

TEXAS TECH UNIVERSITY  
HEALTH SCIENCES CENTER™

OFFICE OF  
RESEARCH  
& INNOVATION

**2024 Annual Report**

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# WELCOME

## from Lance R. McMahon, Ph.D.

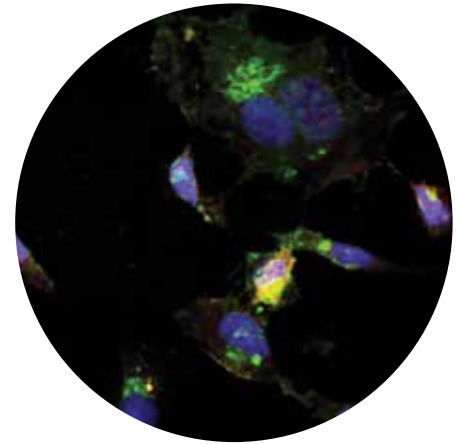
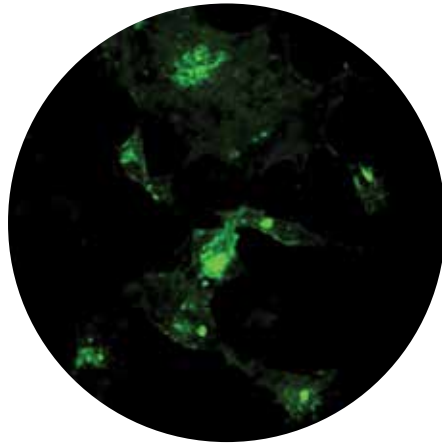
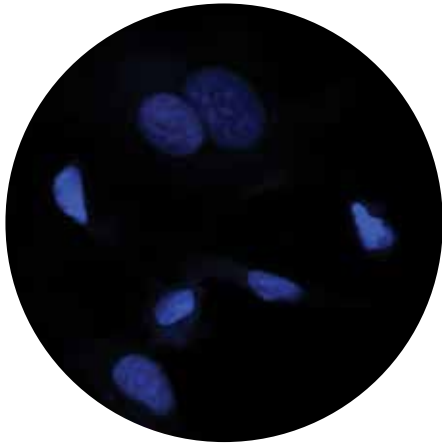
Texas Tech University Health Sciences Center (TTUHSC) is a leader in biomedical research and health care innovation, focusing on a wide range of medical fields including infectious diseases, cancer, neurological disorders and more. Our institution partners with health care providers, industry professionals and outside collaborators to translate research into real-world solutions, benefiting patients across Texas and beyond. By promoting collaboration across various health care disciplines and with external institutions, we enhance the quality of research output.

The numerous centers and institutes at TTUHSC, many of which focus on research, serve as catalysts. In this past year, our institution formed three new entities: **The Center for Nursing Research, Collaboration and Innovation** will provide our already successful nursing program with the infrastructure needed to support grant writing and publication activities; formed in partnership with Texas Tech University, the **Institute for One Health Innovation** will focus on improving the health of people, animals and the environment by recognizing that their health is closely linked; and the Jerry H. Hodge School of Pharmacy's **Brain Drug Discovery Center** will enable novel drug target discoveries and treatments for neurodegenerative diseases. All of these reflect TTUHSC's expanding expertise and drive toward advancing cutting-edge research and innovation, positioning our institution at the forefront of addressing critical regional and global health challenges.

It goes without saying that the ingenuity of our faculty continues to propel us forward. The pages within this report highlight members of our team who rank among the world's top 2% of scientists, and we celebrate those who have received endowed chair positions, Grover E. Murray Professorships and distinguished research or innovation awards. We are also honored to stand alongside our NIH-funded faculty team members who are working to uncover the role HIV plays in hypertension, how mammalian sodium-coupled epithelial amino acid co-transporters are involved in chronic diseases and advancing the understanding of bacterial biofilm's role in wound infections.

And as always, our institution continues to remain focused on improving health care outcomes for rural and underserved populations. This research includes studying the unique health challenges faced by rural communities, developing interventions for chronic diseases and improving access to mental health care, all of which serve TTUHSC's broader mission of providing access to high quality health care.

Lance R. McMahon, Senior Vice President for Research and Innovation



# Spotlight on Research Excellence

12 FULL-TIME TTUHSC RESEARCHERS NAMED TO  
LATEST WORLD'S TOP 2% OF SCIENTISTS RANKINGS

Last fall, Stanford University/Elsevier's sixth edition of the World's Top 2% of Scientists List was released and included 12 full-time and three part-time researchers from TTUHSC. The rankings, compiled using data through 2022, combine standardized data on citations, h-index and other bibliometric indicators to identify the world's leading researchers and comprise approximately 2% of all scientists worldwide.

