TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER.

# OFFICE OF RESEARCH & INNOVATION 2022 ANNUAL REPORT

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# WELCOME

**WE ARE ALL VERY PROUD OF THE MANY ACCOMPLISHMENTS** our institution has achieved this past year, and we applaud the success of our team members — many of whom you will read about in the upcoming pages of this report.

The Office of Research and Innovation is dedicated to supporting the research and development needs of our Texas Tech University Health Sciences Center (TTUHSC) community, with the ultimate goal of facilitating the translation of groundbreaking scientific discoveries into innovative solutions that enhance the lives of the West Texas communities we serve. Our team is here to work one-on-one with researchers to ensure their success throughout the entire award lifecycle. We begin by seeding milestone-driven research programs that educate faculty on how to bridge their ideas to state and federally-sponsored programs. We have teams devoted to supporting principal investigators (PIs) by identifying collaborators and building competitive research proposals. Our Office of Research and Innovation team works collaboratively with faculty ensuring the utmost integrity in compliance and ethics throughout their data collection. Through our partnerships with the Texas Tech University (TTU) Innovation Hub and the Office of Research Commercialization, we have pathways to guide our PIs in translating their discoveries to impact.

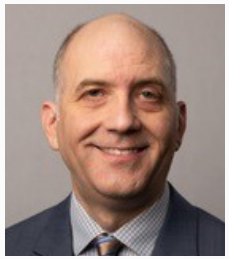
The pages that follow showcase only a few of our successful research endeavors, and our drive toward innovation and collaboration has fueled ambitious advancements in cancer, neuroscience, infectious disease and other notable areas of research that are advancing health care in our communities. Our federally-funded research continues to grow, our collaborative IP efforts between TTU and TTUHSC continue to increase, and our growing number of innovation activities continue to raise TTUHSC's profile as a resource for the development of drug therapies and new health care technologies.

None of this would be possible without the talented and collaborative team of researchers and educators who elevate our institution. As a Hispanic-serving, Carnegie-classified research university, we celebrate our world-class faculty and the exceptional doctoral degree trainees who have worked together to secure TTUHSC's designation as a global leader in academic health-related research.

LANCE R. MCMAHON, PH.D.
Senior Vice President for Research and Innovation

**ALYCE ASHCRAFT, PH.D., R.N.**
Associate Dean for Research and Scholarship
School of Nursing

**ULRICH BICKEL, M.D.**
Associate Dean of Sciences
Jerry Hodge School of Pharmacy



**TROY HOOPER, PH.D., P.T.**
Associate Dean for Research
School of Health Professions

**LESLIE SHEN, PH.D.**
Associate Dean for Research
School of Medicine

**MICHAEL BLANTON, PH.D.**
Associate Vice President for Research
Senior Associate Dean, Graduate School of
Biomedical Sciences

**CHRISTINE GARNER. PH.D., R.D.**
Assistant Vice President for Research

**MIN KANG, PHARM.D.**
Associate Vice President for
Research and Innovation

**PHIL SIZER JR., P.T., PH.D.**
Associate Vice President for
Research Innovation

**KRISTYN SORENSEN, J.D., PH.D.**
Assistant Vice President for
Research Integrity

**ERIN WOODS, M.R.A.**
Assistant Vice President for
Sponsored Programs

# DIVISIONS OF SUPPORT

## LABORATORY ANIMAL RESOURCE CENTER (LARC)

- Ensures the health and welfare of research and teaching animals utilized in the TTUHSC Animal Care and Use Program
- Operate and maintain research animal vivaria in Lubbock, Amarillo and Abilene
- Provide technical, teaching and collaborative support to the research community to facilitate discovery and innovation

"We provide expert support for animal care and facilitate high end biomedical research through training, education, collaboration and regulatory oversight. - Scott Trasti"

## OFFICE OF SPONSORED PROGRAMS (OSP)

- Review and approve grant proposal submissions to external funding agencies
- Promotion of successful post-award grant management
- Institutional reporting on proposals and awards

"We provide administrative support and guidance to our faculty and staff during their quest for external funding and the management of awarded projects that enables them to transform health care through innovation and collaboration. -Erin Woods"

## RESEARCH INNOVATION, COLLABORATION, AND ENTREPRENEURSHIP (RICE)

- Advance TTUHSC Research and Innovation enterprise
- Provide infrastructure and environment
- Support collaborative research, innovation, partnerships and entrepreneurship

"We work with faculty, students and staff to help them build functional teams and translate their innovative ideas from concept to marketable application. -Phil Sizer"

## RESEARCH INTEGRITY OFFICE (RIO)

- Administrative oversight of quality assurance and compliance for all research
- Maintain research operating procedures and policies
- Manage several research compliance committees and mandatory trainings

"In providing research administrative oversight and outreach, we work to support and empower leaders within our research community to act with the highest ethical standards in order to create and maintain our culture of ethics, compliance and integrity. -Kristyn Sorensen"

# COLLABORATIO

OUR DISCOVERIES BEGIN WITH COLLABORATION

Daniel Hardy, Ph.D.

**TTUHSC, TTU Study Uncovers Second Speciation Gene Ever Found In Mammals**

Daniel Hardy, Ph.D., from TTUHSC's Department of Cell Biology and Biochemistry, and Robert Bradley, Ph.D., director of the Natural Science Research Laboratory, published a study in Genome Biology in 2022. Hardy contacted Bradley about studying the Zan gene's function in hybridization. Three additional scholars joined the team: Emma Roberts, Emily Wright and Steve Tardif, Ph.D. Their reconstruction of the evolution of the gene revealed that the Zan gene tree closely matched the accepted species tree for mammals and the gene changed faster than any other gene in the mammalian genome. "We had discovered a new speciation gene," Hardy said. The team's discovery is the second speciation gene ever to be found in mammals. "I'm proud of how Emma, Steve and Emily turned an intellectual seed planted more than 30 years ago into a gratifying discovery that has set us up for exciting new projects," Hardy said.

