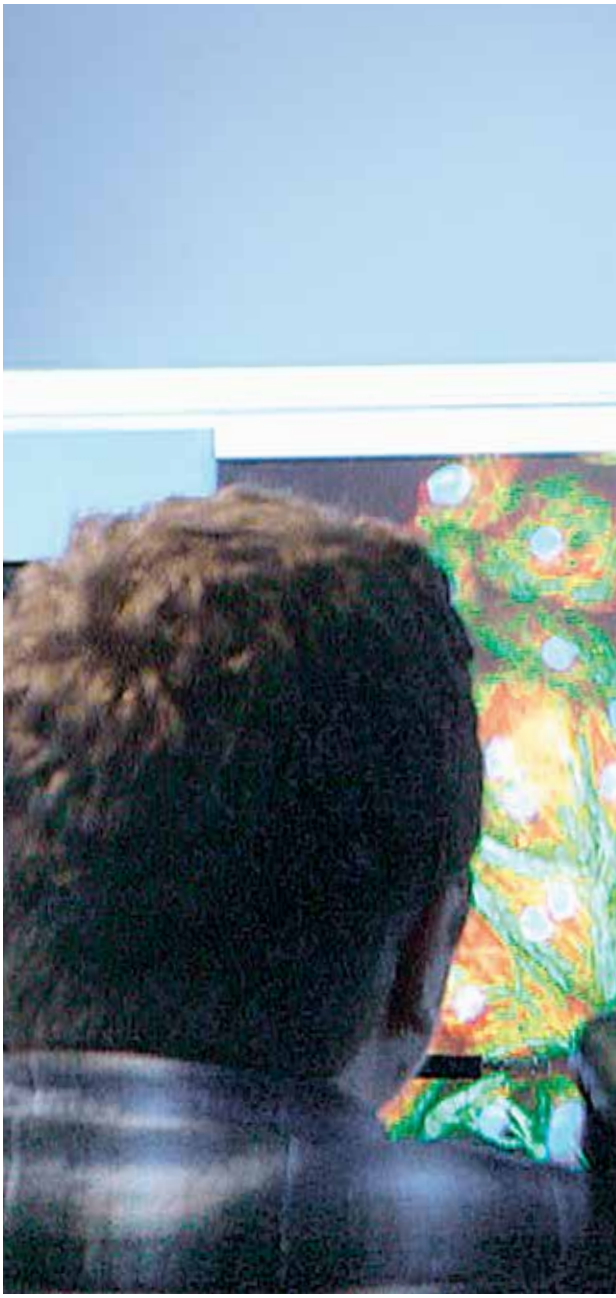
Scientists say the new technique enhances accuracy for surgical-like editing of the human genome, correcting mistakes in the DNA that cause devastating diseases such as DMD and opening up the possibility of less risky treatment approaches for other diseases as well.

"This is a significant step," said Dr. Olson, also Chair of Molecular Biology at UTSW and Co-Director of the Wellstone Muscular Dystrophy Cooperative Research Center, which helped fund the research. "We're hopeful this technique will eventually alleviate pain and suffering, perhaps even save lives, of DMD patients who have a wide range of mutations and, unfortunately, have had no other treatment options to eliminate the underlying cause of the disease."

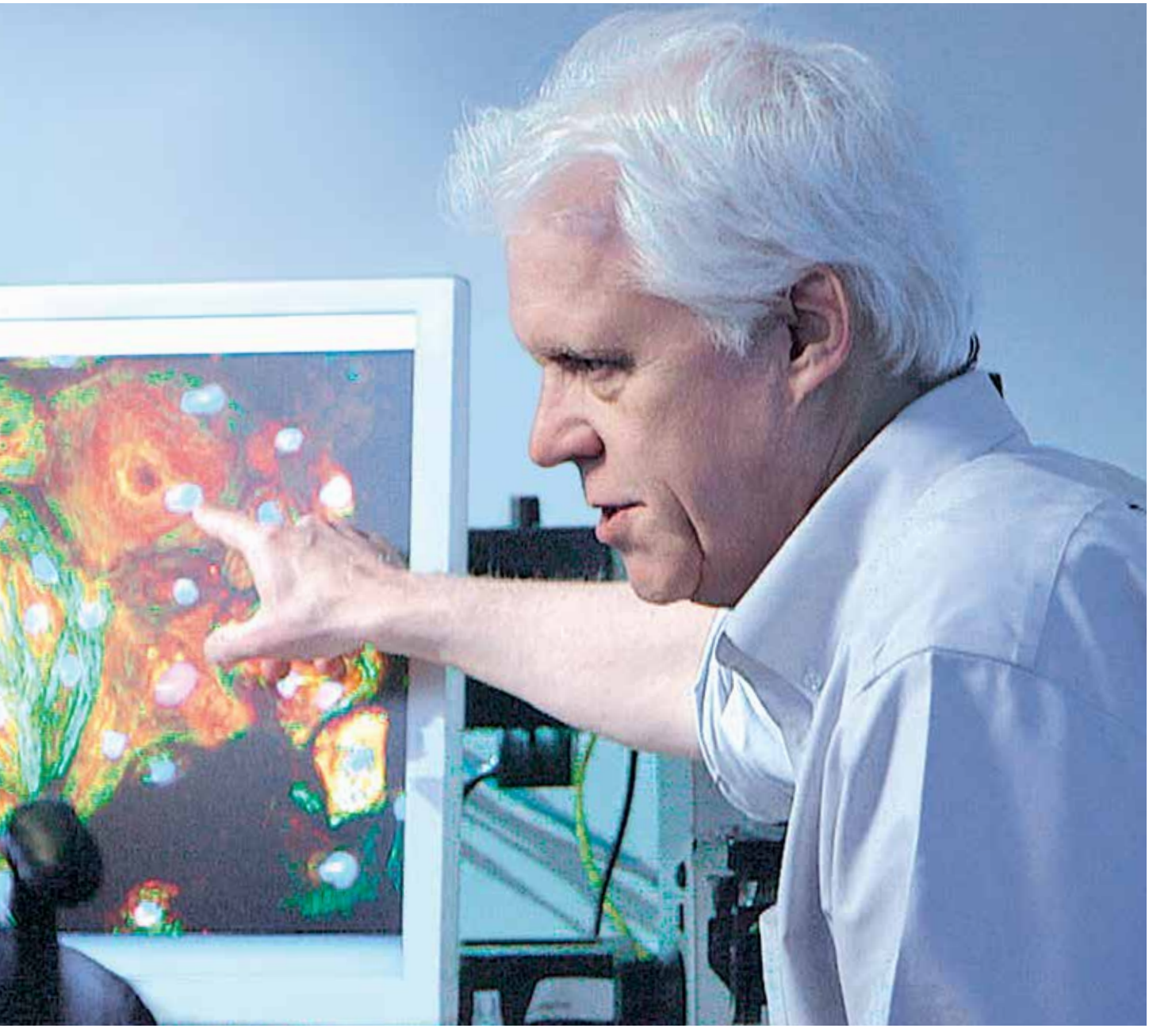
The research was supported by additional grants from the National Institutes of Health, Parent Project Muscular Dystrophy, and the Robert A. Welch Foundation.

Dr. Olson's latest findings build on his previous research using the CRISPR-Cas9 technique to correct the DMD mutation in mice. The new research demonstrates how a wide range of mutations can be corrected in human cells by eliminating abnormal splice sites in genomic DNA.

Once the gene is successfully edited, it produces a significantly improved dystrophin protein, enhancing muscle tissue. Cardiac function returned to near-normal levels in the lab's human-engineered heart muscle tissue after less than half the muscle cells were corrected this way, the researchers reported in *Science Advances*.



The image depicts a CRISPR-Cas9 gene editing complex from streptococcus pyogenes. The Cas9 nuclease protein uses a guide RNA (ribonucleic acid) sequence to cut DNA (deoxyribonucleic acid) at a complementary site. Atoms are shown as color-coded spheres. Cas9 protein is in red, RNA gray-green color, DNA light red.



Dr. Eric Olson shows DMD patient Ben Dupree the dystrophin protein (red) produced in gene-edited heart muscle cells taken from Mr. Dupree's blood. A new study from Dr. Olson shows the CRISPR-Cas9 gene-editing tool can potentially correct a majority of the 3,000 types of mutations that cause DMD.

The CRISPR-Cas9 gene-editing tool uses an RNA strand to guide an enzyme called Cas9 to cut a specific area of DNA. Dr. Olson's lab worked to develop and test various guide RNAs that could lead the Cas9 enzyme precisely to 12 designated splice sites and avoid errant edits.

The researchers will continue testing their method to improve the precision of the guide RNAs and to ensure there are no adverse side effects, said Dr. Olson, who holds the Pogue Distinguished Chair in Research on Cardiac Birth Defects, The Robert A. Welch Distinguished Chair in Science, and the Annie and Willie Nelson Professorship in Stem Cell Research.

Children of hope

Patients with rare brain diseases help scientists open new doors for gene therapy

For children like 5-year-old Willow Canaan, UT Southwestern researchers are a last hope in their race against death.

Dr. Steven Gray searches for ways to use gene therapy to help children with extremely rare, deadly diseases.

The Mississippi girl has a rare genetic condition – multiple sulfatase deficiency – that kills many of its victims by age 10. The gene mutation prevents the body from filtering cellular waste, which then builds up, wiping out the nervous system as well as the ability to think and to walk.

Willow, along with children like Joseph Hann, 6, their parents, and supporters, are praying that faculty at UTSW's Peter O'Donnell Jr. Brain Institute can find cures for the rare but deadly neurological diseases that threaten their lives, but so often go ignored.

A UT Southwestern gene therapy program is playing a leading role in this effort, trailblazing a series of clinical trials for diseases in which a single gene missing from the patient's DNA can be packaged into a virus and delivered into brain cells.

The scientists have harnessed adeno-associated virus (AAV) as their best hope. Once the harmless virus is loaded with the missing gene, it is injected into fluid in the spine, allowing it to reach the brain.

To speed development and refinement of this therapy, the program has established one of the nation's few facilities to manufacture AAV for patient use.

"Our work here is changing medicine," said Dr. Steven Gray, who is coordinating with the Food and Drug Administration to arrange a clinical trial to test a treatment for Willow's disease, hopefully by late this year. "Now we're in a rather unique position to help families who may not have had much hope."

Dr. Gray, an Associate Professor of Pediatrics, Molecular Biology, and Neurology and Neurotherapeutics, is pioneering gene therapy treatments for other rare diseases as well. (Dr. Gray also has appointments in the Eugene McDermott Center for Human Growth and Development and the Hamon Center for Regenerative Science and Medicine.)

Joseph Hann, who suffers from a form of Batten disease that progressively takes away eyesight and mobility, is another of those young patients looking for hope at the gene therapy center.

Customizing a cure

UT Southwestern's gene therapy program is among the few of its type in the country that manufactures a special gene-delivering virus for clinical trials. The virus acts like a delivery truck to bring missing genes into a patient's cells to correct diseases. Here's how it works:

- **Geneticists manufacture an adeno-associated virus (AAV) in the lab.**
- **A gene missing from a patient's DNA is packaged inside the AAV.**
- **Two tablespoons containing trillions of viral particles are loaded into a syringe and injected into the spinal fluid of the patient.**
- **The virus solution spreads along the spinal cord to the brain. Along the way, individual virus particles bind to cells and get transported to the nucleus.**
- **The shell of the virus falls apart and releases the gene. The cell then converts the gene into a type of mini-chromosome that will reside permanently in the nucleus as its own piece of DNA.**

Willow Canaan, a 5-year-old gene therapy program participant

Success could lay the foundation for the more intricate gene editing of common brain conditions – ranging from epilepsy to autism – that involve multiple genes.

Dr. Berge Minassian, Professor of Pediatrics, Neurology and Neurotherapeutics, and Neuroscience, leads UT Southwestern's gene therapy program. Dr. Minassian also works with the Children's Medical Center Research Institute at UT Southwestern and holds the Jimmy Elizabeth Westcott Distinguished Chair in Pediatric Neurology.

"If we can fix one brain disease, it opens the door to treat literally thousands of diseases by delivering a single gene and essentially making the brain whole again," Dr. Minassian said.

A promising one-two punch to destroy deadly brain tumors

Cancer researchers at UT Southwestern may have identified a treatment for the most lethal and common form of brain cancer.

Their studies in mice show that a combination of two approved medications destroys glioblastoma, a difficult-to-treat type of brain tumor that is typically fatal in little more than a year. The drugs are currently used separately to treat lung cancer and arthritis.

"This could be a groundbreaking treatment," said Dr. Amyn Habib, a member of UT Southwestern's Peter O'Donnell Jr. Brain Institute and the Harold C. Simmons Comprehensive Cancer Center. "If it works in patients, then it will be an important advance."

The drug combination disables two proteins that help glioma cancer cells survive, the researchers found. The research, published in *Nature Neuroscience,* answers the decades-old question of why a treatment that can disable a protein common to various cancers and that has been effective in some forms of lung and colon cancer has not worked for glioblastoma.

Dr. Gao Guo, Instructor of Neurology and Neurotherapeutics, points to brain imaging that shows how a new treatment strategy destroys brain tumors in mice. Dr. Amyn Habib (right) led the research that he says may provide a groundbreaking treatment for glioblastoma.

The targeted protein – epidermal growth factor receptor – is found in the tumor cell's membrane and has been a traditional focus for fighting malignant tumors. But Dr. Habib's team found that when doctors use a medication that disables the protein/receptor, the brain produces a second protein to take over the receptor's function and keep the cancer cell alive.

The UT Southwestern study shows that blocking both the receptor and the tumor necrosis factor (TNF) protein produced in the brain destroys glioma tumors. It demonstrates how UTSW physician-scientists are using the genetics of disease – in this case the vulnerabilities of tumor proteins – to mine therapeutic targets.

UT Southwestern is working to fast-track this drug combination for clinical trials.

While Dr. Habib, Associate Professor of Neurology and Neurotherapeutics, is encouraged by the initial success of this protein-disabling strategy, he acknowledges that a cure may not be imminent since cancers tend to adapt to treatments.

"But if we can provide a remission or slowing of the disease and extend survival, that's a big advance in fighting this devastating disease," said Dr. Habib, also a staff physician at the Dallas Veterans Affairs Medical Center.

This research was supported by the National Institutes of Health and the Department of Veterans Affairs.

Pioneering less invasive surgical techniques

UTSW surgeons among world's first to heal aortic arch aneurysm with leading-edge technique

James Isbon, a 78-year-old from East Texas, made history last year when surgeons used an investigational minimally invasive procedure to repair his damaged aorta without cutting open his chest.

The surgery led by Dr. Carlos Timaran at UT Southwestern's William P. Clements Jr. University Hospital marked the second time this novel method had been used in the U.S. – and the seventh instance worldwide. Dr. Timaran is just one of two vascular surgeons nationally – and the only one in the Southwest – who has been granted an investigational device exemption by the Food and Drug Administration (FDA) to use the device involved.

Mr. Isbon, a grandfather from Payne Springs, had undergone a more invasive open-heart procedure in 1993 to repair a heart valve. He remembered the long and painful recovery that followed as his rib cage healed.

This time, Dr. Timaran, who performed the new procedure, repaired the aneurysm in Mr. Isbon's aortic arch through two small openings on Mr. Isbon's neck and two even smaller ones near the top of his thighs.

Credit: Cook Medical, Bloomington, Indiana

Image of aortic arch stent device

Using these openings, Dr. Timaran snaked small catheter tubes loaded with customized stent grafts through Mr. Isbon's arteries to his aortic arch and the three arteries that rise from it to carry blood to the arms, neck, and brain. The largest stent went into the aortic arch to carry blood past an aneurysm, or bulge, in that artery. Three smaller stents were placed in the three arteries branching off the aorta.

This new procedure is part of a trend to do more heart, valve, and artery repairs without cracking open the rib cage. Benefits include a shorter, less painful recovery; reduced scarring; and a safer procedure.

The four-stent device used was an improvement over an earlier version that allowed catheter-based repair of only two of the three arteries branching off the aorta. In that earlier procedure, in order to address the third branch, a surgeon would make an incision near the collarbone at the base of the neck and perform a bypass, increasing the risk of damage to the nerves, blood vessels, or lymphatic duct in that area, said Dr. Timaran, a UTSW Professor of Surgery.

Making history last year, surgeons used an investigational minimally invasive procedure to repair a damaged aorta without cutting open the chest.

While Dr. Timaran can perform more of these surgeries, it may be years before the FDA approves it for general use. Dr. Timaran, Chief of Endovascular Surgery, also holds the G. Patrick Clagett, M.D. Professorship in Vascular Surgery. He has practiced at UT Southwestern since 2004.

"The traditional, standard repair involves open-heart surgery – splitting open the patient's breastbone, stopping the heart, connecting the patient to a bypass machine, cooling the brain, and then repairing the aneurysm," said Dr. Timaran, who performed the procedure along with Dr. Michael Jessen, who is Chair of Cardiovascular and Thoracic Surgery and holds the Frank M. Ryburn, Jr., Distinguished Chair in Cardiothoracic Surgery and Transplantation. "There's a prolonged recovery and a 10 to 15 percent mortality rate with that operation."

The new device with three branches off the main one eliminates the need for that more invasive part of the procedure, he said.

Compared with his earlier open-heart surgery, Mr. Isbon's recent experience at UT Southwestern was remarkably easy. The only evidence of his May 18 surgery is small, roughly 1-inch scars on either side of his neck, and needle-sized scars on each thigh.

"I feel great for someone who has just gone through heart surgery," Mr. Isbon said as he prepared to leave the hospital five days later. "With this new procedure, the second day after the surgery I was up and moving around. It's amazing what they can do now."

Less invasive repairs for bypass open-chest surgery

Brad and Sharon Gale

Brad Gale had already endured open-heart surgery in 2003, along with the many weeks of recovery that followed.

So when doctors told him he'd need more surgery – this time a heart valve replaced – he dreaded going through the ordeal again.

Fortunately, his cardiologist had heard about a surgeon at UT Southwestern who is one of the few in the country specializing in heart valve repair using less invasive techniques.

That surgeon, Dr. Neelan Doolabh, Director of Minimally Invasive Heart Valve Surgery, replaced Mr. Gale's aortic valve by entering through a 2-inch opening between the ribs rather than sawing down the sternum and cracking open the rib cage. "I didn't have any rib pain or chest pain," said Mr. Gale, a retired Lockheed Martin executive from Colleyville, Texas.

Dr. Doolabh, also Associate Professor of Cardiovascular and Thoracic Surgery, is among a select group of specialists who wield special, extra-long surgical tools through small incisions in the patient's side to replace valves, remove tumors, and repair holes and arrhythmias (irregular heartbeats) in ailing hearts.