[1]Roberts, E.K., Tardif, S., Wright, E.A. et al. Rapid divergence of a gamete recognition gene promoted macroevolution of Eutheria. Genome Biol 23, 155 (2022). https://doi.org/10.1186/s13059-022-02721-y

COLLABORATIVE PUBLICATIONS BETWEEN TTUHSC + TTU

2019

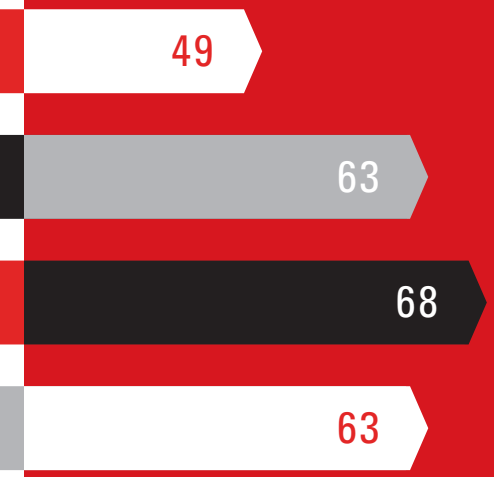
2020

2021

2022

**Dufour Studies Sertoli Cells and Their Role in Diabetes, Immune Responses**

Jannette Dufour, Ph.D., from the TTUHSC School of Medicine researches diabetes, including the use of Sertoli cells to protect cells that make insulin so they can normalize blood glucose levels long-term. Sertoli cells, located in the walls of the seminiferous tubule in the male testes, are responsible for supplying nutrients to sperm. Sertoli cells also are called nurse cells because they protect those developing sperm cells from being attacked by the body's immune system. In 2022, Dufour published one study that explored how Sertoli cells act to both protect germ cells from an autoimmune response and to activate certain immune responses to fight off infections. She also published four papers in 2022-2023 describing how Sertoli cells regulate immunity factors that prevent organ rejection after transplantation. These studies, like her initial 2012 research into using Sertoli cells to potentially address diabetes, were made possible by funding from The CH Foundation, which for years has supported research endeavors, educational programs and served as a catalyst for bridging TTUHSC faculty to federal funding opportunities.




Source: WellSpring

# RESEARCH AT A GLANCE

## $21.97M TOTAL RESEARCH FUNDING FY 2022


**HSI DESIGNATION RECEIVED**

977 **PUBLICATIONS**

385 **NON-EXEMPT HUMAN RESEARCH STUDIES CONDUCTED AT TTUHSC CAMPUSES**

77 **REGISTERED CLINICAL TRIALS**

**CARNEGIE CLASSIFICATION FOR SPECIAL FOCUS FOUR-YEAR RESEARCH INSTITUTION RECEIVED**

**Lawrence Receives NIH Grant to Examine Impact of Vitamin A Depletion on Alzheimer's Disease**

Research suggests that an accumulation of toxic reactive oxygen species (ROS) in the brain's hippocampal dentate gyrus (DG) may begin early in the onset of Alzheimer's disease. To gain additional insight into the potential relationship between ROS accumulation in the DG and the onset of Alzheimer's disease, the NIH awarded a five-year, $1.87 million grant to J. Josh Lawrence, Ph.D., from TTUHSC's School of Medicine. Under the grant, the Lawrence team will determine if the depletion of all-trans retinoic acid, an antioxidant within the DG, promotes ROS toxicity. Other benefits that could result from the project include identifying specific dysregulated genes that could be targeted for treatment, and the extent to which a diet that incorporates foods with high levels of Vitamin A can be a potent prevention strategy for Alzheimer's disease.

**Lee Studies Potential of Telemedicine in Helping Children with Cleft Palate**

The Centers for Disease Control and Prevention estimates that 1 of every 1,700 babies in the U.S. is born with cleft palate. However, there is a significant shortage of speech-language pathologists (SLPs) across the country, especially in rural areas such as West Texas. With funding from a U-Series Clinical Trial grant from the National Institutes of Health, Sue Ann Lee, Ph.D., CCC-SLP, from the TTUHSC School of Health Professions, is seeking to establish the efficacy of applying telepractice (telemedicine) speech intervention for children with repaired cleft palate; to quantitatively define articulation errors using instrumentation analyses; and to identify any speech perception deficits in children with cleft palate. Lee's clinical trial grant is the first multi- year NIH grant awarded to the School of Health Professions. Lee, a Fulbright U.S. Scholar, is collaborating with Joshua Demke, M.D., from the TTUHSC School of Medicine.

Joshua Demke, M.D.

Sue Ann Lee, Ph.D., CCC-SLP

COMMITMENT TO
# CANCER RESEARCH

## Cancer Center Plays Key Role in Fighting Against the Disease

TTUHSC's School of Medicine Cancer Center provides a center of excellence for cancer research throughout the university and across the South Plains region by studying cancer in all of its forms, developing new drugs for difficult-to-treat cancers and collaborating with academic investigators and pharmaceutical companies to develop novel patient-derived models for studying cancers. Those models are then used to carry out preclinical laboratory testing of novel therapies and generate data that support developing clinical trials, some of which are conducted by the South Plains Oncology Consortium (www.SPONC.org) that is hosted by the Cancer Center.

The School of Medicine Cancer Center hosts several national resource laboratories that support clinical and translational research for childhood cancer, including the Neuroblastoma Pharmacology Resource Laboratory for the Children's Oncology Group (COG), the New Approaches to Neuroblastoma consortium and the COG Childhood Cancer Repository, supported by Alex's Lemonade Stand Foundation (ALSF). The COG/ALSF repository establishes, banks and distributes patient-derived cell lines and xenografts from children with cancer. These models are provided to hundreds of laboratories across 30 countries, making it a world-wide repository for childhood cancer cell lines and xenografts which are housed at the TTUHSC campus in Lubbock..

In 2021, the Cancer Prevention and Research Institute of Texas (CPRIT) awarded a $6 million center grant to TTUHSC and principal investigator C. Patrick Reynolds, M.D., Ph.D., establishing the Texas Regional Excellence in Cancer Research (TREC) Center for Developmental Therapeutics at TTUHSC.

### CANCER CENTER HIGHLIGHTS FY 2022

34 MEMBERS

31 PUBLISHED PEER-REVIEWED PAPERS

$36 MILLION IN ACTIVE EXTERNAL GRANT FUNDING

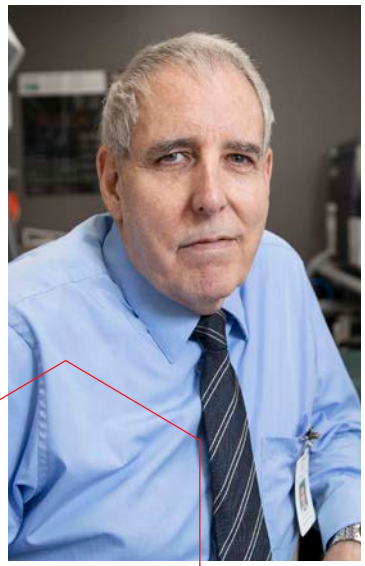
$10.4 MILLION IN NEW EXTERNAL GRANT FUNDING IN 2022

$75.2 MILLION IN EXTERNAL FUNDING DURING THE 15-YEAR LIFE OF THE CENTER

SPONSOR OF THREE ACTIVE FDA INVESTIGATIONAL NEW DRUG (IND) APPLICATIONS

ONE CURRENTLY ACTIVE PHASE I ONCOLOGY CLINICAL TRIAL

FROM 2014 TO 2022 BANKED CANCER SPECIMENS FROM > 6000 ADULTS AND CHILDREN WITH CANCER



## Reynolds Secures Grant Funding to Continue Cancer Research

C. Patrick Reynolds, M.D., Ph.D., a professor of pediatrics, medicine, cell biology and biochemistry, is director for the Cancer Center and the South Plains Oncology Consortium. He also sponsors multiple FDA Investigational New Drug applications, and his laboratory serves as the Childhood Cancer Repository for the Children's Oncology Group, powered by Alex's Lemonade Stand Foundation (ALSF).

In 2022, Reynolds received a five-year, $1.9 million RO1 grant from the National Cancer Institute and a four-year, $1.34 million grant from CPRIT. He also has other active grant support from the Cancer Prevention and Research Institute of Texas (CPRIT), the NIH (RO1 and UO1 grants), the U.S. Department of Defense and ALSF.

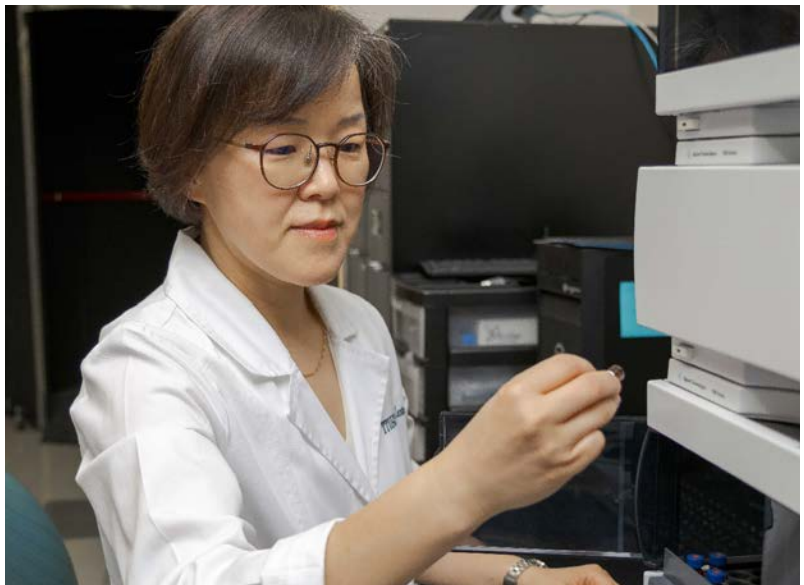
Reynolds has authored or co-authored more than 250 peer-reviewed scientific papers that have garnered more than 28,000 citations. In 2022, one of his studies ("Alternative Lengthening of Telomeres in Cancer Confers a Vulnerability to Reactivation of p53 Function") was published in Cancer Research, a journal of the American Association for Cancer Research. The study sought to expand upon his lab's previous research that showed ALT tumors identified by a biomarker known as C-circles share a common biology that confers vulnerabilities to be exploited for cancer therapy.

**TTUHSC's Rahman Receives Grant Extension to Expand ABC24WT Program**

The Cancer Prevention & Research Institute of Texas (CPRIT) in 2022 eas awarded a $2,499,999 grant extension to Rakhshanda Rahman, M.D., a TTUHSC professor of breast surgical oncology and the founding executive director of the School of Medicine's accredited and multi-campus Breast Center of Excellence (BCE). The extension will allow Rahman and the BCE to provide no-cost mammograms and Pap smears to underinsured and uninsured women in the Permian Basin region. The grant extension represents a continuation of funding CPRIT initially awarded to Rahman in 2010 that led to the establishment of BCE's Access to Breast Care for West Texas (ABC4WT) program. A 2014 extension added cervical screening services, creating the Access to Breast and Cervical Care for West Texas (ABC$^2$4WT) program and expanded its coverage area from the Panhandle and South Plains regions into the Central West Texas region.

**TTUHSC Receives CPRIT Grant to Address South Plains Colorectal Screening Rates**

In an effort to bolster access to colorectal cancer screening among underserved and uninsured Texans, CPRIT also awarded a $1 million prevention grant to Rahman and TTUHSC School of Medicine colleagues Rebeccah Baucom, M.D., and John Kidwell, M.D. The grant, "Fecal Immunochemical Testing for Screening and Treatment of Occult Preneoplasia (FIT-STOP)," will allow the TTUHSC team to provide no-cost colorectal cancer screening and colonoscopies to underinsured and uninsured people living in 15 counties from the state's South Plains region, including Bailey, Cochran, Crosby, Dickens, Floyd, Garza, Hale, Hockley, King, Lamb, Lubbock, Lynn, Motley, Terry and Yoakum. The FIT-STOP program will operate using the same processes and relationships Rahman established for her ABC$^2$4WT program.



**Kang Receives CPRIT Funding to Support West Texas Pharmacology Core**

Pharmacology, the process of studying how drugs and biological systems interact, is a critical component in developing and approving new drugs. To emphasize pharmacology's importance to the development of new cancer drugs, including those being investigated for use in treating pediatric cancers, CPRIT awarded a five-year, $3.37 million grant to Min Kang, Pharm.D., to support the West Texas Pharmacology Core laboratory at TTUHSC, which focuses primarily on drug development and pediatric cancer. "Establishing the West Texas Pharmacology Core will allow us to update the core at TTUHSC that already supports some Texas academic investigators, especially in the area of pediatric cancers," Kang said. "CPRIT's support also will allow us to support small biotech companies and other academic institutions across Texas."

**Srivastava Secures Patent for Repurposing Antipsychotic Drug to Treat Cancer**

For much of the last two decades, Sanjay Srivastava, Ph.D., from TTUHSC's Jerry H. Hodge School of Pharmacy, has investigated the use of drugs previously approved by the U.S. Food and Drug Administration (FDA) to treat other diseases as potential cancer therapies. Repurposing FDA-approved drugs for additional indications is one way to rapidly introduce new treatments to patients. In 2022, that work earned Srivastava a U.S. patent for repurposing the antipsychotic drug pimavanserin to treat various types of cancer. Srivastava said the patent covers all applications of the drug in the field of cancer and could potentially lead to licensing agreements with companies to develop pimavanserin as a cancer therapeutic. The next step, he added, is to conduct clinical trials to determine pimavanserin's active effect against cancer in humans. It generally takes several years before investigators are confident in a drug's clinical efficacy and safety profile; however, Srivastava believes the timeframe could accelerate with pimavanserin, given its prior FDA approval.