If the patient is not a candidate for surgery, other surgeons and cardiologists are turning to collapsible heart valves, stents, and other devices that can be loaded onto a catheter tube and delivered to the heart by snaking the catheter up from the groin, through the arteries, and to the heart. The result?

"You're seeing fewer and fewer open-chest procedures performed," said Dr. Mark Link, Professor of Internal Medicine and a nationally renowned heart arrhythmia specialist who uses minimally invasive catheter techniques to treat arrhythmias. Dr. Link holds the Laurence and Susan Hirsch/Centex Distinguished Chair in Heart Disease.

In 2013, UTSW surgeons performed their first aortic valve repair using TAVR (transcatheter aortic valve replacement), and since then have placed more than 275 valves with the procedure. UT Southwestern also offers another catheter-delivered device, the MitraClip, to coax leaky mitral valves to close more tightly.

While not every heart-related issue can be repaired the less invasive way, these types of surgeries are on the rise.

"As a result, patient satisfaction is substantially improved and recovery times are vastly shortened," said Dr. Joseph A. Hill, Chief of the Division of Cardiology, Professor of Internal Medicine and Molecular Biology, Director of the Harry S. Moss Heart Center, and holder of the James T. Willerson, M.D. Distinguished Chair in Cardiovascular Diseases, and the Frank M. Ryburn, Jr. Chair in Heart Research.

UT Southwestern surgeons insert a new stent device through the groin vessels to repair an aneurysm of the aortic arch.

The device is made of Dacron reinforced with stainless steel and an alloy containing nickel and titanium. Surgeons and engineers use computer models of CT scans of the patient's aorta to customize each stent to fit the patient's arteries.

Mr. Isbon said he wasn't afraid to undergo such an innovative procedure. "The biggest thing that went through my mind was the gratefulness I had for the opportunity – that's because the alternative was to cut my chest open and I didn't want that."

Today, Mr. Isbon said he looks forward "to just being home, mowing my grass, feeding the birds and the cantankerous squirrels in my yard, and getting a few more years with my daughters, grandchildren, and three great-grandchildren. I thank the Lord – and my doctors – for giving me more time to do those things."

Machinery with a human touch

Amputees participating in UTSW neural interfacing study may help change the way robotic hand biofeedback occurs

Michael "Shawn" Findley, 45, lost his hand after a factory accident. Now, he's helping a UT Southwestern researcher and U.S. collaborators improve the way robotic hand biofeedback occurs. Ultimately, he hopes this research may lead to the closest thing to feeling in the hands of every amputee.

UTSW is taking a lead role in this effort to use electrodes implanted in a patient's arm to send messages between a robotic hand and nerves still functioning in the limb.

"Feeling your hand is absolutely the purpose here," said Dr. Jonathan Cheng, Associate Professor of Plastic Surgery and the head of the UTSW portion of the study. "For all of my other patients, being able to feel with their hand is mandatory. It should be no different for patients using robotic hands."

Dr. Cheng and his colleagues from six teams across the country believe the body's neural communications pathway – even after it has been severed – can be tapped into using an artificial messaging bridge. In their research, electrodes placed within the nerves create that bridge, and testing has advanced from the laboratory to human clinical trials.

Mr. Findley, who lives in Mount Pleasant, Texas, was fitted with a prosthetic hand after a 2005 fabrication shop accident. The injury, which left him with mangled and amputated fingers on his left hand, eventually led to amputation at the midforearm.

He joined Dr. Cheng's neural interfacing study in late 2017. At UT Southwestern's William P. Clements Jr. University Hospital, Dr. Cheng implanted electrodes into Mr. Findley's residual limb. Afterward, the study participant drove to Dallas weekly to take part in the research. His tasks included relearning how much fingertip pressure it takes to pick up small weights.

Researchers believe the body's neural communications pathway – even after it has been severed – can be tapped into using an artificial messaging bridge.

With injured soldiers in mind, the U.S. Defense Advanced Research Projects Agency (DARPA) funds robotic hand research. Two promising robotic hands have emerged, Dr. Cheng said, but they have not yet proved practical because patients cannot feel with them or control them naturally. Dallas residents Jane and Bud Smith have given financial support for this research.

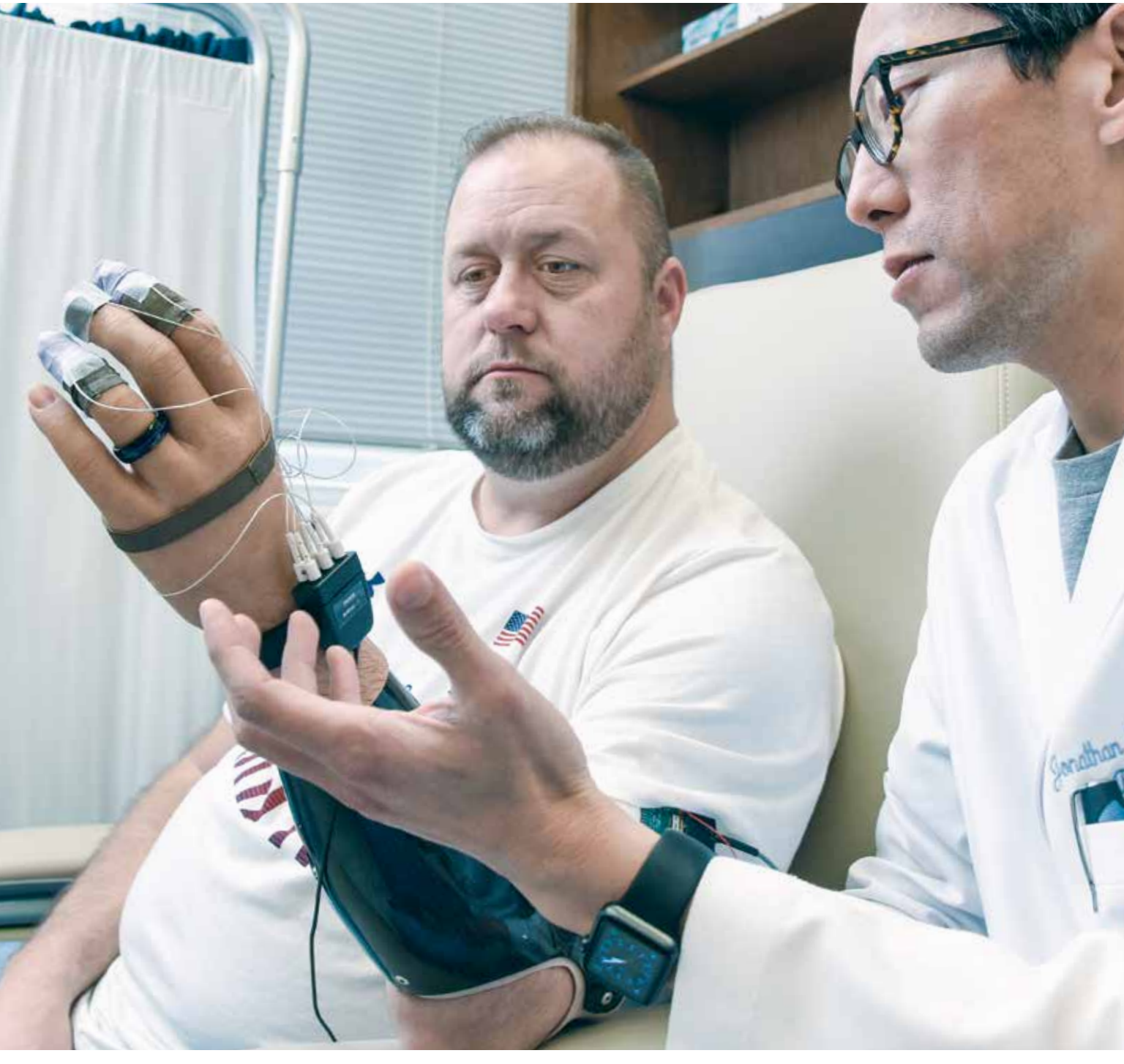
DARPA sponsorship of this project is part of the federally funded BRAIN initiative and comes to UTSW through Nerves Inc., a Dallas-based company that researches nerve injury and repair. Dr. Cheng is a founder and

investor in that company while Dr. Edward Keefer of Nerves Inc. is the Principal Investigator of the multidisciplinary team. The research is part of the federal government's Hand Proprioception and Touch Interfaces (HAPTIX) program.

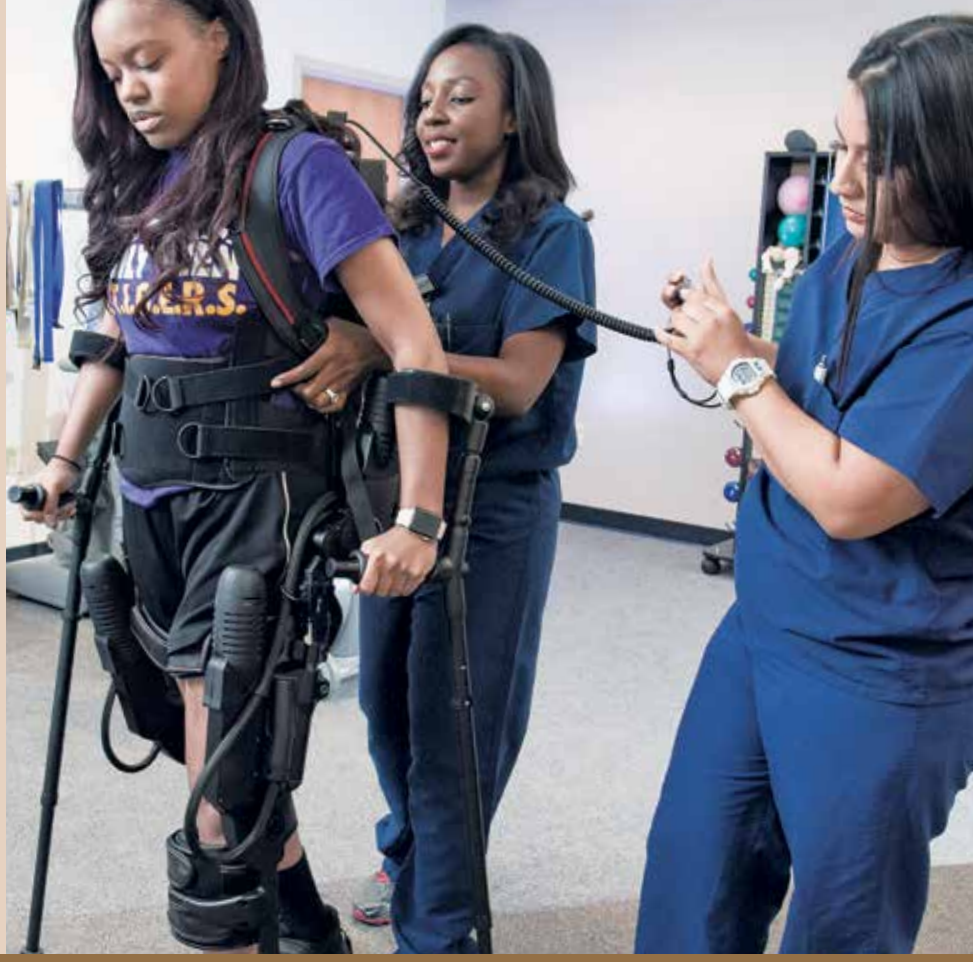
For Mr. Findley, who served in the military from 1993 to 1999 and whose 20-year-old son is a Marine, his contribution is a duty and an honor.

"You hope they all stay out of harm's way, but you want to have done what you could," Mr. Findley said, his voice catching with emotion. "You've got to have someone willing to do this, and I'm here for as long as they want me."

Dr. Jonathan Cheng visits with Michael "Shawn" Findley, an amputee participating in the study at UT Southwestern. Dr. Cheng and his collaborators are investigating whether tying into residual nerves can serve as a bridge in re-establishing "feel" in prosthetic hands.



Kiara Connley, who woke up one morning paralyzed by a rare autoimmune disease, learns to walk again using an exoskeleton at UT Southwestern.



Exoskeleton technology enables those paralyzed to walk again

Kiara Connley was a thriving college student when she started noticing weakness, pain, tingling, and numbness in her joints, along with lost vision in her left eye. Soon after, she woke up paralyzed from the waist down.

The young woman was diagnosed with transverse myelitis, a rare inflammatory disease that damages the spinal cord. She was forced to put her studies on hold as she focused on recovery and had to use a wheelchair and rely on help from others to get through the day.

It took a strong resolve and spirit to reclaim her life – but Ms. Connley also gives credit to the physical therapy she received at UT Southwestern using a device called an exoskeleton.

An exoskeleton is a robotic suit used to treat patients with leg paralysis. The framework of braces and assistive technology does what a patient's own muscles and nerves cannot – support and move the legs. The suit assists a patient's leg muscles so they can relearn correct step patterns, walk with proper support and posture, and master other skills essential to regaining mobility.

It is one of today's most advanced and promising therapeutic rehabilitation tools.

UT Southwestern's Department of Physical Medicine and Rehabilitation recently acquired two exoskeleton robotic suits with support from the A.L. Chilton Foundation. Established in 1945 in Texas by A.L. and Leonore Chilton, the Foundation has made gifts totaling more than $6.25 million to support programs and research at UTSW.

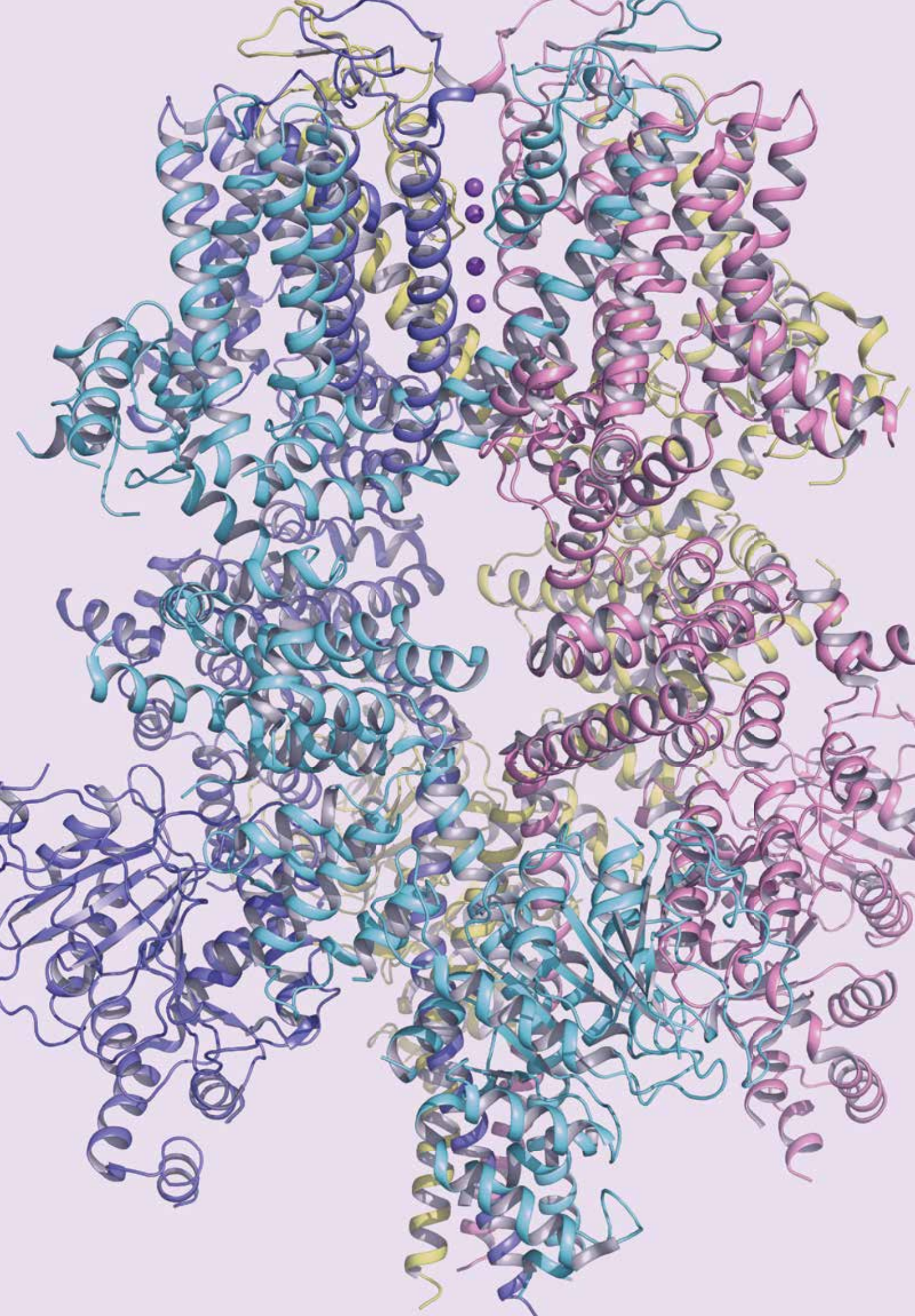
"The exoskeleton has helped transform my body," Ms. Connley said. "My posture has done a complete turnaround. I no longer walk hunched over, and my leg muscles are stronger and allow me to stand more firmly on the ground."

Ms. Connley is back in college and able to walk slowly without assistance. She dreams of becoming a physical therapist and helping others, just like her care team at UT Southwestern provided guidance and support on her journey.

In pursuit of scientific breakthroughs

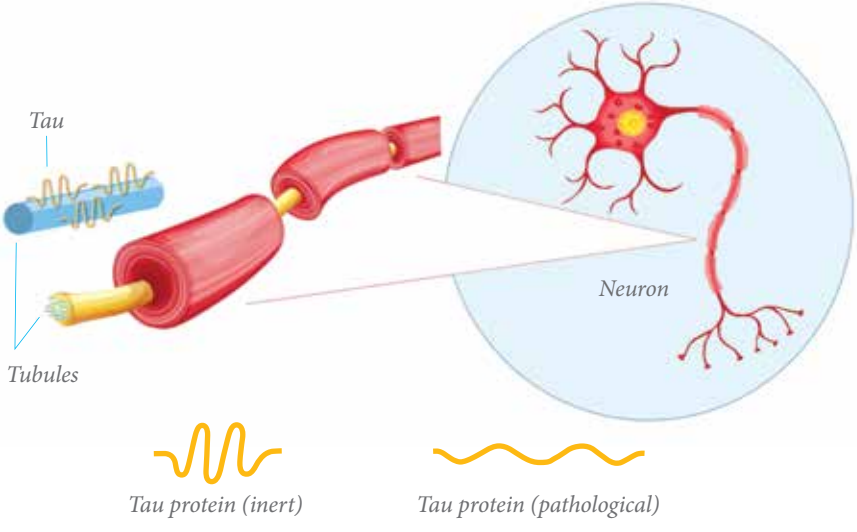
What leads to a breakthrough? Asking tough questions. Digging deeper. Refusing to stop investigating, despite setbacks, until an answer validates a hypothesis. For UT Southwestern researchers, these are ingrained skills that have produced notable findings such as the point at which a protein in the brain turns toxic or the revelation of how a liver hormone affects cravings for alcohol and sugar.

UT Southwestern's cryo-EM facility advances science with its solutions of important protein structures.



Shape-shifting tau identified as genesis of Alzheimer's disease

UT Southwestern scientists have discovered the exact point at which a protein called tau becomes toxic but has not yet begun forming deadly tangles in the brain characteristic of Alzheimer's disease.



This revolutionary investigation – from UT Southwestern's Peter O'Donnell Jr. Brain Institute – provides new insight into the shape-shifting nature of tau just before the molecule begins sticking to itself to form the larger aggregates seen in Alzheimer's cases. The findings reveal a new strategy for detecting the devastating disease before it takes hold, and they also set in motion intense efforts to develop treatments that may stabilize tau proteins before they change shape.

In pathological tau, reactive amino acids are exposed, enabling tau to stack up.

"This is perhaps the biggest finding we have made to date," said Dr. Marc Diamond, Director of UT Southwestern's Center for Alzheimer's and Neurodegenerative Diseases. "It has completely changed how we think about the problem."

The research, published in *eLife,* contradicts the belief that tau has no distinct shape and is only harmful after beginning to assemble with other tau proteins. Scientists in the Diamond lab made their discovery after extracting tau from human brains and isolating the proteins as single molecules. They found that the harmful form of tau exposes a part of itself that is normally folded inside. This exposed portion causes it to stick to other tau proteins, enabling the formation of tangles that kill neurons.

"We think of this as the Big Bang of tau pathology," said Dr. Diamond, referring to the prevailing scientific theory about the formation of the universe. "This is a way of peering into the very beginning of the disease process."

A Professor of Neurology and Neurotherapeutics, and Neuroscience, Dr. Diamond also holds the Distinguished Chair in Basic Brain Injury and Repair. In this study, he collaborated with Dr. Lukasz Joachimiak, an Assistant Professor in the Center for

Dr. Marc Diamond's studies focus on a molecule linked to the beginning of Alzheimer's.

Dr. Diamond is a leading dementia expert credited with determining that tau acts like a prion, an infectious protein that can self-replicate. Prions became notorious as the cause of the 1980s outbreak of mad cow disease.

Alzheimer's and Neurodegenerative Diseases, and in the Department of Biochemistry, who is also an Effie Marie Cain Scholar in Medical Research. Their research was supported by the Rainwater Charitable Foundation, the

The path toward tau research

Growing up, Dr. Marc Diamond pulled apart watches to see how they worked, built small boats and rockets, and held a general fascination with the natural world. The neurologist's leanings toward a future career in science and medicine were inherited as well to some extent – his father, also a neurologist, founded a center for addiction research and two uncles were physicians.

During college, Dr. Diamond worked for two summers in the lab of Dr. Stanley B. Prusiner, a famed University of California, San Francisco researcher who later won the Nobel Prize for discovering infectious proteins called prions.

Dr. Diamond graduated from Princeton University with a history degree – about as far afield from science as you'd imagine – but then headed to UCSF School of Medicine. He took a two-year break as a medical student to work as a Howard Hughes Medical Institute Student Research Fellow in the lab of Dr. Keith Yamamoto, studying how nuclear receptors sense hormones in the body and regulate transcription.

"After working with Keith, I knew I wanted to be a lab scientist," said Dr. Diamond, Director of UT Southwestern's Center for Alzheimer's and Neurodegenerative Diseases, who holds the Distinguished Chair in Basic Brain Injury and Repair. "I decided to focus on neurodegenerative diseases because I recognized that they represent the single most mysterious and awful problem in neurology." At that point, the path to tau research was clear.

After deciding in 2003 to test whether the brain's tau proteins might work like prions to cause neurodegenerative diseases such as Alzheimer's, it took Dr. Diamond seven years to get National Institutes of Health (NIH) funding for his work.

"The ideas were very revolutionary at the time, and we needed tremendous amounts of preliminary data to convince reviewers that this could be true," Dr. Diamond said. Back then, beta-amyloid tangles were the trending Alzheimer's research topic. "Fortunately, we were able to get funding from the Sandler Foundation, a philanthropic supporter of science, to carry on this work."

Later, when he was ready to publish his lab's first work, which reported that assemblies of tau can journey into cells and between them to spread pathology, he spent 18 months getting rejections before his study was finally accepted for publication in the *Journal of Biological Chemistry* in 2009. It is now the most highly cited work from his lab.

National Institutes of Health, and the Effie Marie Cain Endowed Scholarship.

Despite billions of dollars spent on clinical trials through the decades, Alzheimer's remains one of the most devastating and baffling diseases in the world, affecting more than 5 million Americans.

But now Dr. Diamond is hopeful the field has turned a corner, noting that identifying the genesis of the disease provides scientists a vital target to diagnose the condition at its earliest stage, before the symptoms of memory loss and cognitive decline become apparent.

His team's next step is developing a clinical test that can examine a patient's blood or spinal fluid to detect the first biological signs of the abnormal tau protein.

Just as important, efforts are underway to develop a treatment for those diagnosed. Dr. Diamond cites a compelling reason for cautious optimism here: Tafamidis, a recently approved drug, stabilizes a different shape-shifting protein that causes deadly protein accumulation in the heart, similar to how tau overwhelms the brain.

"The hunt is on to build on this finding and make a treatment that blocks the neurodegeneration process where it begins," Dr. Diamond said. "If it works, the incidence of Alzheimer's disease could be substantially reduced. That would be amazing."

Uncharted territory: UT Southwestern joins global effort to map human cells

UT Southwestern's Peter O'Donnell Jr. Brain Institute is taking part in an international effort to map and characterize all cells in the human body, an ambitious project designed to gain insight into how cellular changes cause disease.

Dr. Genevieve Konopka, a neuroscientist with the O'Donnell Brain Institute, leads a seven-member team that is evaluating which technologies are best for determining how genes are expressed in the brain at a single-cell level. The team is discovering how cells turn specific genes on and off to generate the dozens of cell types found in the human brain.

The project is part of the Human Cell Atlas, an effort involving scientists from around the world to create comprehensive maps of all human cells. The goal is to understand how healthy cells work and what malfunctions when people get sick.

Dr. Konopka's brain team is funded by the Chan Zuckerberg Initiative.

"Our project could have a major impact on how we understand and ultimately treat brain disorders with complex genomic underpinnings such as autism and schizophrenia," said Dr. Konopka, Associate Professor of

HUMAN CELL ATLAS

What is the Human Cell Atlas?

In 2016, prominent world scientists launched a project that would describe and define all human cells. As a result, the Human Cell Atlas consortium was founded. The group's goal is to create comprehensive reference maps of all human cells as a basis for both understanding human health and diagnosing, monitoring, and treating disease.

For more information, visit humancellatlas.org.

Neuroscience and a Jon Heighten Scholar in Autism Research, who estimated this work would take at least a decade.

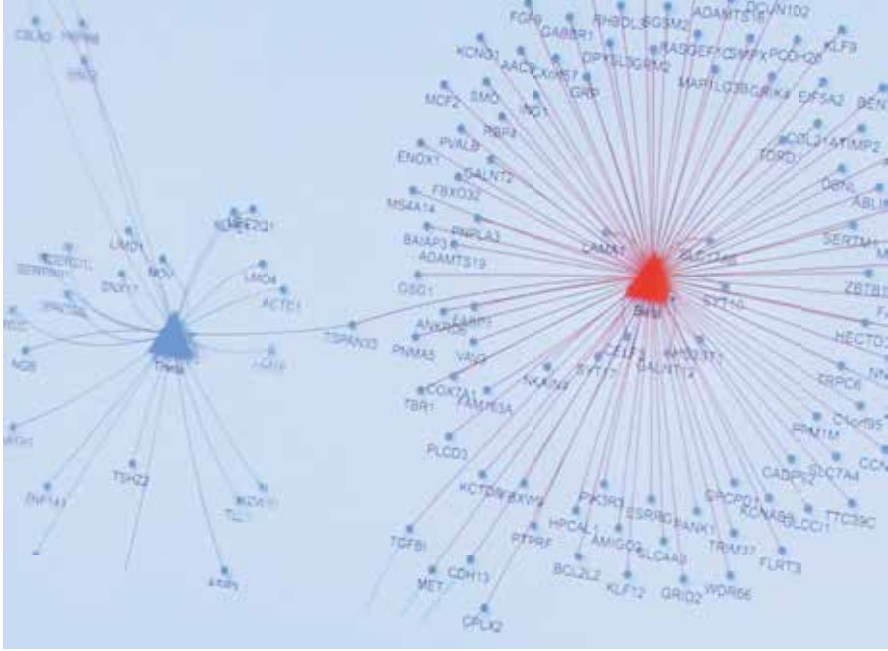
Dr. Konopka has researched various aspects of the brain, including the genetic pathways involved in language development that are vulnerable in autism. In 2017, she published a study identifying more than 100 genes linked to memory.

"Dr. Konopka is a rising star in the field of human gene expression in the brain," said Dr. Joseph Takahashi, Chair of Neuroscience and an Investigator

Dr. Genevieve Konopka, a neuroscientist with the Peter O'Donnell Jr. Brain Institute at UT Southwestern, leads a team working to identify genes and cells within the brain as part of an international project – the Human Cell Atlas – aiming to map all cells in the body.

for the Howard Hughes Medical Institute. Dr. Takahashi also holds the Loyd B. Sands Distinguished Chair in Neuroscience.

The Chan Zuckerberg Initiative, founded by Facebook creator Mark Zuckerberg and his wife Priscilla Chan in 2015, supports various initiatives in scientific research.



The illustration shows genes involved in memory.

Mind bender: Researchers identify 100-plus genes linked to memory

Scientists at UT Southwestern's Peter O'Donnell Jr. Brain Institute have identified more than 100 genes linked to memory, including many previously thought to have no brain process connections.

The findings could ultimately advance treatment of various brain disorders and unravel some of the mysteries behind the body's most complex organ.

Dr. Genevieve Konopka, Associate Professor of Neuroscience and a Jon Heighten Scholar in Autism Research, teamed up with Dr. Bradley Lega, Assistant Professor of Neurological Surgery, Neurology and Neurotherapeutics, and Psychiatry, who was conducting memory research on epilepsy patients. Dr. Lega works with epilepsy patients to map their brain waves and pinpoint patterns related to memory formation. In her research, Dr. Konopka studies the link between specific genes and resting-state brain behavior.

Combining their techniques, the researchers found that a different group of genes is used in memory processing than those involved when the brain is in a resting state.

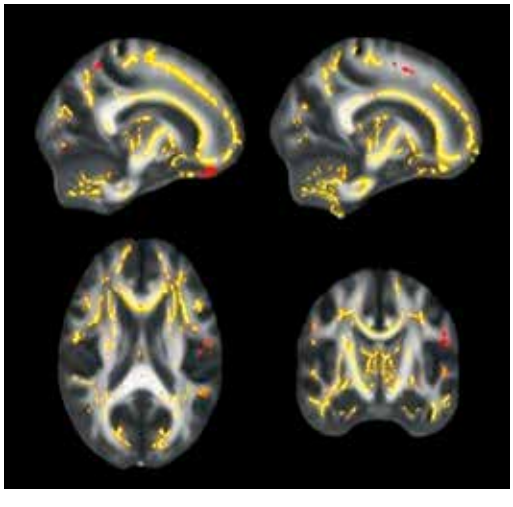
The researchers are hopeful these findings can help scientists better understand and treat a range of conditions involving memory impairment, from epilepsy to Alzheimer's disease. Follow-up studies are currently underway to refine and add to this list of memory genes by analyzing the expression of genes in the brains of patients undergoing memory assessments.

Poor fitness linked to weaker brain fiber, higher dementia risk

Scientists have more evidence that exercise improves brain health and could be a lifesaving ingredient that prevents Alzheimer's disease.

This UT Southwestern research, published in the *Journal of Alzheimer's Disease*, suggests that the lower the fitness level, the faster the deterioration of vital nerve fibers in the brain. What happens then is cognitive decline, including memory issues characteristic of dementia patients.

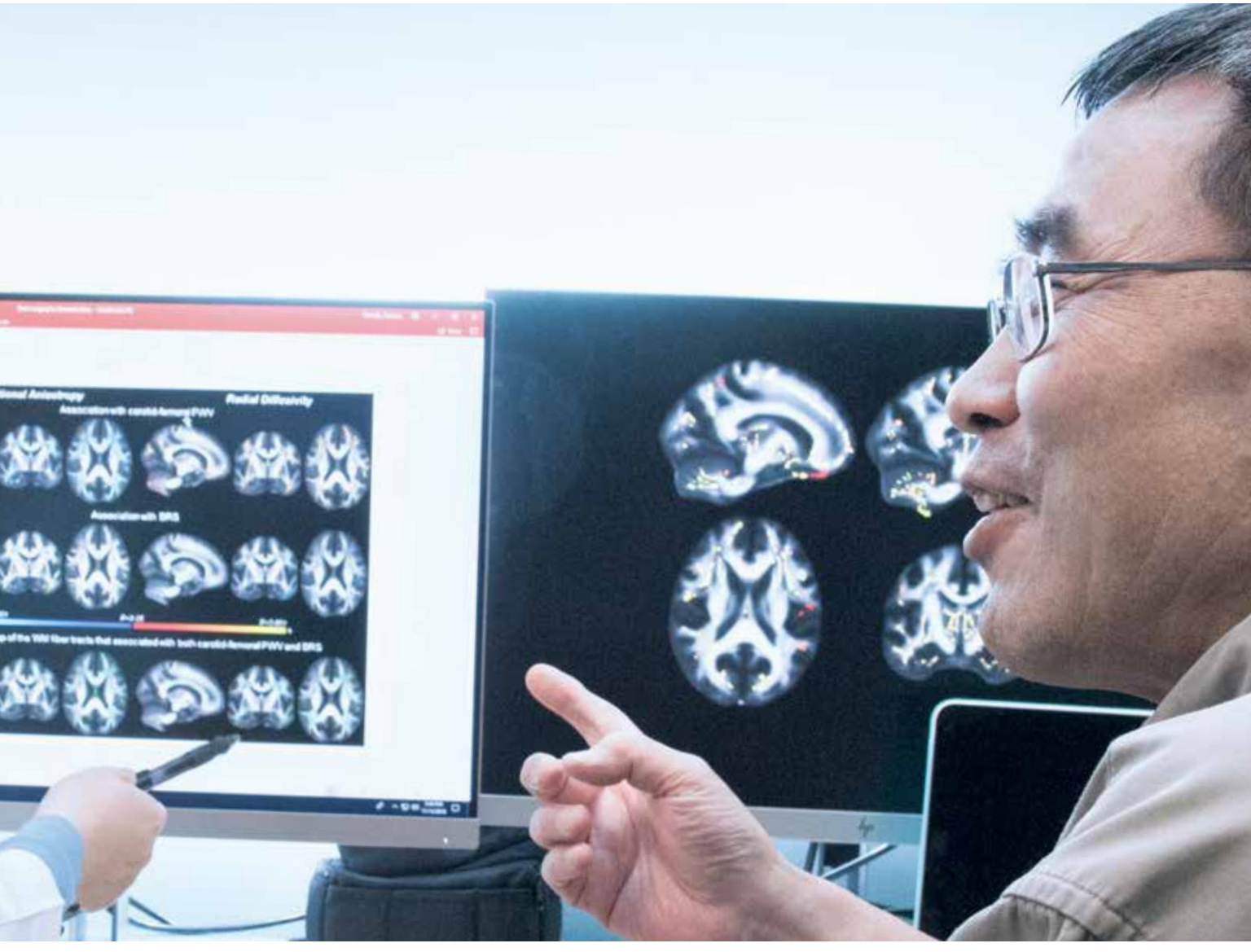
"This work supports the hypothesis that improving people's fitness may improve their brain health and slow down the aging process," said the study's author, Dr. Kan Ding, an Assistant Professor of Neurology and Neurotherapeutics with the Peter O'Donnell Jr. Brain Institute and a former UTSW fellow and resident.



Brain imaging shows yellow and reddish pixels representing areas where the functionality of white matter is associated with higher fitness levels.

The research focused on white matter, a type of brain tissue comprised of millions of bundles of nerve fibers used by neurons to communicate across the brain.

Dr. Ding's team enrolled older patients at high risk of developing Alzheimer's who showed early signs of memory loss, or mild cognitive impairment. They measured the patients' cardiorespiratory fitness and



Dr. Kan Ding (left) and Dr. Rong Zhang examine images of human brains as part of research at UT Southwestern looking into whether exercise can help ward off dementia.

imaged the brain to test the functionality of their white matter. Memory and other cognitive tests on the patients followed, to evaluate brain function.

The researchers found that lower fitness levels were associated with weaker white matter, which in turn correlated with lower brain function.

In related work, researchers at the O'Donnell Brain Institute are leading a five-year multicenter clinical trial designed to determine whether participating in aerobic exercise regularly and taking medications to reduce high blood pressure and cholesterol levels preserves brain function. This trial involves more than 600 older adults who are at risk to develop Alzheimer's.

Dr. Rong Zhang, Professor of Neurology and Neurotherapeutics and Internal Medicine, is overseeing the trial. The Dallas arm of the study is being carried out by the Institute for Exercise and Environmental Medicine, a joint program between UT Southwestern and Texas Health Resources. Dr. Zhang is Director of the Cerebrovascular Laboratory at the Institute.

Why alcohol, sugar lead to thirst

Texas and European researchers uncover liver hormone's role in the brain

UT Southwestern researchers identified a hormone that acts on the brain to increase the desire to drink water in response to specific nutrient stresses that can cause dehydration.

Why does drinking alcohol or consuming sugar make us thirsty? An international study reveals an unexpected anti-dehydration mechanism that may help in finding new treatments to prevent intoxication.

The study, published in *Cell Metabolism,* identifies a hormone that acts on the brain to increase the desire to drink water under conditions that can cause dehydration, such as alcohol consumption. The study involved research in mice and data from human study participants in Europe.