Nadia German, Ph.D. *(Left)*

**Pharmacy Researchers Patent Chemical Probe to Target Brain's Dopamine Transporter**

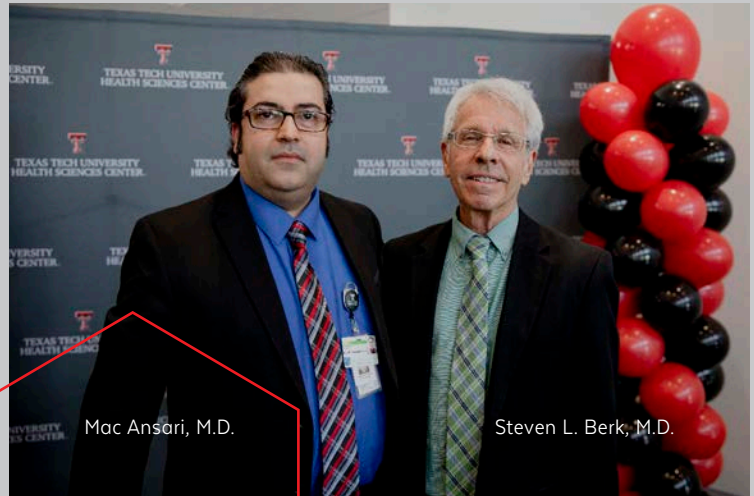
Neuroinflammation has been linked to dopaminergic signaling, and there is increasing interest in determining whether the modulation of dopamine levels at the inflammation site can stop or reverse neurodegeneration. To help make that determination, Nadia German, Ph.D., and Constantinos Mikelis, Ph.D., from the TTUHSC Jerry H. Hodge School of Pharmacy, received a U.S. patent in 2022 for a chemical that targets and affects the brain's dopamine transporter, one of the ways by which dopamine levels in the brain can be controlled. German and Mikelis patented the molecule as a chemical scaffold, a process that adds desired bioactive properties to the core structure of the molecule. In addition to Alzheimer's disease, Parkinson's disease and traumatic brain injuries, German said there are other central nervous system disorders such as glioblastomas and multiple sclerosis that also exhibit dopamine-related neuroinflammation and that could potentially benefit from the newly patented chemical probe.

**Study Seeks to Improve Pediatric Patient Safety by Addressing Language Barriers**

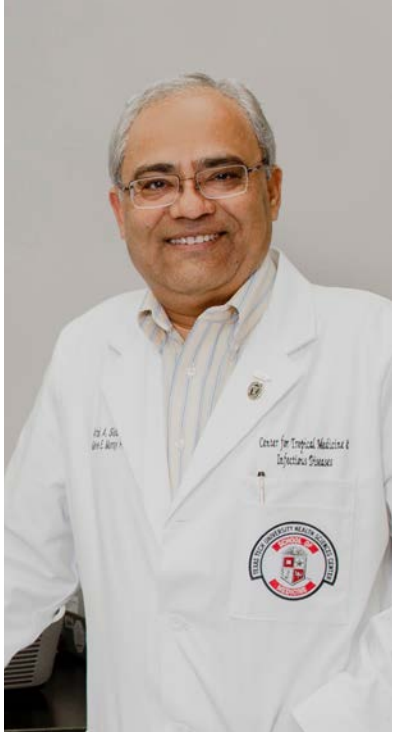
Studies have shown that health care processes such as assessment and diagnosis, information management, operative care and medication use are among the primary causes of medical errors. However, the number one reason many investigators believe these mistakes occur is the lack of effective communication, an issue that is amplified when English is not the patient's primary language. To help address these communication hurdles, the Patient-Centered Outcomes Research Institute (PCORI) in 2022 awarded a $438,756 subcontract to Tetyana L. Vasylyeva, M.D., Ph.D., from the TTUHSC School of Medicine. The five-year subproject, "Comparing Three Approaches to Communication with Hospitalized Children and Families with Limited English Proficiency," is part of a larger PCORI project directed by Alisa Khan, M.D., MPH, from Boston Children's Hospital that is based upon a pilot study the hospital conducted from 2014-2017 that produced a 38% reduction in harmful medical errors.

**Center of Excellence in PAD Treatment Helps Patients Through Innovation, Collaboration**

Peripheral artery disease (PAD) is caused by the buildup of plaque that narrows and restricts blood flow to the body's peripheral arteries. To help advance treatment for this potentially life-threatening condition, the TTUHSC School of Medicine established the Center of Excellence in Peripheral Artery Disease under the direction of Mohammad "Mac" Ansari, M.D., and with the support of Steven L. Berk, M.D., TTUHSC's Executive Vice President for Clinical Affairs and School of Medicine Dean, and other university leaders. The center includes the collaborative efforts of multidisciplinary TTUHSC clinicians whose mission is to provide screening, treatment and education related to PAD and critical limb ischemia, a condition often developed by PAD patients that can lead to amputation. That multidisciplinary approach includes collaborations with interventional cardiologists, vascular surgeons, imaging cardiologists, wound care specialists and podiatrists. The team also includes medical specialists who cover risk factors and co-morbidities such as endocrinologists, rheumatologists, orthopaedics and nephrologists. In addition, the team collaborates with emergency medicine physicians, general internists and hospitalists who may encounter PAD patients who come to the hospital.




Mac Ansari, M.D. Steven L. Berk, M.D.