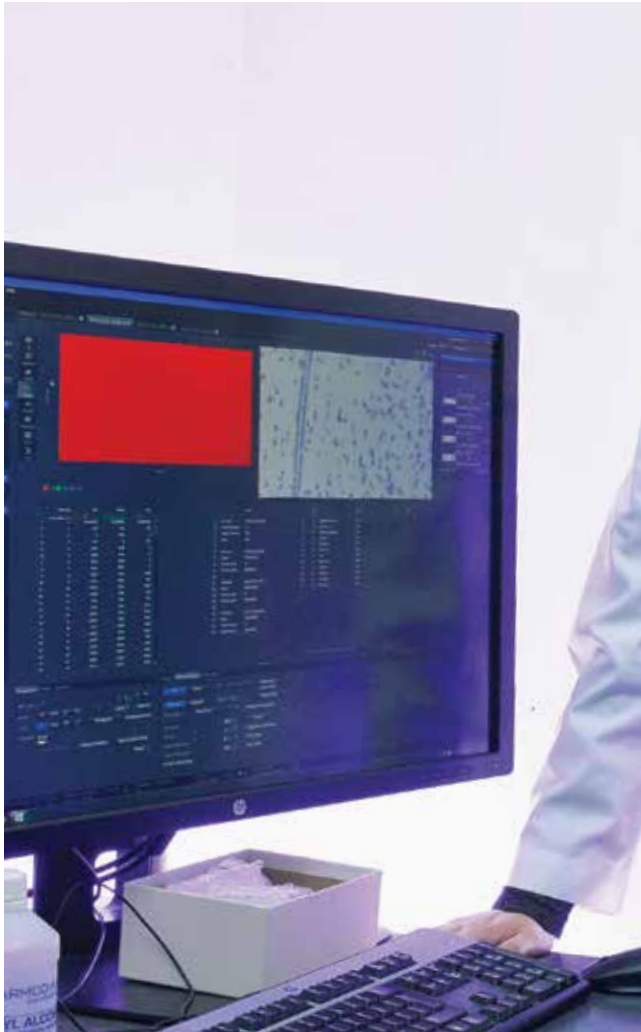
UT Southwestern researchers Dr. David Mangelsdorf and Dr. Steven Kliewer have long studied the liver hormone FGF21, also known as fibroblast growth factor 21. In earlier mouse studies, they found that the hormone acts via the brain's reward pathway to suppress the desire for sugar and alcohol in favor of drinking water.

An important finding in the latest study is a strong response to the hormone in humans as well, Dr. Kliewer said. Validating the researchers' work in mice, 21 study participants at the Medical University of Graz in Austria were randomly assigned to drink either a mixture of alcohol and juice, or juice alone. Hourly over four hours, researchers measured their FGF21 blood levels.

While the hormone remained stable in those drinking only juice, in response to alcohol, FGF21 levels peaked after about two hours.

"This suggests that FGF21 might someday be used as a drug to limit alcohol consumption and protect against its effects in people," said Dr. Mangelsdorf, Chair of Pharmacology, Professor of Pharmacology and Biochemistry, and a Howard Hughes Medical Institute Investigator. Dr. Mangelsdorf also holds the Alfred G. Gilman Distinguished Chair in Pharmacology, and the Raymond and Ellen Willie Distinguished Chair in Molecular Neuropharmacology in Honor of Harold B. Crasilneck, Ph.D.

The scientists knew that exposure to alcohol or sugar turned on production of FGF21 in the liver, added Dr. Kliewer, Professor of Molecular Biology and Pharmacology.



Until this study, however, they did not know that the hormone then travels in the blood to a specific part of the brain – the hypothalamus – to stimulate thirst and prevent dehydration.

"Unexpectedly, FGF21 works through a new pathway that is independent of the classical renin-angiotensin-aldosterone thirst pathway in the kidneys," said Dr. Kliewer, who holds the Diana K. and Richard C. Strauss Distinguished Chair in Developmental Biology.

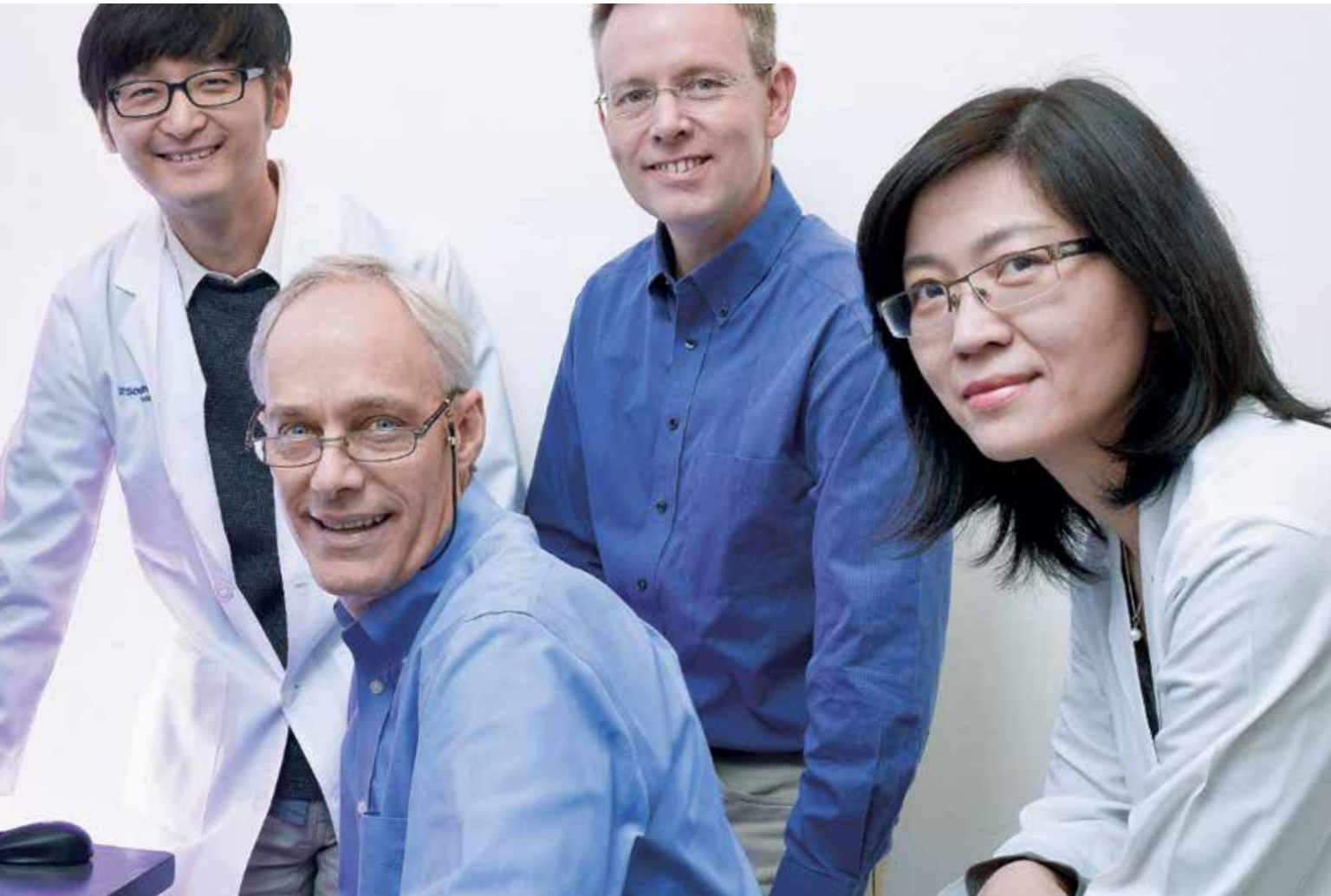
The hormone-induced thirst response appears to depend on another signaling pathway in the hypothalamus, the β-adrenergic circuit, the researchers said.

In another part of the study, done in mice, FGF21 was shown to regulate water consumption in response to nutrient stress. A high-fat/low-carbohydrate diet stimulated water drinking in normal mice, but mice genetically unable to produce the hormone did not drink more in response to this nutritional stress. The findings confirm the hormone's role in signaling the hydration pathway, the researchers said.

For a long time, feeding behavior has been emphasized in metabolic research rather than hydration. This study suggests a change may be on the table, the researchers said.

"To put this in context, we always look at food intake, and the metabolic field has spent comparatively little time studying water intake. This study suggests that we should think more about hydration and how it might contribute to metabolism," Dr. Kliewer said.

UT Southwestern researchers found that the FGF21 hormone appears to reduce cravings for sweets and alcohol. From left: Dr. Parkyong Song, Dr. David Mangelsdorf, Dr. Steven Kliewer, and Dr. Yuan Zhang.



UT Southwestern recognized for quality of scientific research

The quality of scientific investigation underway daily at UT Southwestern and its potential impact is unquestionably high, particularly given the large number of esteemed researchers such as Nobel Laureates, Breakthrough Prize winners, members of the National Academies, and Howard Hughes Medical Institute Investigators who comprise the faculty.

In one of the latest affirmations of this attribute, Nature Index last year ranked UT Southwestern as the top institution within the health care category internationally for publishing high-quality scientific research.

In the Nature Index 2018 Annual Tables, UTSW is ranked first in this category among peer institutions that include Columbia University Medical Center, Memorial Sloan Kettering Cancer Center, Massachusetts General Hospital, and UC San Diego Health. Others rounding out the top 10 are the University of Michigan Health System, MD Anderson Cancer Center, NYU Langone Medical Center, UCLA Health, and Duke University Health System.

"As one of the world's foremost research institutions, UT Southwestern has long cultivated an environment where the pursuit of rigorous scientific research blends seamlessly with multidisciplinary collaboration, resulting in a strong record of leading-edge discoveries and consistent translation into new treatment development," said Dr. Dwain Thiele, Vice Provost and Senior Associate Dean for Faculty Affairs and Initiatives, and Professor, Department of Internal Medicine, who holds the Jan and Henri Bromberg Chair in Internal Medicine.

"This ranking is a testament to the research being conducted every day in the hundreds of labs across campus, where senior faculty, early career researchers, postdoctoral fellows, and graduate students tirelessly work on discovering the underlying causes of disease and the ways in which we can improve health and extend life," he said.

The Nature Index 2018 rankings are based on primary research articles published in a group of 82 high-quality science journals, as selected by a panel of active scientists independently of Nature Research. The list of publications includes both multidisciplinary journals and some of the most highly selective journals within the main disciplines of the natural sciences.

nature INDEX 2018 ANNUAL TABLES TOP 100

The Nature Index 2018 Annual Tables ranked institutions based on the quality of primary research articles published in 2017, as selected by a panel of scientists independently of Nature Research.

UT Southwestern ranked first among peer institutions in the health care institution category on the Nature Index 2018 Annual Tables.

UTSW researchers solve structure of brain receptor using cryo-EM

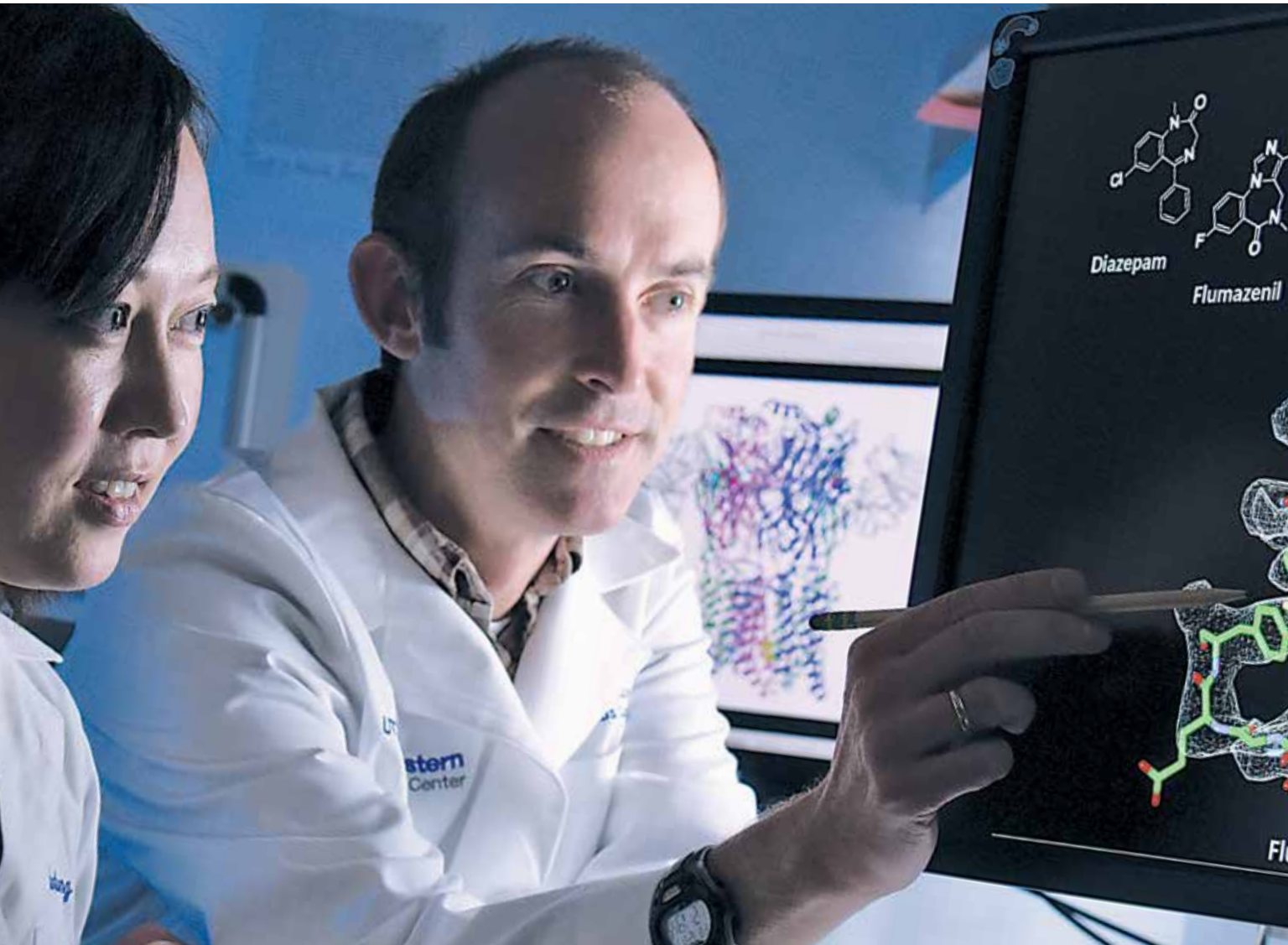
Using some of the most advanced cryo-electron microscopy equipment in the world, UT Southwestern scientists have deciphered the atomic structure of an important neurotransmitter receptor in the brain.

In a study published in *Nature,* researchers at UT Southwestern's Peter O'Donnell Jr. Brain Institute provide a detailed description of the structure of the $GABA_A$ receptor – the receptor in the brain targeted by many medications, including the benzodiazepines used for anesthesia during surgery and prescribed to treat epilepsy, anxiety, and insomnia.

The report shows the first 3D atomic structures of the receptor bound to its neurotransmitter GABA and to the drug flumazenil, which is used to reverse anesthesia and to treat benzodiazepine overdoses.

Knowing the structure of the receptor could someday lead to better treatments, said Dr. Ryan Hibbs, Assistant Professor

Dr. Shaotong Zhu (left) and Dr. Ryan Hibbs look over an image of the $GABA_A$ receptor, whose molecular atomic structure they deciphered using cryo-electron microscopy.



Daniel Stoddard, a Core Facilities Manager, shows the Titan Krios cryo-electron microscope to graduate student researcher DaNae Woodard.

of Neuroscience and Biophysics with the O'Donnell Brain Institute.

"This study reveals the first high-resolution structural information for one of the most abundant and important neurotransmitter receptors in the brain," said Dr. Hibbs, an Effie Marie Cain Scholar in Medical Research. "We are tremendously excited about it."

Many drugs – both legal and illegal – work on the $GABA_A$ receptor. The receptor binds to GABA (γ-aminobutyric acid), the major calming neurotransmitter in the adult brain.

To function properly, the brain needs a balance of stimulating and calming signals, Dr. Hibbs said. Dysfunction of the $GABA_A$ receptor is found in conditions marked by excessive excitation in the brain, such as epilepsy.

The $GABA_A$ receptor has been notoriously resistant to structural characterization. X-ray crystallography – a structural biology approach long considered the standard – requires the crystallization of proteins to determine their structures, Dr. Hibbs explained.

Dr. Shaotong Zhu, lead author of the study and a postdoctoral researcher in Neuroscience, tried that method on $GABA_A$ but with inferior results. At the same time, she also tried to unveil $GABA_A$'s structure using cryo-electron microscopy (cryo-EM). That approach was successful, providing the first 3D atomic structures of the receptor bound to GABA and to the drug flumazenil.

This work was made possible using the University's $22.5 million cryo-EM facility, where samples are rapidly frozen to prevent the formation of damaging ice crystals and then viewed at around minus 300 degrees Fahrenheit (cryogenic temperatures). UT Southwestern's facility – which runs around the clock – is one of the world's top facilities for cryo-EM structural biology.

"We were able to define how GABA binds so selectively to the receptor and to explain why drugs like benzodiazepines and flumazenil – the agent that competes with those drugs at the same binding site to reverse their effects – act specifically on this receptor," Dr. Hibbs said.

In addition to the benzodiazepine class of sedatives, the $GABA_A$ receptor is a common target for barbiturates, anesthetics, and alcohol, he added. All of those drugs act on the brain by increasing the activity of the $GABA_A$ receptor, which in turn calms brain activity.

"This receptor is a pharmacological gold mine. However, where these drugs bind and how they exert their effects had not been understood at the structural level," Dr. Hibbs said.

Information about the receptor's structure is just the starting point for determining how it works at a fine level of detail, he added. Next steps include understanding how additional classes of drugs interact with the receptor to change its properties.

"We are particularly curious to examine how ethanol and general anesthetics exert their effects through this receptor. Beyond information on how therapeutic and recreational drugs interact with the $GABA_A$ receptor, we aim to look at how the receptor is held in the right place in neurons in the brain to do its job, which will involve structural analysis of increasingly complex assemblies of the receptor with additional neuronal proteins," Dr. Hibbs said. "The emergent picture will show us how the receptor works and is affected by drugs in a setting approximating its home in the brain."

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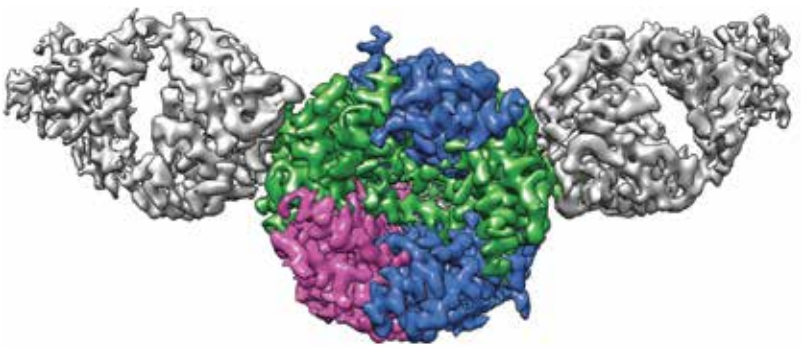


Cryo-EM provided the first detailed 3D atomic structure of the receptor bound to GABA and to the drug flumazenil.

Using the world's most advanced tools in cryo-electron microscopy, UT Southwestern scientists have generated 3D images of atoms and structures within a cell. Here are some of the structures solved to date since the University's $22.5 million cryo-electron microscopy facility opened in 2016.

A The $GABA_A$ receptor – a neurotransmitter receptor that is the target of anti-anxiety drugs like Valium as well as general anesthetics and ethanol

B The mitochondrial calcium uniporter (MCU) – a mitochondrial calcium channel whose function can modulate adenosine triphosphate (ATP) production and cell death

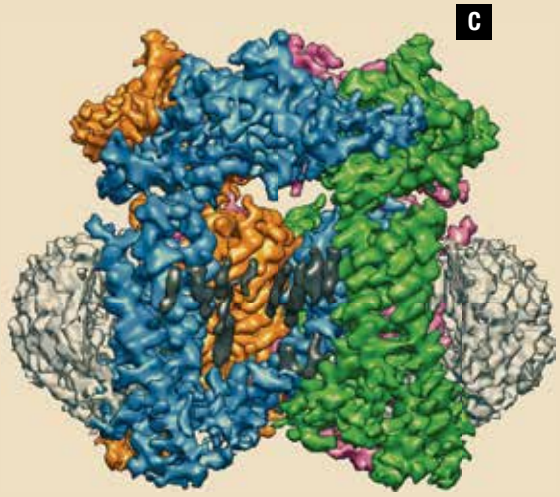
C The TRPML1 ion channel – an ion channel implicated in a rare, inherited human neurodegenerative disease called mucolipidosis type IV

D TRPM4 cation channel protein – a protein with diverse functions in various physiological processes, including temperature sensing

E The TPC1 cation channel protein – a lysosomal ion channel important for nutrient sensing, lipid metabolism, and Ebola virus infection

F The nicotinic acetylcholine receptor (nAChR) – a brain receptor linked to nicotine addiction


B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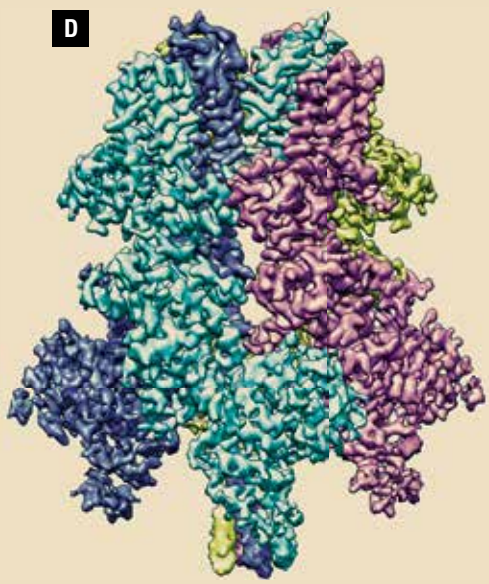
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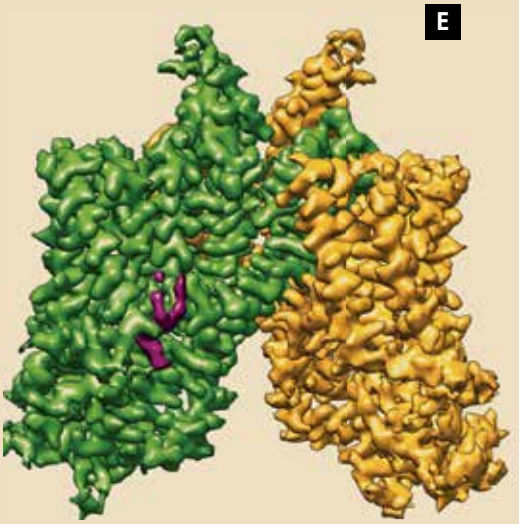
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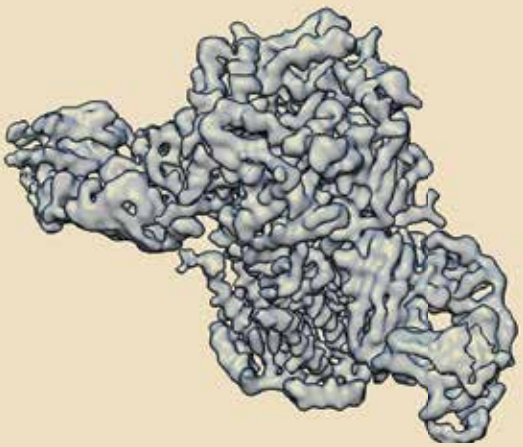
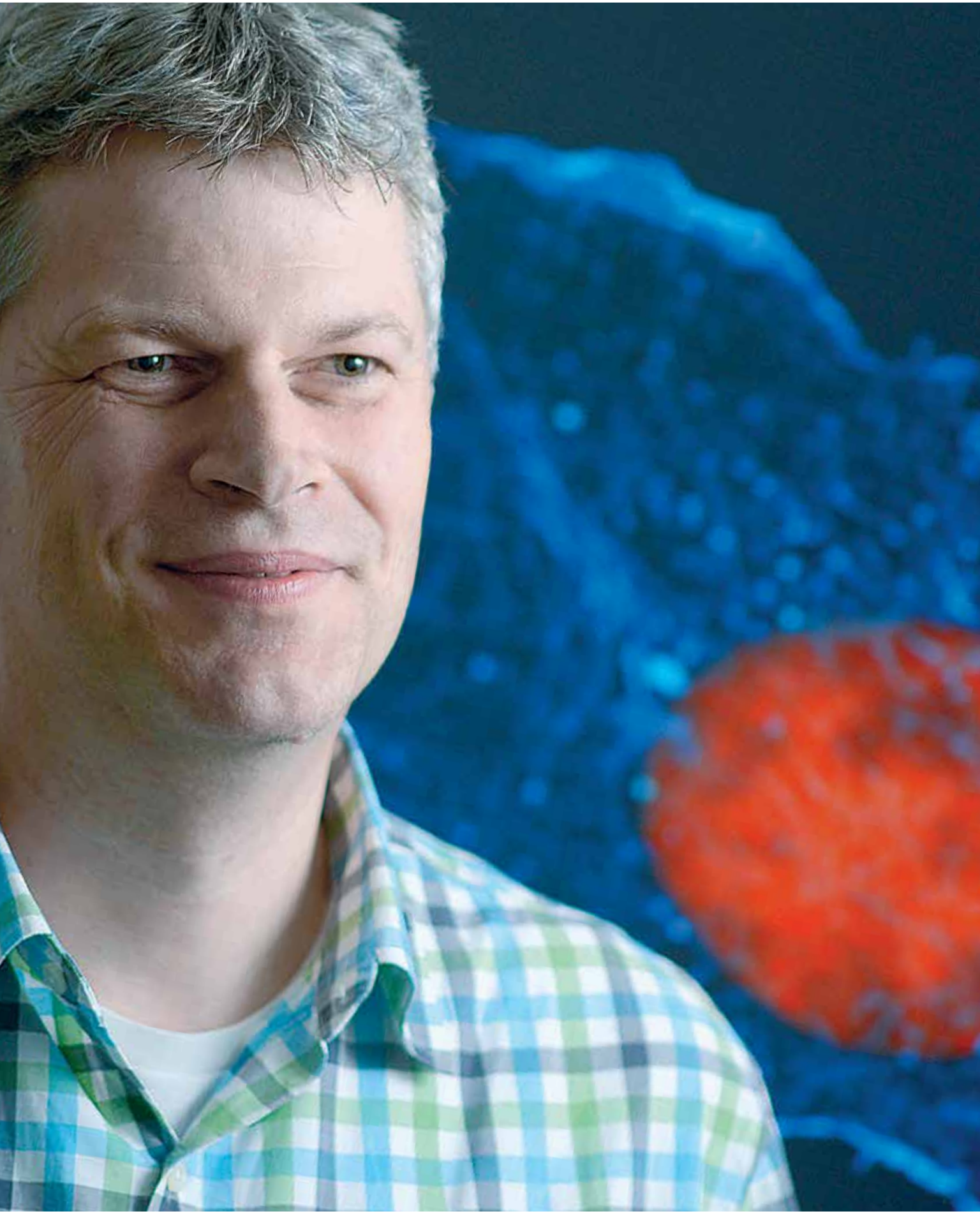


Dr. Gaudenz Danuser, Chair of the Lyda Hill Department of Bioinformatics, wants to build a computer science department within a medical center to help manage and analyze the masses of data now important in biomedical research.



Advancing breakthroughs with the tools of bioinformatics

Dr. Gaudenz Danuser, an internationally recognized leader in engineering and computational biology, has spent the past five years helping UT Southwestern harness the power of bioinformatics – a rapidly growing area of computer science concerned with the collection, organization, and analysis of biomedical data.

Dr. Danuser's goal is to create a computer science department within a medical center – to invent the computational procedures needed to manage and analyze the extremely large data sets now important for biomedical research. Within 10 years, he hopes to recruit 16-20 new faculty involved in this research.

"I see informatics as the backbone of everything we do in biomedical science," said Dr. Danuser, Chair of the Lyda Hill Department of Bioinformatics since its founding. In 2015, a remarkable $25 million gift from Dallas entrepreneur and philanthropist Lyda Hill established the Department.

One of Dr. Danuser's first major studies at UT Southwestern involved designing and building a new microscope capable of creating high-resolution, 3D images of living cancer cells in realistic microenvironments. To do so, he recruited Dr. Reto Fiolka, now Assistant Professor of Cell Biology and Bioinformatics, from the Howard Hughes Medical Institute's Janelia Research Campus. The two co-authored a study in 2016 that describes the design of their unique microscope.

Dr. Danuser also initiated the launch of UT Southwestern's Biomedical High Performance Computing (BioHPC) initiative. Today, the BioHPC has grown into a consortium of 16 UT Southwestern departments that share thousands of processors and 11 petabytes of data storage to perform data-driven basic and clinical science investigations.

In 2015, a $25 million gift from Dallas philanthropist Lyda Hill established the Lyda Hill Department of Bioinformatics.

"Besides assembling increasingly more sophisticated computer algorithms, including artificial intelligence systems, to discover more and more refined information in growing piles of data – which are truly meaningful to biomedical research and clinical practice – I predict that one of the most exciting expansions of bioinformatics moving forward will involve the science of perception," said Dr. Danuser, also Professor of Cell Biology, holder of the Patrick E. Haggerty Distinguished Chair in Basic Biomedical Science, and a Cancer Prevention and Research Institute of Texas Scholar.

"We need to think about how we present the essence of all data we are generating in an intuitive way. Bioinformatics may more and more become the art of finding and seeing the important."

Celebrating the past and creating the future

From its humble start as a small wartime medical college, UT Southwestern has evolved into a premier academic medical center and one of the world's largest. In celebrating its 75th anniversary in 2018, the Medical Center recognized significant milestones leading to its success, initiatives keeping it at the forefront of innovation, and new growth opportunities on the horizon.

Dr. Charles C. Sprague escorts Texas Gov. Dolph Briscoe Jr. and his wife Betty Jane on a campus tour circa 1975.

UT Southwestern celebrates 75 years of excellence

It was a birthday bash 75 years in the making. In January 2018, UT Southwestern began a yearlong anniversary celebration that honored the foundational growth of the past, looked ahead to the future, and recognized the many UT Southwestern contributions that have changed the course of science and medicine.

Throughout the year, the campus was emblazoned with signage commemorating UT Southwestern's 75th anniversary. The Medical District was decorated with anniversary banners, while faculty, employees, and students donned T-shirts and badge reels with the University's signature anniversary logo. Billboards in the Southwestern Medical District commended UT Southwestern for "A Legacy of Excellence," while a website dedicated to anniversary stories, videos, and photos appeared at 75.utsouthwestern.edu, chronicling events of a historic and inspiring year.

UT Southwestern employees celebrate at the official 75th anniversary event held at Seldin Plaza in May.

"This marked an exciting moment and significant milestone in UT Southwestern's illustrious history," said Dr. Daniel K. Podolsky, President of UT Southwestern, who holds the Philip O'Bryan Montgomery, Jr., M.D. Distinguished Presidential Chair in Academic Administration, and the Doris and Bryan Wildenthal Distinguished Chair in Medical Science. "Throughout the year, we celebrated the foundational moments that have made it possible for us to transform medicine in today's environment, when scientific knowledge and medical innovation are expanding exponentially."

Indeed, UT Southwestern has come a very long way since its founding in May 1943 as Southwestern Medical College, a small wartime medical school. Today's UT Southwestern is an expansive and renowned academic medical center that reaches beyond Dallas and includes hospital- and clinic-based patient care, biomedical research, and two additional degree-granting schools: the Graduate School of Biomedical Sciences and the School of Health Professions.

The many accomplishments of UT Southwestern since its establishment in the 1940s – and the promise of the next 75 years – were celebrated in 2018 with events big and small.

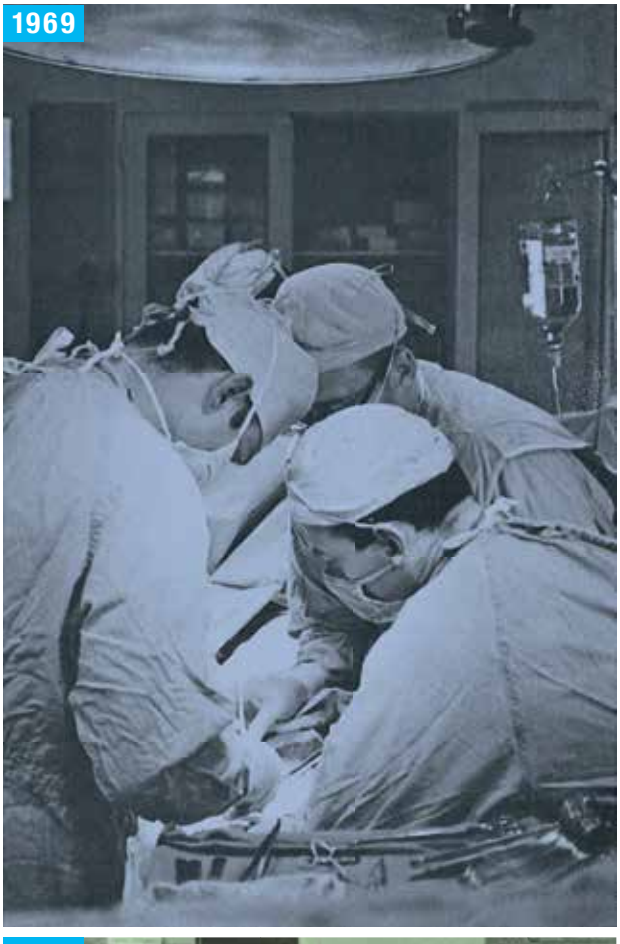
In May, an official campus celebration took place on Seldin Plaza. The heart of the campus was electric with the energy of thousands of staff, faculty, students, and friends – many clad in cheery, bright blue T-shirts commemorating UT Southwestern's 75th anniversary. Attendees enjoyed music from the Transactivators, a band whose members include faculty and staff.

The anniversary year concluded with a two-day signature event Nov. 2-3: The first day, UT Southwestern friends, faculty, and staff attended a future-focused evening program, followed by a lively reception on McDermott Plaza. The next day, Science Saturday, families

and children of all ages experienced a UT Southwestern version of the future of academic medicine.

So what's next? Stay tuned for the next chapter of the UT Southwestern story, which is expected to bring even greater accomplishments in promoting health and a healthy society to enable achievement of full human potential.

A montage of early UTSW imagery **1945** Southwestern Medical College initially was housed in prefabricated plywood buildings on Oak Lawn Avenue, behind the old Parkland Hospital. **1950** Medical students study in the converted Army barracks located on Oak Lawn Avenue. **1969** A surgical team is led by Dr. Watts R. Webb, then-Chairman of Southwestern's Division of Thoracic and Cardiovascular Surgery and a leader in heart transplantation at the time. **1976** Bruce McCarty, an electron microscope technician in Pathology, at one of the Medical Center's "scanning scopes." **1986** Dr. Jeffrey Weinreb reviews MRI images.



75th anniversary signature event celebrates accomplishments, explores frontiers of medical research

Key supporters and North Texas leaders gathered to celebrate UT Southwestern's 75-year history and look toward its future at a signature event held Nov. 2 in the Tom and Lula Gooch Auditorium. The event featured a keynote speech from Dr. Richard Lifton, President of Rockefeller University, and a panel discussion among UT Southwestern faculty moderated by Dr. Lifton.

Dr. Daniel K. Podolsky presents at the 75th anniversary signature event.

The event's primary goal was to highlight UT Southwestern's mission of the past and the future – reaching the previously unreachable through education, research, and patient care. Three videos, "Illuminating the Next Era," "The Future of Medicine," and "Possibilities," juxtaposed UT Southwestern's past and present.

UT Southwestern President Dr. Daniel K. Podolsky greeted attendees by reviewing the institution's evolution from small shacks to the present: "Since its founding, UT Southwestern's mission has been to improve the health of individuals and the health of our community. In this anniversary year, we have taken some time to reconsider how we articulate that – it is not that our mission has changed, it is that we now see it in a broader context," said Dr. Podolsky, who holds the Philip O'Bryan Montgomery, Jr., M.D. Distinguished Presidential Chair in Academic Administration, and the Doris and Bryan Wildenthal Distinguished Chair in Medical Science.

In his keynote remarks, Dr. Lifton praised UT Southwestern for its relationship with the community: "UT Southwestern is one of my favorite institutions to visit, both because of the extraordinary colleagues I get to interact with, but also because I think it has one of the most special and amazing relationships between a community and an academic medical institution that exists anywhere on the planet."

The "Game Changers in Medicine" panel featured UT Southwestern faculty Dr. Robert Collins, Professor of Internal Medicine and Director of the Hematologic Malignancies/ Blood and Marrow Transplant Program and the Combined Adult/Pediatric Stem Cell Transplant Program and holder of the Sydney and J.L. Huffines Distinguished Chair in Cancer Research in Honor of Eugene Frenkel, M.D., and The H. Lloyd and Willye V. Skaggs Professorship in Medical Research; Dr. Gaudenz Danuser, Chair of the Lyda Hill Department of Bioinformatics and holder of the Patrick E. Haggerty Distinguished Chair in Basic Biomedical Science; Dr. Lora Hooper, Chair of the Department of Immunology and holder of the Jonathan W. Uhr, M.D. Distinguished Chair in Immunology, and a Nancy Cain and Jeffrey A. Marcus

Scholar in Medical Research, in Honor of Dr. Bill S. Vowell; Dr. Eric Olson, Chair of the Department of Molecular Biology and holder of the Pogue Distinguished Chair in Research on Cardiac Birth Defects, The Robert A. Welch Distinguished Chair in Science, and the Annie and Willie Nelson Professorship in Stem Cell Research; and Dr. Sandra Schmid, Chair of the Department of Cell Biology and holder of the Cecil H. Green Distinguished Chair in Cellular and Molecular Biology. The panel highlighted the advances UT Southwestern is making in the use of technology to pursue research breakthroughs.