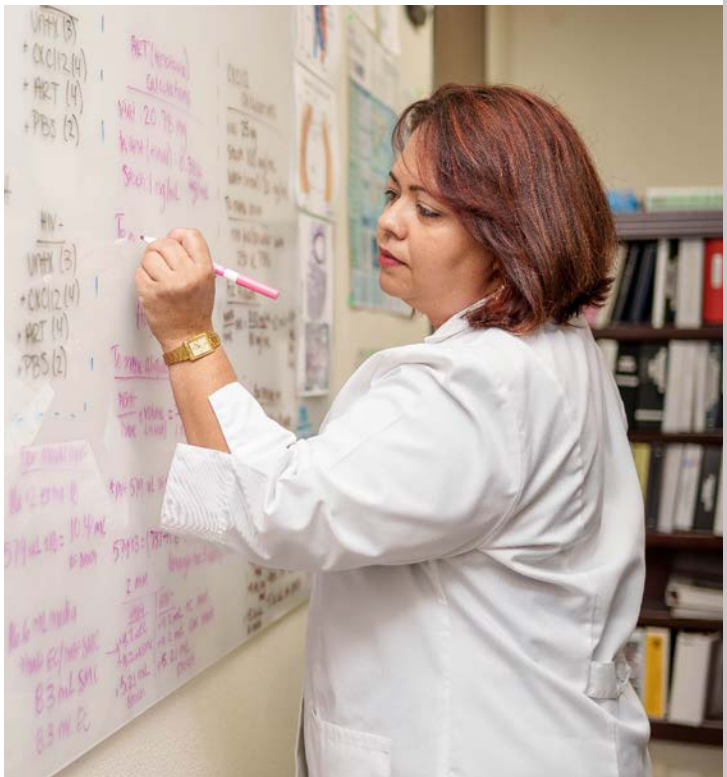


**Humanitarian Effort: Siddiqui Research Advances as First Human Receives SchistoShield® Vaccine**

Schistosomiasis is the second-most deadly tropical parasitic disease after malaria. Afzal A. Siddiqui, Ph.D., from the TTUHSC School of Medicine, began his quest to develop a schistosomiasis vaccine in 1991. In 2014, Siddiqui secured funding from the Bill & Melinda Gates Foundation to conduct proof-of-concept studies on a schistosomiasis vaccine branded SchistoShield®. One of Siddiqui's fundamental goals was to develop a treatment that would be produced for humanitarian purposes rather than profit. To maintain the humanitarian effort, Siddiqui in 2016 received a patent in several countries for SchistoShield®. He took another important step in 2018, signing a license agreement between TTUHSC and PAI Life Sciences. In initial trials, SchistoShield® demonstrated it could kill adult schistosomes and significantly reduce their ability to lay eggs and reproduce. During the upcoming Phase 1, open-label, dose-escalation trial, which was announced in 2022, Siddiqui, PAI and others will evaluate the vaccine's safety and the immunogenicity in 45 healthy adults aged 18 to 55 years. After Phase I trials in the U.S. and Phase 1b trials in Africa (Madagascar and Burkina Faso), vaccine efficacy trials in The Netherlands and Uganda will begin in 2023 in schistosome human challenge models. Siddiqui and PAI are currently working with the Bill & Melinda Gates Foundation to plan for Phase 2 trials, which he expects to be in place by fall 2023. If all trials work according to plan, licensing the vaccine could be accelerated, and it could be ready for distribution through various nonprofits in five to 10 years.

**Gene Sequencing an Important Tool in COVID-19 Battle**

Despite the focused efforts of scientists, medical professionals and public health experts, SARS-CoV-2, the coronavirus that causes COVID-19, has continued to affect daily life. As new vaccines and pills are developed, the virus mutates to create a new variant and remain active. Sharilyn Almodóvar, Ph.D., from the TTUHSC School of Medicine, said gene sequencing is critical because scientists use it to track and identify new virus mutations that may challenge existing vaccines. Because gene sequencing methods can be adapted to meet almost any situation, the Texas Tech Institute for Environmental and Human Health (TIEHH) initiated a genomic sequencing program for classifying variants of the SARS-COV-2 virus in the early days of the pandemic. Nearly three years later, the program continues to provide public health officials with a better understanding of the virus progression and the impact of its variants. Moving forward, Afzal Siddiqui., Ph.D., director of TTUHSC's Center for Tropical Medicine and Infectious Diseases, said if additional contagious or virulent variants are found, gene sequencing would identify the strain and help determine if any public health measures may be necessary.



# PATENT FILED FOR EARLY DETECTION OF ALZHEIMER'S DISEASE


Subodh Kumar, Ph.D.

**TTUHSC's Reddy, Kumar Patent a Promising New Blood-Based Biomarker for Alzheimer's Disease**

As people age, the gradual loss of cognitive function often signals the onset of Alzheimer's disease or similar types of dementia. To help identify and treat patients earlier, a U.S. patent for the development of a novel blood-based biomarker for the early detection of Alzheimer's disease was awarded in 2022 to P. Hemachandra Reddy, Ph.D., and Subodh Kumar, Ph.D., from TTUHSC's School of Medicine. The patent focuses on a novel method for identifying an Alzheimer's disease patient prior to reaching the clinical disease classification and is based on increased levels of microRNA-455-3p in a blood, serum or plasma sample obtained from a cognitively impaired Alzheimer's disease patient. Reddy's laboratory discovered the miR-455-3p biomarker and its therapeutic relevance by conducting a global microarray analysis of serum samples from three groups: Alzheimer's disease patients, individuals with mild cognitive decline and healthy patients with no known signs of the disease.

P. Hemachandra Reddy, Ph.D.

# TRANSFORMING INVENTIONS TO INNOVATIONS

"Innovation paves the way for change we would like to see for patients all over the world. - Erin Adams, Sling Health President, 2022-23"

## I-CORPS™ AND ACCELERTOR METRICS

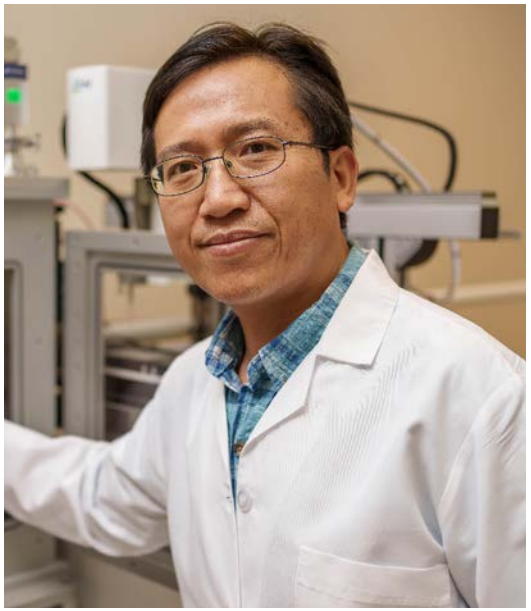
9 **NATIONAL NSF I-CORPS™ TEAMS TO DATE**

34 **REGIONAL NSF I-CORPS™ TEAMS SENT TO DATE**

12 **ACCELERATOR TEAMS TO DATE**

**Liang Awarded U.S. Patent to Battle Antibiotic Resistance Using Novel Nanoantibiotics**

Hongjun (Henry) Liang, Ph.D., from the TTUHSC School of Medicine, has been developing novel nanoparticles known as nanoantibiotics to target bacterial infections, especially those that are resistant to known antibiotic treatments. In 2022, Liang received a U.S. patent to produce novel nanoantibiotics that essentially prevent new bacteria from developing new resistance against the nanoantibiotics. Liang said this discovery provides a blueprint to develop new antibiotics via nanoengineering that could kill bacteria with no toxicity to human cells, and that are biodegradable and environmentally degradable so they don't harm the normal microbial communities in natural habitats. Liang's commercialization effort on nanoantibiotics has commenced at the Texas Tech University Innovation Hub at Research Park, a regional National Science Foundation (NSF) I-Corps™ site where researchers are trained to bring promising ideas from the laboratory to the marketplace. During NSF I-Corps, innovators engage directly with potential end users to learn firsthand about their needs and pain points. Completing the regional NSF I-Corps program provides the necessary lineage for researchers such as Liang to participate in the more intense, but equally immersive national NSF I-Corps program that further facilitates transformation of invention to impact.