Dr. Olson shared one such advance: "I feel that we are in a truly unique moment in human history, because we know not only the sequence of the human genome, but we can do something about it. This is through a revolutionary technology called CRISPR, which makes it possible to identify even a single letter in the 3 billion letters of the human genome and to correct it – and to do it with high efficiency and high accuracy," he said. "Through this technology, we've cured Duchenne muscular dystrophy in mice, and then dogs. This, I believe, is just the beginning of an entire revolution in which we can correct the many mutations for the devastating diseases of mankind."

Following the panel discussion, attendees enjoyed a reception with displays and interactive stations that included a Simulation Center manikin, an inflatable domed theater that played a film from the Peter O'Donnell Jr. Brain Institute, and virtual reality goggles that placed viewers in an operating room during a heart transplant.

West Campus building brings clinics and academic spaces together

When West Campus Building 3 opened in August, its significance far exceeded the fact that it was the 18th campus building to rise in order to keep pace with UT Southwestern's growth over 75 years.

For the first time, clinics and their corresponding academic offices were brought together in a move designed to expedite the translation of clinical science to the best medical care available. Also inside, a state-of-the-art Simulation Center enables medical students, residents, fellows, and UT Southwestern

West Campus Building 3, located at 2001 Inwood Road, is south of Professional Office Buildings 1 and 2, at the site of the former St. Paul University Hospital.

faculty to train in one of the most advanced centers of its type in the U.S.

At the dedication ceremony, UT Southwestern President Dr. Daniel K. Podolsky emphasized the landmark event.

"We are experiencing great momentum. This building is necessary because more and more patients have come to trust us with their care," said Dr. Podolsky, who holds the Philip O'Bryan Montgomery, Jr., M.D. Distinguished Presidential Chair in Academic Administration, and the Doris and Bryan Wildenthal Distinguished Chair in Medical Science.

"This is the first phase of the continual revitalization that will go on over the next 15 to 20 years, making this a hub for outpatient care and continuing education at UT Southwestern."

The opening of the 305,000-square-foot clinical and academic building, called WCB3 for short, is part of a longer-range plan to add more than 1 million square feet for outpatient clinical care, medical education and training, and academic offices. The goal is to create an integrated campus at UT Southwestern that connects seamlessly with the broader Southwestern Medical District. The $875 million West Campus Facilities Master Plan will unfold in five phases over 20 years.

"This is the first phase of the continual revitalization that will go on over the next 15 to 20 years, making this a hub for outpatient care and continuing education at UT Southwestern." – *Dr. Daniel K. Podolsky*

Dr. John Warner, Executive Vice President for Health System Affairs, said he was proud of the building's core representation of three UT Southwestern missions – patient care, research, and education.

Dr. Warner said he's been reflecting on the new structures that have risen in the last several years – the William P. Clements Jr. University Hospital; the UT Southwestern Monty and Tex Moncrief Medical Center at Fort Worth; the William P. Clements Jr. University Hospital Radiation Oncology Building; and now the new West Campus Building 3.

Occupants of the new space include Urology, the Clinical Heart Center, Vascular Surgery, Otolaryngology, and Internal Medicine Subspecialties.

On levels four through eight, clinicians' academic offices are on one side of the floor and their clinics and staffs on the other, enabling them to move easily between the two. Other unique aspects of the nine-story building include two rooftop gardens and exterior walls of glass to draw in natural light – all designed to make the building a welcoming space for patients, staff, and learners.

"We asked patients to help us think through how the building is organized, how and where we could give it those special touches, and how we can make sure that the care they're receiving is the care that they want and need," said Dr. Warner, who holds the Jim and Norma Smith Distinguished Chair for Interventional Cardiology, and the Nancy and Jeremy Halbreich, Susan and Theodore Strauss Professorship in Cardiology. "The voice of the patient has been very prominent in all of our projects."

Expanding to meet patient care needs

In its 75-year history, UT Southwestern has grown from a small wartime medical college into a premier academic medical center that is one of the world's largest. Today, UT Southwestern's clinical footprint spreads across multiple buildings on the main Dallas campus and beyond, including new clinical centers in North Texas. Highlighted here are two major capital projects currently underway.

William P. Clements Jr. University Hospital expansion

- Years ahead of original projections – and less than three years after opening – patient volume levels led UT Southwestern to initiate construction of a third tower. The expansion project began in September 2017 and is expected to be completed in 2020.
- The 30-month construction project will add 290 beds to house services that are now delivered at Zale Lipshy University Hospital, making Clements University Hospital the clinical site of neuroscience programs associated with the Peter O'Donnell Jr. Brain Institute.
- When completed in 2020, the new tower will consolidate all UT Southwestern inpatient services in one facility, improving the quality of hospital care and services.
- Other benefits will include eliminating redundancies in infrastructure, staffing, and inventory; positioning Clements University Hospital as a destination, high-acuity hospital for the region; and preparing UTSW for referrals from growth of the Southwestern Health Resources network.

UT Southwestern Medical Center at Frisco

- This 120,000-square-foot medical office building, part of a new medical complex that includes Texas Health Hospital Frisco, is scheduled to open by the end of 2019.
- An extension of the Peter O'Donnell Jr. Brain Institute will be part of a multispecialty clinic in the building. Besides various surgical specialties, clinical services will include physical medicine, rehabilitation, therapy, and dermatology, as well as pediatric specialty services in ophthalmology, otolaryngology, and gastroenterology.
- The overall $270 million project, which includes the hospital, is the latest collaboration between UT Southwestern and Texas Health Resources. Medical staff at the hospital will include UT Southwestern faculty, local independent physicians, and Texas Health Physicians Group providers.
- The Frisco project will mark the fifth UT Southwestern regional medical center, joining others in Las Colinas, Park Cities, Richardson/Plano, and Fort Worth.

William P. Clements Jr. University Hospital expansion

UT Southwestern Medical Center at Frisco

State-of-the-art Simulation Center expands breadth and depth of caregiver skills

One of the most advanced medical training facilities in the country opened last year when UT Southwestern unveiled a $40 million state-of-the-art Simulation Center inside West Campus Building 3.

The Sim Center, occupying the building's second and third floors, includes six inpatient simulation rooms, 20 standardized patient rooms, five high-fidelity suites, a multipurpose skills lab to accommodate 96 learners, virtual reality and robotic suites, and other high-tech environments. The facility's simulators closely replicate diseases and conditions that providers encounter in the real world and are used to train medical students, residents, fellows, practicing physicians, and learners from the School of Health Professions, among others.

The facility enables UT Southwestern to significantly expand the number and types of simulation programs to give learners more opportunities to refine their skills.

Clinical Simulation Educator Matthew Kosemund shows a laparoscope used for less invasive surgery in the Simulation Center.

"We can find simulation centers of similar size nationally, but as far as verifying proficiency through simulation for learners of all levels across our entire campus, it's quite unique," said Dr. Daniel Scott, Assistant Dean, Simulation and Student Integration at UT Southwestern Medical School, who oversees the Simulation Center. "Cameras and video recordings allow for everything to be observed firsthand or preserved for later viewings and debriefings." Dr. Scott, also Professor of Surgery, holds the Frank H. Kidd, Jr., M.D. Distinguished Professorship in Surgery.

UT Southwestern has long used simulators in its training, but space has been a constraint. At the facility, 49,000 square feet is now available for simulation training versus 3,000 square feet previously.

Simulation technology also got a significant upgrade to enhance learning. The Sim Center includes high-fidelity manikins that replicate real-life physiology of patients in a variety of situations, such as mothers giving birth, neonatal resuscitation, emergency care of trauma victims, and support for critically ill patients. New equipment also includes a surgical robot and high-end laparoscopic systems for minimally invasive surgery, as well as a host of virtual reality simulators for ophthalmology, orthopedic, vascular, urology, endoscopy, and ultrasound procedures.

Simulators enable learners to expand the breadth and depth of their skills by offering opportunities for practice and mastery of learning in a standardized fashion. For patients, simulation training enhances the quality and safety of care they receive as providers are better prepared and more proficient during their training years and as they enter practice.

Medical student Alvand Sehat practices delivering a "baby" in the Simulation Center.

The three-year expansion planning has been led by Dr. Charles Ginsburg, Vice Provost and Senior Associate Dean for Education, Professor of Pediatrics, and holder of the Marilyn R. Corrigan Distinguished Chair in Pediatric Research.

For third-year UTSW medical student Joo Lee, simulation training helps her prepare for real-world medical scenarios she will face after graduation.

"Sometimes simulations can seem silly, but they teach more than you would expect. On my orientation day for Ob/Gyn, in front of me was a plastic version of a woman's hips to practice the delivery of a baby. The baby was plastic. The mother was plastic, and someone else had to manually push the baby through the plastic mother's hips. I practiced proper rotation maneuvers needed to deliver the baby, pretended to cut the umbilical cord, and imagined a crying baby," Ms. Lee said.

The next day, on her second day of rotation, Ms. Lee helped deliver a real baby. This time, the mom was screaming, a screen kept beeping, and a doctor asked her to help deliver the child.

"I performed exactly what I had learned the day before in the Simulation Center. Only this time, I actually heard the cries of a healthy baby girl," she said. "As someone who is not a passive learner, simulations at UT Southwestern have been transformative for my education and the proper care of my patients."

Serving the community and the state

Helping others. It's a natural calling for those who work at UT Southwestern. Last year, faculty, staff, and students reached out more than ever, giving back their time and expertise in a variety of ways. From Hurricane Harvey aid to working with students to combat mental health issues, UTSW employees positively impacted the community.


UTSouthwestern
Medical Center

A force of nature

UTSW community unites in hurricane relief effort

Editor's note: Hurricane Harvey relief efforts concluded in September 2017, falling into the 2017-18 fiscal year and Annual Review cycle.

When a massive hurricane comes barreling toward the Texas coast, it's a natural response for members of the UT Southwestern community to band together and help. The need for aid is real – and just as big as the hearts of those dedicated to providing exceptional patient care.

Even before news reports confirmed that Hurricane Harvey would leave thousands of South Texans homeless and others injured, the UTSW community mobilized.

In Dallas, more than two dozen UT Southwestern physicians, fellows, students, and others volunteered for the medical response at the Kay Bailey Hutchison Convention Center Mega-Shelter, serving evacuees who had relocated from Houston and South Texas, areas devastated by the 2017 hurricane's flooding. The effort included pediatricians, psychiatrists, infectious disease specialists, and emergency medicine personnel.

Other UT Southwestern employees quickly headed to Houston. More than 40 UTSW nurses spent two weeks helping at the MD Anderson Cancer Center there.

Dr. Raymond Fowler, Chief of the Division of Emergency Medical Services at UTSW, said the magnitude of the response impressed him. "The thing that really warms my heart is that the Dallas area – the citizens and the medical community – has a way of coming together when it's important, and this is an example of that," he said.

Dr. Fowler, who holds the James M. Atkins, M.D. Professorship in Emergency Medical Services, served as Chief Medical Officer at the Convention Center operation. There, UT Southwestern physicians and fellows managed medical supplies and set up a plan for triaging patients.

"This is what we are experienced in and train for daily to ensure we're ready when needed," said Dr. Raymond Swienton, Professor of Emergency Medicine, Division Chief for Emergency and Disaster Global Health, and Co-Director of the CDC Exemplar Center for Public Health Emergency Preparedness. "We are fortunate to have some of the most experienced people in disaster medicine on the UTSW faculty."

> "This is what we are experienced in and train for daily to ensure we're ready when needed."
> *– Dr. Raymond Swienton*

UT Southwestern students also heeded the call, volunteering as staff at the Convention

UT Southwestern President Dr. Daniel K. Podolsky (center) meets with Dr. Raymond Fowler (left), Chief of UTSW's Division of Emergency Medical Services, and Dr. S. Isaacs, a Professor of Emergency Medicine and Medical Director for the Dallas Fire-Rescue Department, as they prepare for Hurricane Harvey refugees at Dallas' Kay Bailey Hutchison Convention Center Mega-Shelter.

UT Southwestern's Dr. Raymond Fowler helped organize a convention center shelter clinic that provided more than 2,500 patient visits to people fleeing Hurricane Harvey.

Center and arranging blood drives and diaper donations.

Ashley Aples, one of those helped by the UTSW efforts, was appreciative. He and his family had come to the Mega-Shelter from Houston.

"My family got what they needed," Mr. Aples said with a smile as he surveyed the volunteer groups spread across the sprawling shelter. "Some of the worst times bring out the best in us and show us who we really are."

During its 23 days of operation from Aug. 29 to Sept. 20, 2017, the Mega-Shelter's medical clinic provided more than 2,500 patient visits to the 3,800 evacuees housed at the shelter.

UT Southwestern pediatricians were on hand each day to help treat evacuated children.

"We provided services as long as they were needed," said Dr. Maeve Sheehan, Professor of Pediatrics, who oversaw the shelter's pediatric care with Dr. Halim Hennes, Professor of Pediatrics and Emergency Medicine.

Earlier, UT Southwestern's pediatric neonatologists had assisted in evacuating neonatal infant patients as the flooding began, and its pediatric nephrologists provided dialysis to several displaced children.

"Large numbers of people were stranded for days in this unprecedented disaster," summed up Dr. Swienton, a long-standing senior adviser to the state of Texas. "We stood ready to provide shelter and medical care to our fellow Texans who arrived in Dallas."

Tears and joy: Nurses reflect on historic relief effort

More than 40 nurses from UT Southwestern clinics and its two hospitals, Zale Lipshy and William P. Clements Jr. University Hospitals, answered the call for help from MD Anderson Cancer Center after Houston's Hurricane Harvey flooding in 2017.

Within hours of receiving the request from their sister UT hospital, UT Southwestern nurses were on the way.

They would provide two weeks of welcome relief to a Houston nursing staff facing their own challenges related to the hurricane – from water-soaked homes to difficulty driving into work.

Dr. Madhukar Trivedi, founding Director of the Center for Depression Research and Clinical Care, describes the app he developed that physicians can use to screen patients for mood disorders, such as depression.

Taking a stand against teen suicide with school outreach

Suicide rates among 10- to 14-year-old girls tripled from 1999 to 2014, according to a 2016 study. In 2014, more than 1 in 10 U.S. adolescents reported they had experienced a major depressive episode within the previous year – up 37 percent from 2005.

Dr. Jennifer Hughes, an Assistant Professor of Psychiatry, leads a program implemented in schools across North Texas to help deal with the surge in suicide rates among adolescents.

vital sign[6]

The VitalSign[6] app was developed by Dr. Madhukar Trivedi as a tool for mental health screening.

Mental health specialists at UT Southwestern are moving into classrooms and pediatricians' offices to confront this problem head-on.

"For every teen who commits suicide, there are so many who are suffering equally," said Dr. Madhukar Trivedi, founding Director of UT Southwestern's Center for Depression Research and Clinical Care, a cornerstone of the Peter O'Donnell Jr. Brain Institute. "The earlier we can screen and identify the kids who need help, the better chance they have in the long term."

UT Southwestern's Risk and Resilience Network, a partnership between the Center and child-focused organizations such as schools that puts on a series of education and research programs tackling this issue and is now in its third year, has been implemented in schools across North Texas and continues to expand. Support for the Network has come from the Jordan Elizabeth Harris Foundation, The Rees-Jones Foundation, and the W.W. Caruth, Jr. Foundation.

Participating schools have access to several education and research programs. In addition, a team of UT Southwestern facilitators supervised by a psychologist goes into classrooms to talk about mental health and suicide prevention. Voluntary depression-screening questionnaires are given to students before as well as after the program. Results are then entered into a database for analysis.

Dr. Trivedi, a Professor of Psychiatry who holds the Betty Jo Hay Distinguished Chair in Mental Health and the Julie K. Hersh Chair for Depression Research and Clinical Care, hopes research and analysis of this data will enable his team to predict risk and resilience among teens.

The Network is also helping pediatricians adhere to national guidelines that call for all teenagers to be screened for depression by providing access to the VitalSign[6] mental health-screening tool app that Dr. Trivedi developed.

Some students have clearly been helped. Dr. Jennifer Hughes, an Assistant Professor of Psychiatry at UT Southwestern who leads the school initiative and is an alumna of the UT Southwestern Graduate School of Biomedical Sciences, recalls one girl who said stress was affecting her well-being. Dr. Hughes suggested the girl talk with a school counselor. The following week, she thanked Dr. Hughes, describing how that initial meeting led her to much-needed therapy.

"That was an example of the program doing exactly what it was intended to do – getting students to talk about these things and seek out possible solutions," Dr. Hughes said.

UTSW reaches out to local college to fill gap in mental health services

About 40 percent of the students at Paul Quinn College, a historically African-American, liberal arts institution in Dallas, come from urban, poverty-stricken areas around the country. UT Southwestern has stepped up to help the school deal with some of the problems these students face.

"The first year that we recruited students out of Chicago, I went to Chicago myself," said Dr. Michael Sorrell, President of Paul Quinn. "I know how many of those students were in schools where classmates were shot that year, and it was a staggering number. So, our students were hurting. It affected the student body. It affected the staff, and there was a very real need to meet this problem head-on."

Dr. Sorrell reached out to UT Southwestern for help, leading to establishment of the first mental health services program in the college's history.

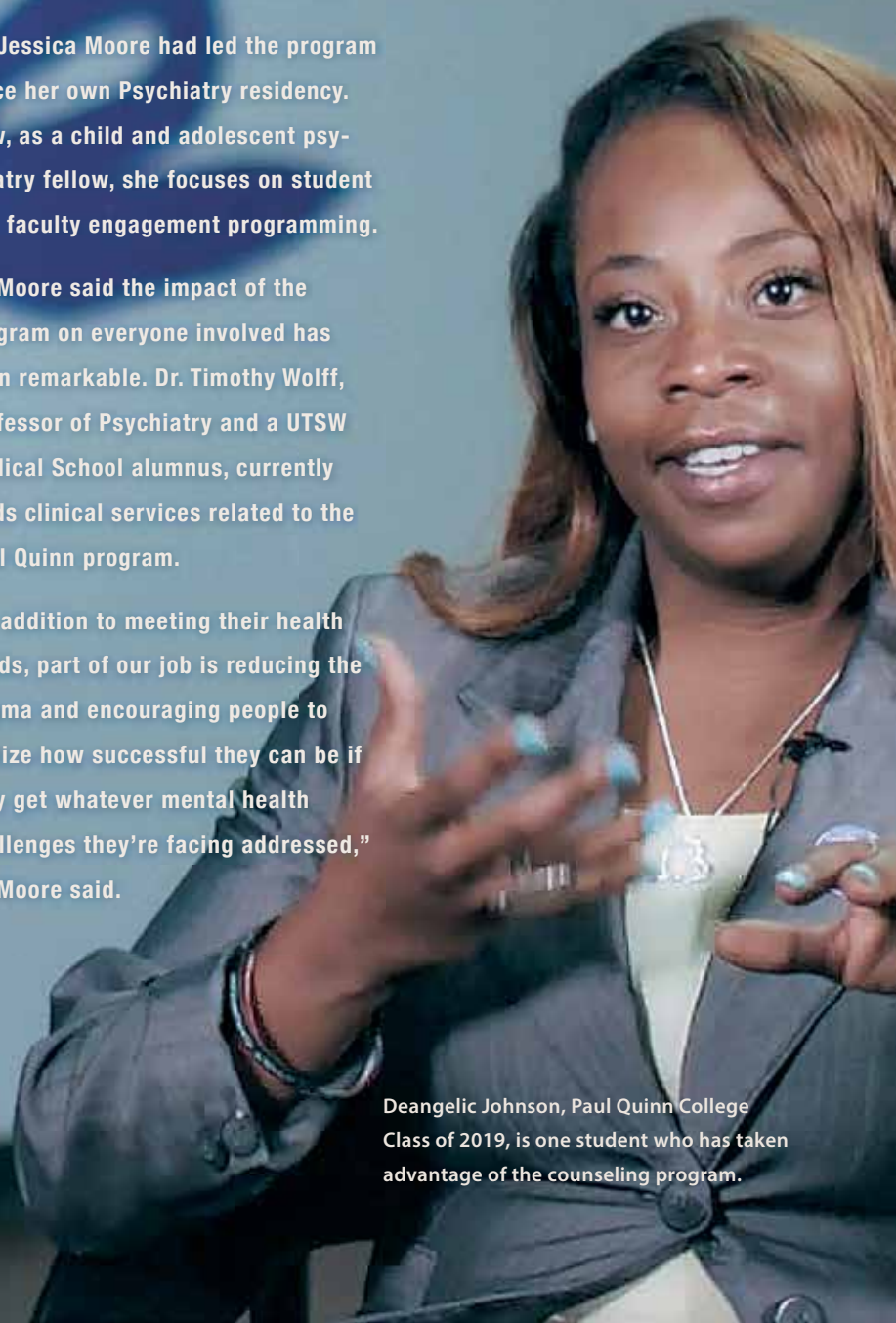
"I am proud that the program has more than met all of our expectations," said Dr. Charles Ginsburg, Professor of Pediatrics, Vice Provost, and Senior Associate Dean for Education at UT Southwestern, who holds the Marilyn R. Corrigan Distinguished Chair in Pediatric Research.

In the clinic at Paul Quinn, UT Southwestern Psychiatry residents offer students medication management and individual counseling services four hours per week, treating everything from anxiety and depression to substance abuse and trauma as part of their clinical rotation overseen by Psychiatry faculty members. Future plans include additional clinic hours, group therapy options, and expansion of holistic services such as yoga and stress management tools.

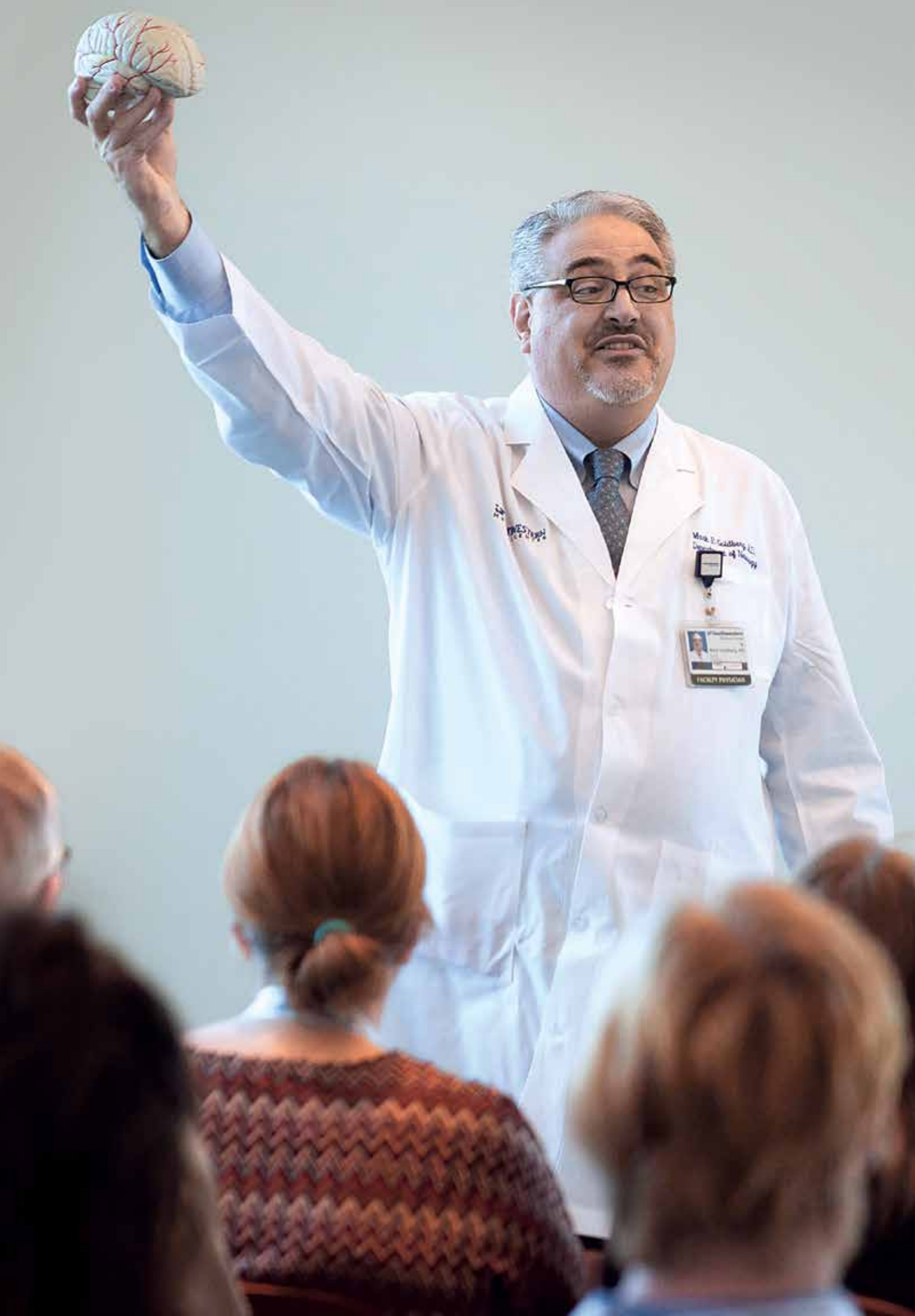
Dr. Jessica Moore had led the program since her own Psychiatry residency. Now, as a child and adolescent psychiatry fellow, she focuses on student and faculty engagement programming.

Dr. Moore said the impact of the program on everyone involved has been remarkable. Dr. Timothy Wolff, Professor of Psychiatry and a UTSW Medical School alumnus, currently leads clinical services related to the Paul Quinn program.

"In addition to meeting their health needs, part of our job is reducing the stigma and encouraging people to realize how successful they can be if they get whatever mental health challenges they're facing addressed," Dr. Moore said.



Deangelic Johnson, Paul Quinn College Class of 2019, is one student who has taken advantage of the counseling program.



UT Southwestern brings the excitement of science to the community

Dallas-area residents got a rare, inside peek into some of the cutting-edge research taking place at UT Southwestern this past year thanks to new collaborations with local organizations.

Last spring, the University opened its labs for the first day of Science in the City, a new science outreach project in collaboration with *The Dallas Morning News.* The partnership drew 125 guests to the campus for what was cleverly called "a tour of our brain."

At the C. Kern Wildenthal Research Building, participants gathered for a morning of hands-on science demonstrations, mini-lectures by researchers, and brainteasers. Topics included concussion awareness, brain imaging, and Alzheimer's research. Dr. Mark Goldberg, Chair of Neurology and Neurotherapeutics and Associate Vice President, Institutional Advancement, welcomed the group of science aficionados. Science in the City will continue as an annual event, and Dr. Goldberg is developing additional community partnerships to expand science awareness.

Dr. Mark Goldberg, Chair of Neurology and Neurotherapeutics, holds up a model of the human brain for participants at last year's first Science in the City event at UT Southwestern.

"Science outreach is about sharing excitement for science knowledge and education," said Dr. Goldberg. "Our open lab tours additionally provide guests a chance to learn firsthand about the pioneering research that happens here at the Peter O'Donnell Jr. Brain Institute."

Also last year, UTSW collaborated with the Perot Museum of Nature and Science's reboot of its Being Human Hall. Exhibits that the University contributed included a human brain with the spinal cord attached, an activity that allows visitors to try out a prosthetic limb, and a video explaining how gene editing is being used to explore new treatments for muscular dystrophy.

Dr. Helen Hobbs, Director of the Eugene McDermott Center for Human Growth and Development, was a guest speaker for the revamped exhibit hall's opening. Dr. Hobbs talked about what led her to become a scientist and encouraged the children in attendance – especially the girls – to consider a career in science. Dr. Hobbs holds the Eugene McDermott Distinguished Chair for the Study of Human Growth and Development, the Philip O'Bryan Montgomery, Jr., M.D. Distinguished Chair in Developmental Biology, and the 1995 Dallas Heart Ball Chair in Cardiology Research.

Dr. Hobbs, also a Howard Hughes Medical Institute Investigator, has won many prizes for her research, including the 2016 Breakthrough Prize in Life Sciences, which is on display at the Being Human Hall alongside the Nobel Prizes and other awards of several UTSW Nobel Laureates.

Medical robot could help solve sports concussion dilemma in rural America

Concussion awareness has moved to the mainstream of national dialogue in recent years, fueled by revelations that former NFL players have suffered permanent brain damage due to repeated head impacts.

A UT Southwestern-led project is trying out a "doctor" robot as a way to bring a remote concussion specialist to high school athletes.

But across America, as high school students play football and other impact sports, more than 60 percent of schools lack an athletic trainer.

Now, in North Texas, a UT Southwestern-led project is trying out a "doctor" robot as a way to bring a remote concussion specialist to high school athletes who might not otherwise have access to one.

Dr. Bert Vargas, who directs the Sports Neurology and Concussion Program at UT Southwestern's Peter O'Donnell Jr. Brain Institute, worked with Rivercrest High School in Bogata, Texas – population 1,077 – to place a 4-foot-tall mobile robot on its campus and arrange for an area neurologist to provide remote consultations.

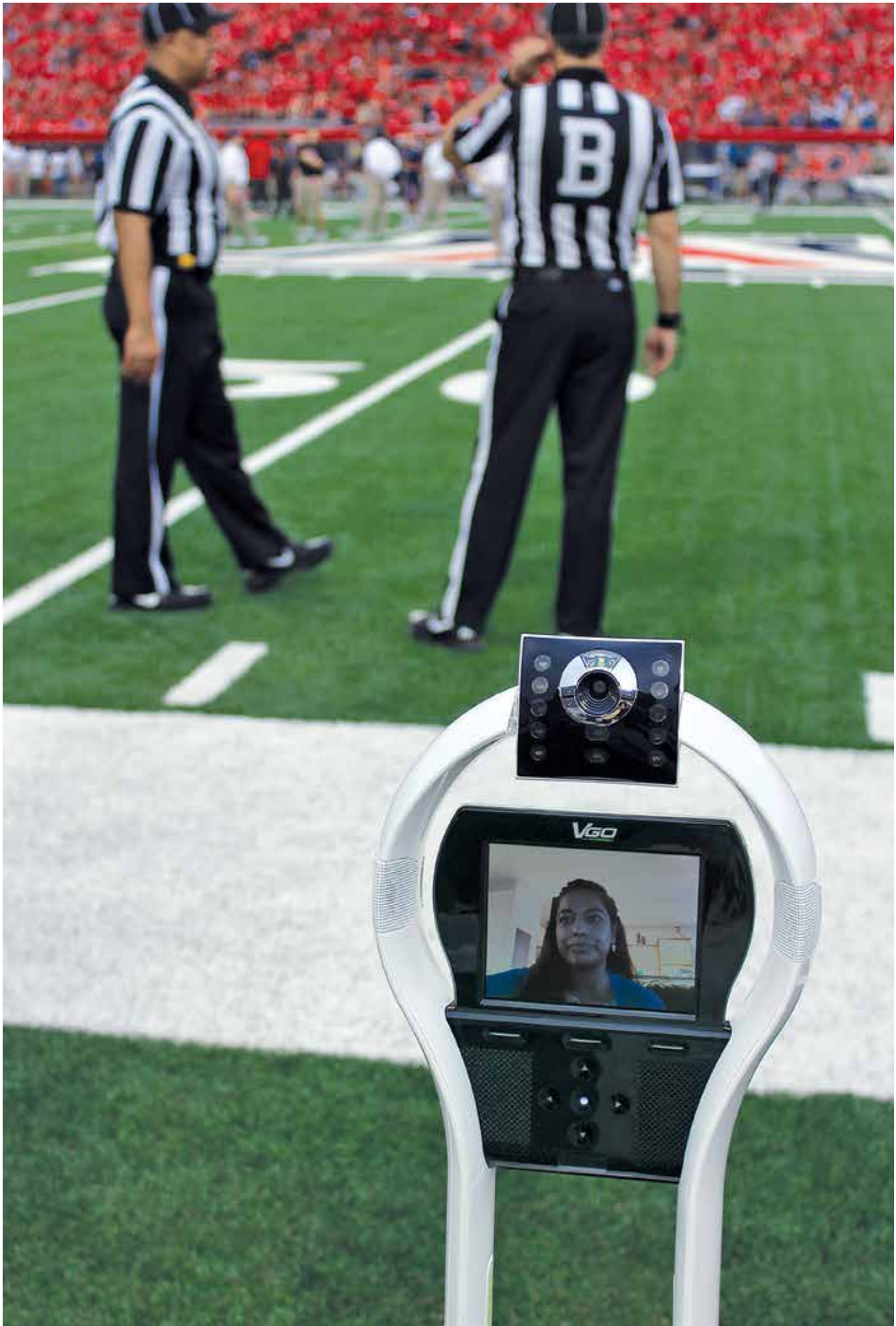
Dr. Vargas developed the project after working with Mayo Clinic researchers on a study that compared how a remote neurologist assessed possible concussions at Northern Arizona University football games using a robot versus face-to-face assessments by team physicians and athletic trainers. Using diagnostic tools that measure cognition, balance, and other factors, the remote neurologist assessed 11 cases. When those assessments were compared with assessments made by on-site medical personnel, the results matched every time.

"We aim to mitigate the disparity in access to concussion expertise," said Dr. Vargas, an Associate Professor of Neurology and Neurotherapeutics at UT Southwestern and the Arizona study's lead author.

He hopes to roll out more robots at Texas schools as the program grows. Having someone on hand to quickly identify and remove concussed players from games is important to protect against long-term injuries, Dr. Vargas said.

UTSW neurologist Dr. Bert Vargas developed a program to provide remote assessments by a concussion specialist to rural high school athletes.

A "doctor" robot stands on the sidelines at a football game, with a remote health care specialist ready to evaluate injured players.



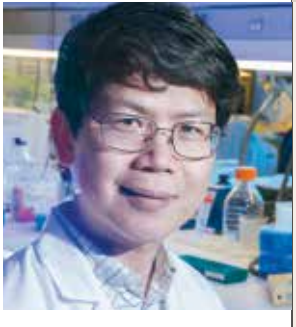
Recognizing and honoring the people who are UT Southwestern

UT Southwestern would not be the institution it is today without the people behind it – faculty, staff, students, and community supporters. Exceptional work by esteemed faculty members and staff led to numerous high-profile awards this past year, such as the Breakthrough Prize. Sadly, the University also mourned the loss of some legendary faculty members and key benefactors.

Outstanding scientific, clinical work brings distinguished honors

UT Southwestern faculty earned prestigious national and international awards this past year for breakthroughs ranging from discovery of an enzyme that launches the body's immune defenses to identification of a gene linked to low cholesterol. On the clinical side, excellence in patient care led to the selection of a William P. Clements Jr. University Hospital employee as Nurse of the Year, an honor presented annually by consulting firm Press Ganey to one outstanding nurse nationwide. Highlighted here are some of those exceptional individuals whose work merited top honors in 2017-2018.

Dr. Zhijian "James" Chen – *Breakthrough Prize and Lurie Prize*



Biochemist Dr. Zhijian "James" Chen, Professor of Molecular Biology and Director of the Center for Inflammation Research as well as a Howard Hughes Medical Institute Investigator, won the prestigious 2019 Breakthrough Prize in Life Sciences for his discovery of the cGAS enzyme that launches the body's immune defense against infections and cancers. That enzyme patrols the cell's interior and triggers the immune system in response to DNA. The international award program, founded in 2013, is sponsored by Sergey Brin, Priscilla Chan and Mark Zuckerberg, Ma Huateng, Yuri and Julia Milner, and Anne Wojcicki. Winners receive $3 million each.

Dr. Chen, who holds the George L. MacGregor Distinguished Chair in Biomedical Science, also received the 2018 Lurie Prize in Biomedical Sciences for the same discovery. The prize includes a $100,000 honorarium made possible through a donation by philanthropist Ann Lurie.

Dr. Chen's discovery of the enzyme cyclic GMP-AMP synthase (cGAS) solved a century-old medical mystery. DNA was known to activate the immune system long before its role as a genetic material was understood. In 1908, a Nobel Laureate noted in his acceptance speech that surgeons in Europe treated patients with DNA to boost their patients' defense against infections. Dr. Chen's investigations revealed the mechanism underlying that response.

Dr. Helen Hobbs – *Institut de France Grand Prix and Harrington Prize*

Geneticist Dr. Helen Hobbs received two awards honoring her discovery of the link between a mutation in the PCSK9 gene and low cholesterol – the Institut de France Grand Prix Scientifique Lefoulon-Delalande Grand Prize in Science and the 2018 Harrington Prize for Innovation in Medicine.