"As new clinical faculty embarking on an innovative journey, I have been consistently and delicately molded into the place I am today. The Innovation Hub not only helped me build an effective team through the established programs within, but has provided education, guidance, assistance and accolades to us in a way that I am so grateful for. Most excitingly for me, my career has taken an exhilarating new trajectory and my creative outlet gets to cross over with academia and innovation now thanks to the Hub. - Brittany K. Bankhead, M.D., M.S., FACS, Assistant Professor of Surgery, Division of Trauma, Burns, & Critical Care, TTUHSC"

# OUR ENTREPRENEURIAL JOURNEY

## IP/ENTREPRENEURSHIP timeline

**1995**
First Licensing
*Drs. Mario Fiola, Jan Simoni and Peter Canazaro*

**1998**
Office of Research Commercialization Establishment

**2013**
**OCTOBER**
First NSF I-Corps™ Award
*Dr. Siva Vanapali, TTU*

**2014**
**SEPTEMBER**
Innovation Hub Groundbreaking

**OCTOBER**
First SBIR/STTR Award
*Kiromic BioPharma, Inc., Ovarian Cancer Using Novel Nanoparticle Formulations, Dr. Maurizio Chirivainternati*

**2015**
**AUGUST**
The TTU Innovation Hub Launch

**2016**
**MARCH**
Innovation Hub Awarded LEED Silver Certification

**2017**
**2017-2018**
First Accelerator Company
*Reproductive Solutions, Inc. & TKQuant, LLC*

**APRIL**
First NSF I-Corps™ Award
*Dr. Michael Schaffer, TTUHSC*

**2018**
Texas Tech Research Park Establishment

First Sling Health Graduation

**2019**
First TTUHSC National Academy of Inventors Fellow Inductee
*Dr. Sam Prien*

**2020**
**FALL**
First Associate VP for Research Innovation
*Dr. Phil Sizer*

**2022**
**SEPTEMBER**
Launch of Research Innovation, Collaboration, Entrepreneurship (RICE) Division

**2023**
**FEBRUARY**
First VentureWell Award

# PARTNERS IN ENTREPRENEURIAL SUCCESS

### TTU Office of Research Commercialization

- Protects intellectual property with patents and copyrights
- Leverages marketing and industry connections to translate research
- Provides licensing and legal services

### TTU Innovation Hub at Research Park

- Assists innovators with ideation, commercialization and acceleration to advance new technologies and services
- Offers entrepreneurial programs that provide mentorship and funding for prototype development
- Offers incubator space for startups to launch their business adventures

Samuel Prien, Ph.D. Lindsay Penrose, Ph.D.

### TTUHSC Researchers Receive Second Patent for Specimen Collection Cup

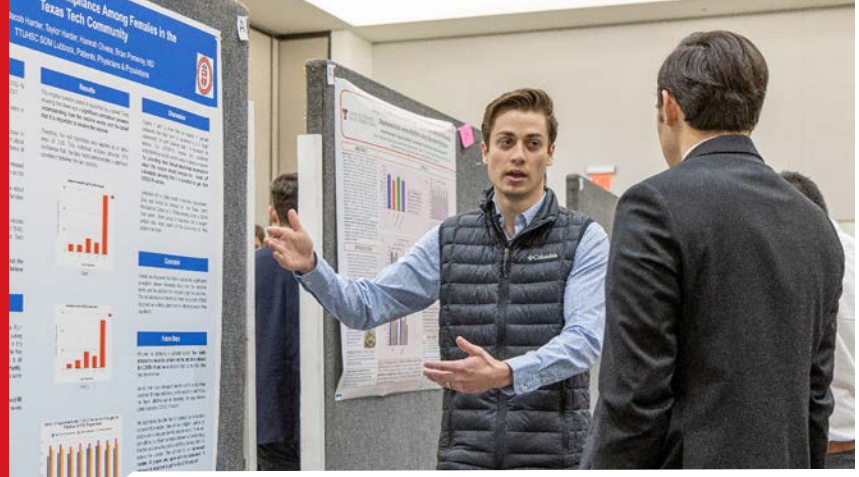
Approximately one-in-seven U.S. couples face pregnancy issues, and roughly 25% of these cases are linked to the male. To help address these male-related issues and raise the rate of successful pregnancies, Samuel Prien, Ph.D., and Lindsay Penrose, Ph.D., from the TTUHSC School of Medicine, have worked for years to develop a specimen collection cup that better protects the sperm. In 2022, their efforts yielded a patent that makes important improvements to the first patented collection cup, also invented at TTUHSC by Prien and Dustie Johnson, Ph.D. That device, known as the DISC (Device for Improved Semen Collection), is sold by RSI Technologies under the brand name ProteX. The original DISC pooled the sample into the smallest exposed surface area possible, producing better temperature control and significantly reducing oxygen exposure. The new DISC provides additional levels of protection to prevent biochemical damage to sperm cells during processing. Optimizing the collection environment is expected to lead to healthier sperm and ultimately more pregnancies for couples seeking reproductive treatment.

### TTUHSC DISCLOSURES, PATENTS AND LICENSES

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Disclosures | 31 | 26 | 31 | 24 | 22 |
| Provisional Patent Applications | 19 | 4 | 11 | 8 | 4 |
| Non-Provisional Patent Applications | 13 | 42 | 19 | 30 | 9 |

### JOINT TTU-TTUHSC DISCLOSURES, PATENTS AND LICENSES

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Disclosures | 6 | 4 | 3 | 4 | 5 |
| Provisional Patent Applications | 2 | 0 | 4 | 0 | 4 |
| Non-Provisional Patent Applications | 0 | 1 | 2 | 2 | 2 |



## 2022 RESEARCH AND INNOVATION AWARD WINNERS

**Brittany Bankhead, M.D., & Julie Chugh**, Surgery, were recipients of the Presidents' Innovative Startup Award for their company, Better Bleeding Control, and their work on developing a realistic, wearable training device that provides real-time, performative feedback on bleeding control techniques that can reduce the cost of hemorrhage control training. Better training results in better outcomes.

**Hiranmoy Das, Ph.D.**, Pharmaceutical Sciences, received the Chancellor's Council Distinguished Research Award for his commercialization successes and his work on Kruppel-like Factor 2, a gene that influences the development of bone and musculoskeletal diseases.

**Nandini Nair, M.D.**, Cardiology, received the Presidents' Innovative Startup Award for her work with Dongping Du, Ph.D., (TTU) on their company, Cardio Intelligent Systems, LLC that develops software applications to predict the postoperative risk and treatment outcomes of cardiac surgeries for heart failure patients.