Not only did her work lead to the swift development of a drug to lower refractory high cholesterol and thus prevent heart disease, but her research also changed the methodology used by many genetic researchers.

Dr. Hobbs is Director of the Eugene McDermott Center for Human Growth and Development at UTSW and a Howard Hughes Medical Institute Investigator. She is also a Professor of Internal Medicine and Molecular Genetics and holds the Eugene McDermott Distinguished Chair for the Study of Human Growth and Development, the Philip O'Bryan Montgomery, Jr., M.D. Distinguished Chair in Developmental Biology, and the 1995 Dallas Heart Ball Chair in Cardiology Research.

Dr. Philipp Scherer – *Diabetes Prize for Excellence*

Dr. Philipp Scherer, Director of the Touchstone Center for Diabetes Research, won the 2017 EASD-Novo Nordisk Foundation Diabetes Prize for Excellence in recognition of his research on the relationship between body fat and Type 2 diabetes.

The European Association for the Study of Diabetes (EASD) prize is bestowed on an internationally recognized researcher for outstanding research or technology that contributes to the understanding of diabetes, its disease mechanisms, or its complications. The prize includes 6 million Danish kroner (approximately $960,000) and is widely considered the most prestigious European prize for diabetes research.

Dr. Scherer, a Professor of Internal Medicine and Cell Biology and holder of the Gifford O. Touchstone, Jr. and Randolph G. Touchstone Distinguished Chair in Diabetes Research, is known for his 1995 discovery of adiponectin – a hormone produced by fat – and for defining its physiologic roles. Previously, adipose tissue had been considered solely a storage depot for excess calories.

Dr. Ralph DeBerardinis – *Howard Hughes Medical Institute Investigator and O'Donnell Award*

Dr. Ralph DeBerardinis, Professor at the Children's Medical Center Research Institute at UT Southwestern (CRI), was named UT Southwestern's 15th Howard Hughes Medical Institute (HHMI) Investigator.

With his selection, UT Southwestern leads the state in the number of HHMI investigators. HHMI is a philanthropic organization created to advance basic biomedical research and science education for the benefit of humanity.

Dr. DeBerardinis, Chief of the Division of Pediatric Genetics and Metabolism at UT Southwestern and Director of the Genetic and Metabolic Disease Program at CRI, also received the 2019 Edith and Peter O'Donnell Award in Medicine from The Academy of Medicine, Engineering and Science of Texas for his work on how altered metabolism contributes to human diseases, including inborn errors of metabolism and cancer.

Also a Professor of Pediatrics and a member of the Eugene McDermott Center for Human Growth and Development, Dr. DeBerardinis holds the Joel B. Steinberg, M.D. Chair in Pediatrics and is a Sowell Family Scholar in Medical Research and a Robert L. Moody, Sr. Faculty Scholar. In addition, he is an attending physician at Children's Health.

Dr. Julie Pfeiffer – *O'Donnell Award*

Dr. Julie Pfeiffer, Professor of Microbiology, was awarded the 2019 Edith and Peter O'Donnell Award in Science from The Academy of Medicine, Engineering and Science of Texas for her work to understand virus-host interactions that impact the development of disease.

Dr. Pfeiffer, who holds the Kern and Marnie Wildenthal President's Research Council Professorship in Medical Science, studies how intestinal bacteria promote infection with enteric viruses. Enteric viruses are extremely common human infections that can range from mild gastroenteritis to systemic disease and death.

Her work has deepened the world's understanding of the interplay between the gut's microbiome – the viruses and bacteria that line the intestines – and disease. Specifically, she found that some viruses use the body's natural gut bacteria in order to become more infectious and replicate.

Dawn Brown – *Press Ganey Nurse of the Year*

Dawn Brown, a UT Southwestern employee for more than a decade, was recognized as Nurse of the Year by Press Ganey, a national consulting firm specializing in health care performance.

Ms. Brown, M.S.-M.A.S., B.S.N., the sole nationwide recipient of this prestigious award, is Clinical Manager of the Surgical Specialty Unit at William P. Clements Jr. University Hospital.

The award recognizes the contributions of an outstanding direct care nurse who has gone above and beyond in their role and demonstrated care innovation, transformation, and collaboration that supports an exceptional patient experience.

Described as a "voice for patients who fiercely advocates for their needs," Ms. Brown was nominated and ultimately selected based on her exceptional patient care, proven leadership skills, and ability to successfully collaborate with other team members. The recognition also noted her effort to craft successful pain management strategies that contributed to improvements in patient care.

‘Intellectual father’ of UT Southwestern left an enduring legacy

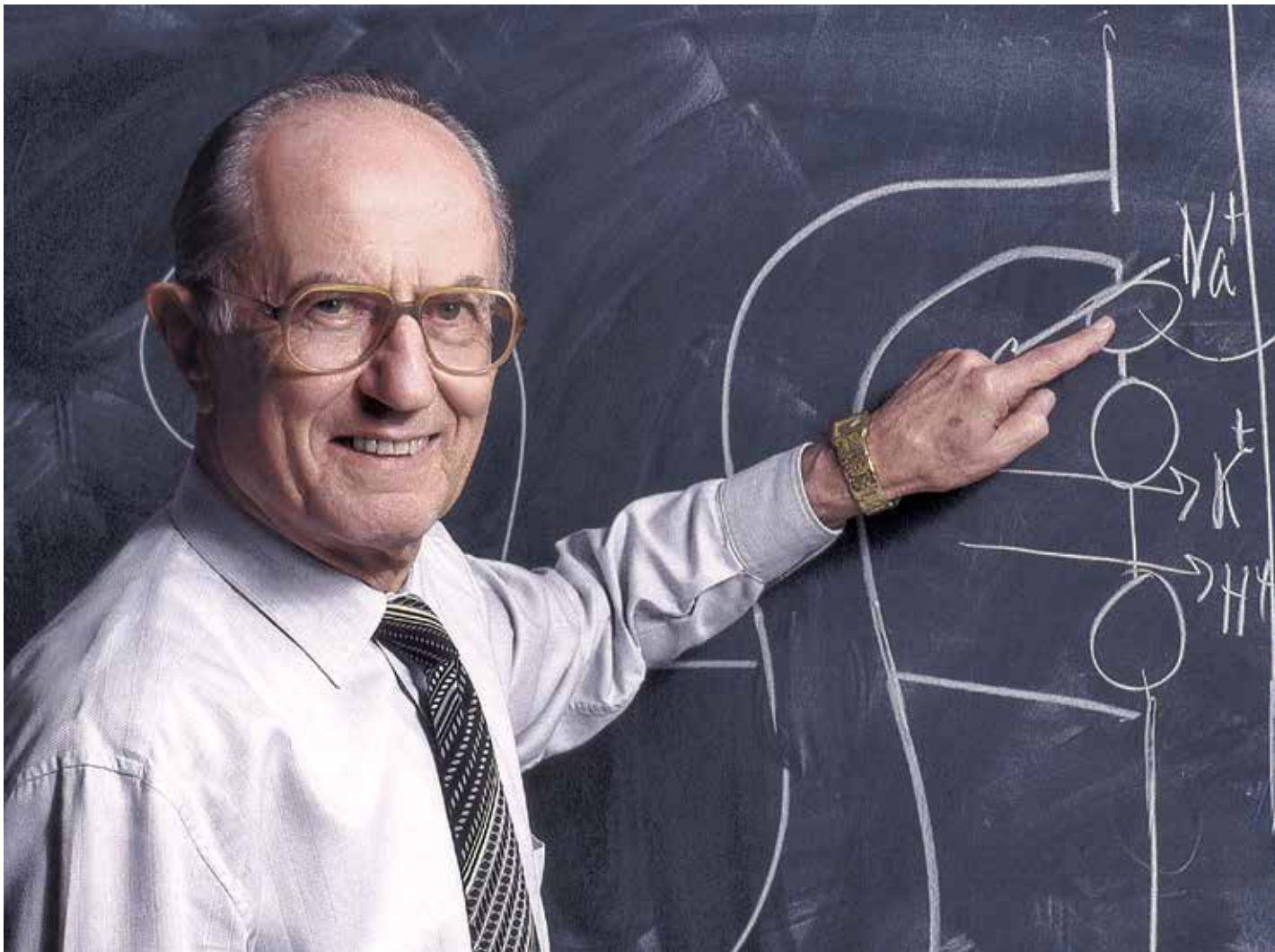
Dr. Donald W. Seldin, known as the “intellectual father” of UT Southwestern and one of the most distinguished medical educators in the history of internal medicine, died in April 2018 at the age of 97.

The contributions of Dr. Seldin, Professor and Chairman Emeritus of Internal Medicine, are interwoven in UT Southwestern’s growth story. During his 67 years working at UT Southwestern, his dedication to educating generations of top medical professionals, as well as his success in transforming a small medical school housed in converted Army barracks into one of the nation’s premier academic medical centers, are all part of the lasting legacy of this giant of medicine and higher education.

Dr. Daniel K. Podolsky, President of UT Southwestern, noted the magnitude of Dr. Seldin’s many professional achievements over his lifetime and at UT Southwestern.

“In his 36 years as Chairman of Internal Medicine at UT Southwestern, he held a singular view of what an academic department should be and built a world-class department around that vision – which has been emulated across the country,” said Dr. Podolsky, who holds the Philip O’Bryan Montgomery,

UT Southwestern lost its “intellectual father” last year when Dr. Donald W. Seldin died in April at the age of 97. Dr. Seldin shepherded UTSW from a small medical school housed in converted Army barracks in the 1940s to the respected medical, educational, and research institution that it is today.



Jr., M.D. Distinguished Presidential Chair in Academic Administration, and the Doris and Bryan Wildenthal Distinguished Chair in Medical Science.

After completing high school at age 16, Dr. Seldin earned a bachelor's degree in literature. The New York native had read extensively in college, developing an interest in literary works – especially poetry. But realizing the lack of job opportunities in this field, he began taking courses needed to apply to medical school. In 1943, he graduated from Yale University School of Medicine.

Dr. Seldin's career at UT Southwestern started in 1951. He was recruited to then-Southwestern Medical School of The University of Texas from Yale, where he had joined the faculty following service in the Army. After working for only a year in UT Southwestern's Department of Internal Medicine, Dr. Seldin became Chairman of the Department that he would ultimately bring to great acclaim.

Dr. Seldin led the Department of Internal Medicine from 1952 until 1988. During his tenure, he garnered renown for identifying, motivating, and nurturing talented students, residents, and fellows who went on to become distinguished leaders and faculty members in the academic world. Dr. Seldin built a department recognized as one of the best in the country.

Widely admired as one of the greatest chairs of internal medicine in American medical history, Dr. Seldin was a visionary, a tenacious leader, and a demanding yet patient teacher. His vast grasp of medicine established a climate at UT Southwestern that attracted superior faculty. Contrasting with this scientific side, Dr. Seldin's interest in art and literature fed the creative part of his personality. Always willing to take part in Medical School skits and chili cook-offs, Dr. Seldin is remembered fondly for his wit and fun-loving spirit, as well as for his medical acumen.

He garnered innumerable teaching honors, was an early member of the prestigious Institute of Medicine (now the National Academy of Medicine) and the American Academy of Arts and Sciences, and received six honorary degrees, including one from Yale and another from the Université de Paris VI – Pierre et Marie Curie.

Dr. Seldin held the William Buchanan Chair in Internal Medicine at UT Southwestern. In addition, several chairs at UT Southwestern have been created in his honor: the Donald W. Seldin Distinguished Chair in Internal Medicine, the Donald W. Seldin Professorship in Clinical Investigation, and the Sinor/Pritchard (Katy Sinor and Kay Pritchard) Professorship in Medical Education Honoring Donald W. Seldin, M.D.

A major figure in the emergence of nephrology as a discipline, Dr. Seldin was a founder of the American Society of Nephrology, one of seven learned societies around the world to which his peers elected him President.

Dr. Donald W. Seldin is known as the "intellectual father" of UT Southwestern and one of the most distinguished medical educators in the history of internal medicine.

Dr. Donald W. Seldin's life journey

OCTOBER 24, 1920
Dr. Seldin was born on Coney Island in New York City, the son of European immigrants.

1940 He graduated from New York University on a full scholarship. Dr. Seldin took a number of courses in biology and chemistry his senior year, allowing him to apply to medical school.

DECEMBER 1943
Dr. Seldin graduated from Yale University School of Medicine in a class of 39 students. His medical internship and two-year residency were completed at Yale's New Haven Hospital.

1945 – 1947 Dr. Seldin served in the Medical Corps as Chief of the Department of Medicine at the 98th Military Hospital in Munich, Germany. During this time, he testified at a Nuremberg trial of a Nazi physician from the Dachau concentration camp about the deaths of inmates following purported liver biopsies for hepatitis. The then-27-year-old's expert testimony helped lead to guilty verdicts.

JANUARY 1951
Recognizing a lack of advancement opportunities at Yale, Dr. Seldin joined the Southwestern Medical School of The University of Texas as an Associate Professor in the Department of Internal Medicine. Within a year, at age 31, he became Professor and Chairman of the Department, serving in that position until 1988.

MARCH 16, 2015 On the South Campus, a 7-foot bronze statue and plaque commemorating Dr. Seldin's service was unveiled. More than 400 people, including Nobel Laureates, philanthropists, and UT Southwestern leaders and physicians attended the dedication ceremony for the Dr. Donald Seldin Plaza, renamed in his honor.

APRIL 25, 2018 Dr. Seldin died of lymphoma at his home. His career included serving as President of seven learned societies. He also received six honorary degrees and numerous awards during his lifetime, including election to the Institute of Medicine (now the National Academy of Medicine) and the American Academy of Arts and Sciences.

Remembering others we lost

Ruth Altshuler: A dedicated UT Southwestern advocate

Ruth Collins Sharp Altshuler, a longtime advocate for UT Southwestern and a prominent person in Dallas politics, died Dec. 8, 2017. She was 93. Born and raised in Dallas, she had an enduring passion to strengthen her community through purposeful work.

Mrs. Altshuler played a leadership role in fundraising for the Medical Center, participating in three key campaigns: the Innovations in Medicine *campaign, which ultimately raised $772 million for research and clinical programs at UT Southwestern; the* Building the Future of Medicine *campaign to build the William P. Clements Jr. University Hospital; and the* Campaign for the Brain, *which is helping UT Southwestern develop cures for brain diseases. She served as past Chair of the Carolyn P. Horchow Women's Health Symposium, as a lifetime member of the UTSW President's Advisory Board and the former UTSW Board of Visitors, as a member of the Zale Lipshy University Hospital Board, and as a member of the Friends of the Center for Human Nutrition.*

A recipient of multiple national honors in philanthropy, on a personal level Mrs. Altshuler was beloved for her engaging, friendly personality and quick wit. Friends said she had a unique talent for being poignant and funny at the same time when she shared stories about her life.

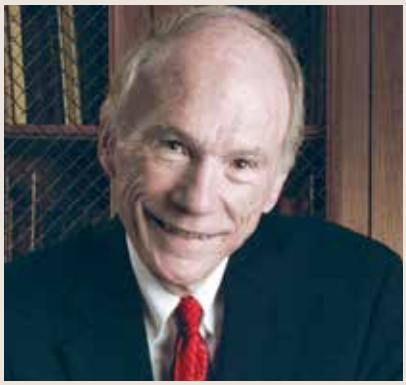
Rita Clements: Texas first lady and UT System leader

Rita Crocker Clements, one of the state's most generous philanthropists who served as an adviser at the highest levels of state government and education, died Jan. 6, 2018, from complications of Alzheimer's disease. She was 86.

Mrs. Clements was married for 36 years to former Texas Gov. William P. Clements Jr., who died in 2011. She is remembered for her dignity, elegance, and wide-ranging intellect, which allowed her to assume leadership roles that included loyal, long-standing support for UT Southwestern, Southwestern Medical Foundation, and the UT System.

Gov. and Mrs. Clements' support for research, education, and clinical care efforts in cancer, Alzheimer's disease, and human nutrition programs at UT Southwestern included significant gifts given anonymously; a $1.25 million gift in 1998 to create the Rita C. and William P. Clements Jr. Scholar in Medical Research program; a $10 million donation in 2006 to complete a UT Southwestern clinical and medical research facility later named the Bill and Rita Clements Advanced Medical Imaging Building; and Gov. Clements' $100 million transformative contribution in 2009 to benefit UT Southwestern.

One friend described Mrs. Clements as a force of nature – someone who combined unusually keen intelligence, strong people skills, boundless energy, and very high aspirations for causes she felt passionate about.



Dr. Daniel W. Foster: Longtime Internal Medicine Chairman

Dr. Daniel W. Foster, a world-renowned diabetes expert, inspiring medical school instructor, and nationally recognized Chairman of UT Southwestern's Department of Internal Medicine for 16 years, died Jan. 18, 2018. He was 87.

Dr. Foster's long and varied medical career, which began as a medical student at UT Southwestern, took him from working as a research fellow at the National Institutes of Health to serving as a member of the President's Council on Bioethics, and from holding a Department Chair to hosting a popular weekly medical TV show. After 25 years as a UT Southwestern faculty member, Dr. Foster succeeded Dr. Donald W. Seldin as Chairman of the Department of Internal Medicine, where he served from 1988 to 2003. Under Dr. Foster's leadership, the Department launched the Dallas Heart Study, as well as liver and lung transplant programs.

Respected and loved by the patients he served, Dr. Foster brought the highest integrity to every endeavor, whether it involved teaching weekly Sunday School classes, pursuing research projects, caring for patients, or speaking at medical conferences.

Dr. Foster, the third of five faculty Chairs of the Department of Internal Medicine since it was founded, held the John Denis McGarry, Ph.D. Distinguished Chair in Diabetes and Metabolic Research.

Margaret McDermott: A rare friend and visionary

Margaret Milam McDermott, who died May 3, 2018, at the age of 106, was a visionary benefactor whose leadership, loyal friendship, and unwavering commitment provided transforming support to UT Southwestern.

Mrs. McDermott, a journalist who had spent time in both Germany and Japan after the end of World War II, married industrialist Eugene McDermott in 1954. He was a co-founder of Geophysical Services Inc. and its successor, Texas Instruments.

With a history of exceptional generosity to UT Southwestern totaling nearly $45 million, the imprint of the McDermotts and their Foundation is far-reaching across campus. Among the many programs, centers, buildings, and endowed chairs named in their honor is the Eugene McDermott Center for Human Growth and Development. Mrs. McDermott also made significant gifts toward the Building the Future of Medicine *campaign and to help expand William P. Clements Jr. University Hospital.*

Through the years, many close personal friendships were formed as Mrs. McDermott repeatedly made generous gifts to UT Southwestern, speaking to her unique character as a true, rare friend and philanthropist. Humble at heart, she preferred to give generously but avoid the media spotlight.