**Courtney Queen, Ph.D.**, BioMedical Sciences, and collaborators George Zouridakis and Tarun Wadhawan, received the Presidents' Innovative Startup Award for her company Advanced Codex Solutions, LLC that is developing a non-invasive, low-cost and mobile diagnostic tool for the early detection of both melanoma and Buruli ulcer disease.

**Sanjay K. Srivastava, Ph.D., & Shreyas Gaikwad**, received the Presidents' Innovative Startup Award for their company, NeoPurpose Therapeutics, a biotech startup focused on the development of novel anti-cancer therapies as well as platform technology for anti-cancer drug discovery screening and testing.

### Student Research Week

TTUHSC's Graduate School of Biomedical Sciences hosted its 34th Annual Student Research Week in 2022, providing an opportunity for TTUHSC student investigators to showcase their work and hear presentations from distinguished national speakers. The event theme for 2022 was "CSI: Immunology (Conducting Scientific Investigations)." Student Research Week Committee members included TTUHSC Graduate School of Biomedical Sciences students Peyton Presto, Rachel Washington, Taylor Hibler, Sayanika Dutta and Morgana Kellogg. The committee worked with Graduate School of Biomedical Sciences Dean Brandt Schneider, Ph.D. to develop a program that featured keynote speakers Stanley Hazen, M.D., Ph.D., from the Cleveland Clinic, and Claudia Kemper, Ph.D., from the National Institutes of Health. The event also included podium presentations from students whose research spanned several disciplines, and an Alumni Career Panel discussion during which recent TTUHSC graduates advised current students about networking and career opportunities. Student Research Week also features a poster competition, and there were a record-breaking 312 posters submitted in 2022. Entries came from all TTUHSC schools and campuses, students from TTUHSC's distance learning program and undergraduate researchers from Texas Tech University.

### 2022 Student Research Week Poster Competition Award Winners

**Basic/Translational**
*(Third- and Fourth-year students)*
1st Place: Peyton Presto
2nd Place: Taylor Hibler
3rd Place: Ryan Sweazy

**Undergraduate Students**
1st Place: Isaiah K. George

**Literature Reviews**
1st Place: Jacob Awkal
2nd Place: Akhila Reddy

**Clinical Case Studies**
1st Place: Dan Hayward
2nd Place: Jessica Sisco
3rd Place: Bayley Richardson

**Basic/Translational Science**
*(First- and Second-year students)*
1st Place: Rebecca Gabrilska
2nd Place: Marilyn Mathew
3rd Place: Kerri Spontarelli

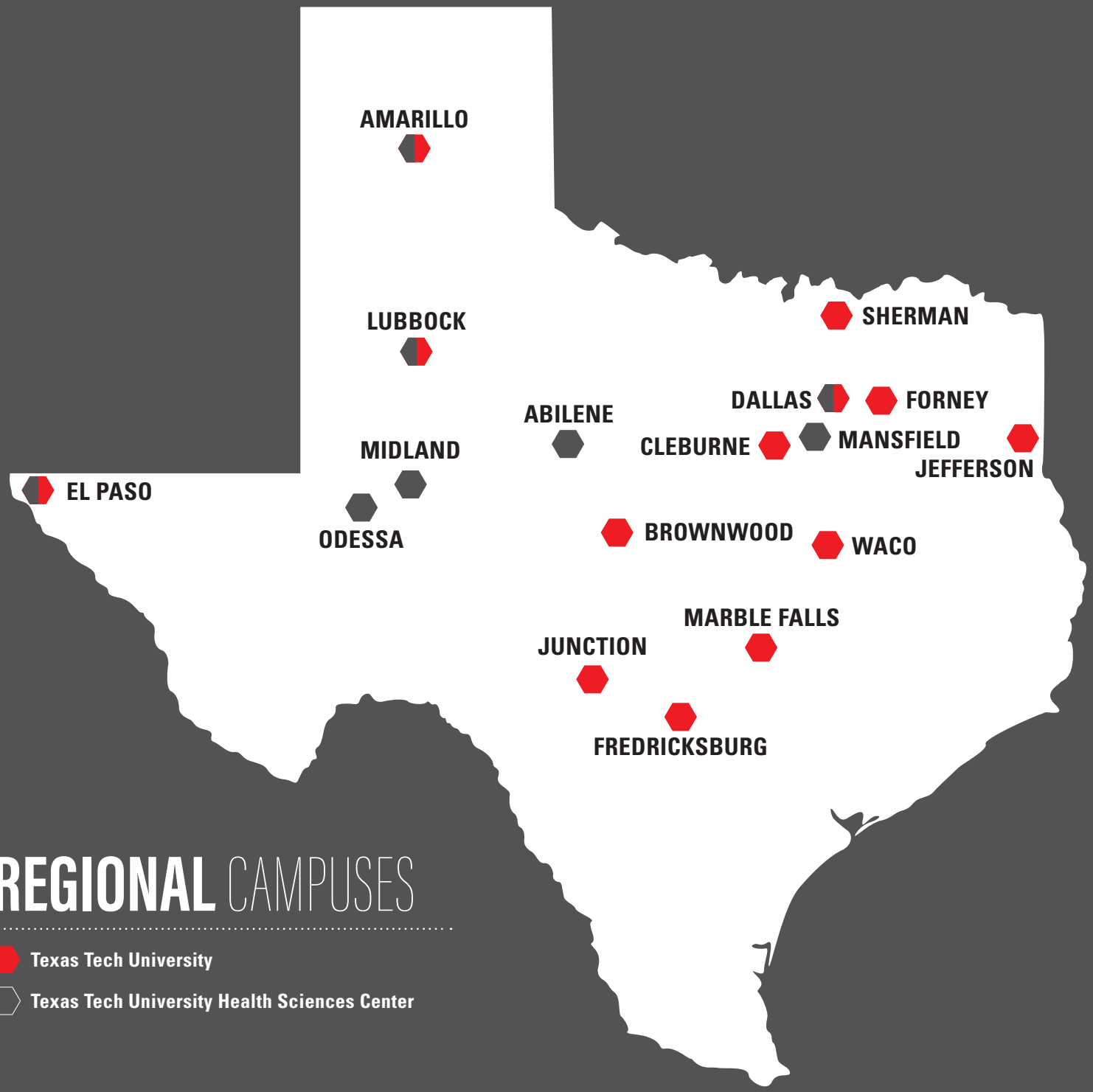
**Lorenz O. Lutherer, M.D., Ph.D., Clinical Research Award**
Hannah Daniel

**Medical Education**
1st Place: John Wolpert
2nd Place *(tie)*: Scarlett Bloodworth
2nd Place *(tie)*: Caitlin Lowryv

**Clinical Chart Reviews**
1st Place: Addie Pederson
2nd Place *(tie)*: Evan Bradshaw
2nd Place *(tie)*: Jake Sellers

**School of Nursing**
1st Place: Emily Shussler, BSN, R.N, and Candace Webb, BSN, R.N.
2nd Place: Valerie Huerta, BSN, R.N., and Jennifer Ozzello, BSN, R.N.
3rd Place: Alma Nevarez, BSN, R.N.

# REGIONAL CAMPUS HIGHLIGHTS




## REGIONAL CAMPUSES

- Texas Tech University
- Texas Tech University Health Sciences Center

## ABILENE

**Julia Jones Matthews School of Population and Public Health**

TTUHSC and members of the Abilene community celebrated in 2022 the official unveiling (unveiling of the new Julia Jones Matthews School of Population and Public Health). The school, which is the sixth at the university, officially opened May 24 and seeks to train future health care leaders in population and public health — a sector of health care that was elevated in the public's awareness by the COVID-19 pandemic. In 2017, TTUHSC officially named its Department of Public Health in honor of Matthews, a longtime supporter of the Abilene community and of TTUHSC, and carried that namesake to the school, which officially resides on the TTUHSC campus in Abilene and offers students and researchers a collaborative educational experience that emphasizes research and the use of large data sets to better understand health care delivery needs.

## DALLAS

**Carlos Alvarez**

To investigate the association between the initiation of statin treatment and disease progression in patients with diabetes, Carlos Alvarez, Pharm.D., an associate professor of pharmacy practice and director of the Clinical Pharmacology and Experimental Therapeutics Center at the TTUHSC Jerry H. Hodge School of Pharmacy in Dallas, conducted a retrospective matched-cohort study. The results, published in JAMA Internal Medicine, found an association between statin use and diabetes progression, and recommended that the risk-benefit ratio of statin use in diabetes patients include the consideration of its metabolic effects.

## REMOTE

**Richard Greenhill**

Richard Greenhill, DHA, an assistant professor and assistant program director in Health Care Management and Leadership at the TTUHSC School of Health Professions, was nominated by the director-general of the World Health Organization (WHO) to serve as an expert with the WHO's Eastern Mediterranean Regional Office in Cairo, Egypt for Hospital Resilience and Disaster Preparedness. Greenhill, who also serves as a content expert for the National Association for Healthcare Quality and is a patient safety and quality improvement expert for the International Society for Quality in Healthcare, is deputy editor of the International Journal for Quality in Healthcare, Communications.

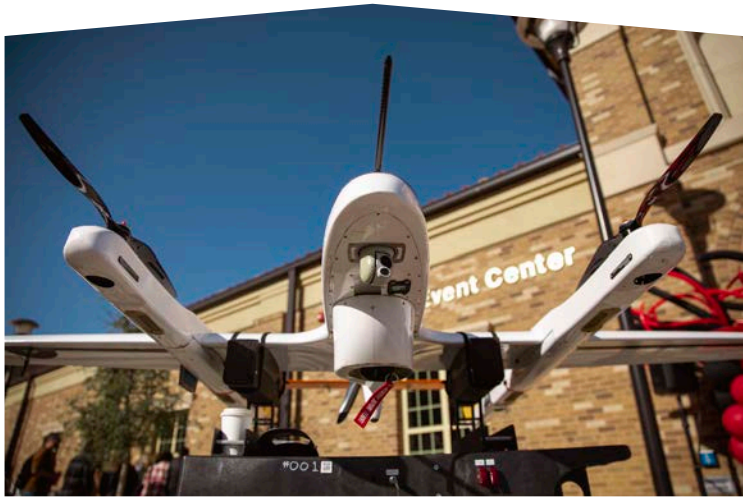
**Bolstering Our Clinical Workforce for Rural and Underserved Communities**

The Health Resources and Services Administration (HRSA), an agency of the U.S. Department of Health and Human Services that provides resources to improve systems of care in rural communities, awarded grants in 2022 to the TTUHSC Schools of Health Professions and Medicine in the Permian Basin, and to the School of Nursing in Lubbock. The Permian Basin awards include a four-year HRSA Workforce Physician Assistant (PA) grant and a five-year HRSA Hispanic Center of Excellence (HCOE) grant. Christina Robohm-Leavitt, DMSc, PA-C, regional dean for the School of Health Professions, is the principal investigator (PI) for the Workforce PA grant, which will establish and implement TTUHSC's Physician Assistant Rural Education and Community Healthcare (PA REACH) program to train PA students to provide high-quality primary care in rural West Texas settings. Timothy Benton, M.D., School of Medicine regional dean, will serve as PI for the HCOE grant that will engage Permian Basin and West Texas students from junior high to high school and through college who are interested in medical careers. It also will support students as they seek acceptance into medical school, especially the TTUHSC School of Medicine and its Family Medicine Accelerated Track (FMAT). In addition, the HCOE grant will fund the development of an information repository regarding culturally-appropriate physician training focused on delivering culturally-appropriate health care throughout the Permian Basin region. Linda McMurry, DNP, R.N., associate dean for Clinical Services and Community Engagement at the School of Nursing and executive director for TTUHSC's Larry Combest Community Health & Wellness Center, is PI for the School of Nursing's three-year HRSA grant. The funding will allow the school to train and certify new community health workers (CHWs) or other health support workers, and to provide additional training for those already certified as CHWs in the Lubbock area and throughout the state to help provide training and employment through registered apprenticeship programs and job placements.

**Linda McMurry,** DNP, RN, NEA-BC

**Christina Robohm-Leavitt,** DMSc, PA-C

**Timothy Benton,** M.D.




**Bridging Academia, Industry to Advance Drone Technologies**

TTUHSC, Texas Tech University (TTU) and 2THEDGE, a leading technology consulting firm, unveiled in 2022 the groundwork for a public-private collaboration supporting the advancement of Uncrewed Aerial Systems (UAS) research and commercialization supporting health care and industry. The Matador UAS Consortium is comprised of commercial, educational and non-profit collaborators that include South Plains College, LifeGift, University Medical Center and Reese Technology Center. Collectively, these partners will innovate and advance UAS technology across the South Plains and all of West Texas using shielded airspace. The consortium's early focus includes harnessing UAS technology to advance telehealth support, rural health care services and lifesaving rapid organ and tissue procurement and transport. The consortium's research efforts seek to mitigate risks to biological materials and streamline organ delivery by efficiently using commercial drones in dedicated flight corridors that are capable of carrying larger critical cargo loads. The research seeks to secure and optimize cargo management with real-time monitoring, and to harness drone technology for search, rescue and recovery services; large animal sample transport; renewable energy infrastructure inspection; and drone technology and operations job training for drone corridor workforce development.

# INFORMATION + CONTACTS

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