The rankings classify researchers into 22 scientific fields and 174 sub-fields based on established classifications from Science-Metrix and data provided by Elsevier through Scopus, a large database of peer-reviewed research literature. In the latest rankings, scientists' career-long data are updated through 2022.

According to Stanford/Elsevier's latest rankings, the 12 full-time TTUHSC researchers earning spots on the World's Top 2% of Scien-

tists List include (alphabetically): Ulrich Bickel, M.D., Jerry H. Hodge School of Pharmacy; Gail A. Cornwall, Ph.D., School of Medicine; Thomas E. Hutson, D.O., Pharm.D., Ph.D., School of Medicine; Lance R. McMahon, Ph.D., Jerry H. Hodge School of Pharmacy; Volker Neugebauer, M.D., Ph.D., School of Medicine; Kenneth Nugent, M.D., School of Medicine; P. Hemachandra Reddy, Ph.D., School of Medicine; C. Patrick Reynolds, M.D., Ph.D., School of Medicine; Kendra P. Rumbaugh, Ph.D., School of Medicine; Quentin R. Smith, Ph.D., Jerry H. Hodge School of Pharmacy; Sanjay K. Srivastava, Ph.D., Jerry H. Hodge School of Pharmacy; and Michael C. Wiener, Ph.D., School of Medicine.

Part-time TTUHSC researchers making the Top 2% rankings include Vadivel Ganapathy, Ph.D., School of Medicine; Matthew B. Grisham, Ph.D., School of Medicine; and Rial D. Rolfe, Ph.D., School of Medicine.



**Ulrich Bickel,  
M.D.**



**Gail A. Cornwall,  
Ph.D.**



**Thomas E. Hutson,  
D.O., Pharm.D., Ph.D.**



**Lance McMahon,  
Ph.D.**



**Volker Neugebauer,  
M.D., Ph.D.**



**Kenneth Nugent,  
M.D.**



**P. Hemachandra  
Reddy, Ph.D.**



**C. Patrick Reynolds,  
M.D., Ph.D.**



**Kendra P.  
Rumbaugh, Ph.D.**



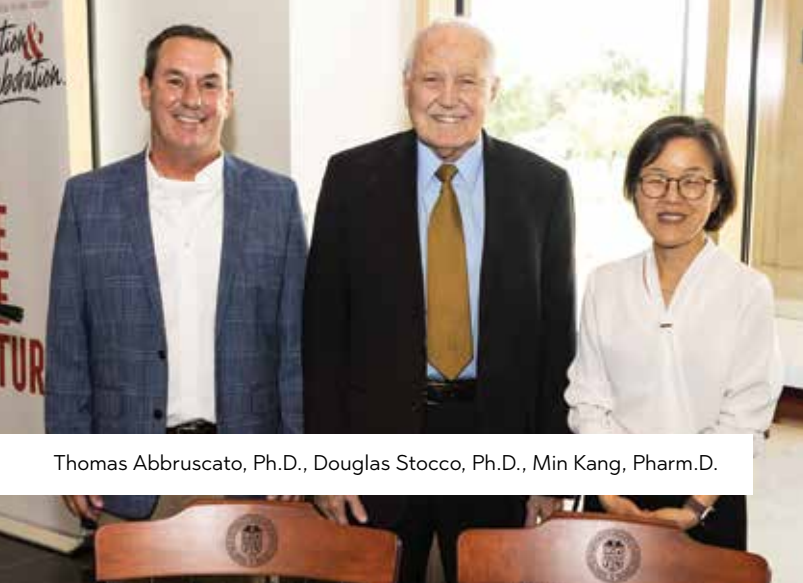
**Quentin R. Smith,  
Ph.D.**



**Sanjay K. Srivastava,  
Ph.D.**



**Michael C. Wiener,  
Ph.D.**



Thomas Abbruscato, Ph.D., Douglas Stocco, Ph.D., Min Kang, Pharm.D.



First recipients of the Douglas Stocco Research Chair

# Distinguished Research Leaders

## ABBRUSCATO, KANG RECEIVE FIRST STOCCO RESEARCH CHAIR ENDOWMENT APPOINTMENTS

In July, Thomas Abbruscato, Ph.D., and Min Kang, Pharm.D., became the first recipients of the Douglas Stocco Research Chair, an endowment formerly known as the Texas Tech University Health Sciences Center’s Research Endowment. The Texas Tech University System Board of Regents officially renamed the endowed chair in November 2023 and made two appointments available.

Abbruscato is professor and chair in the Department of Pharmaceutical Sciences at the TTUHSC Jerry H. Hodge School of Pharmacy. Kang is a professor of pediatrics at the TTUHSC School of Medicine and associate vice president for research.

Abbruscato’s lab is currently investigating the effects of mixed tobacco product exposure on the blood-brain barrier, advancing their stroke-brain drug discovery project related to testing small molecule activators of brain neurolysin and evaluating the effects of nicotine on the blood-brain barrier and cognition, memory and motor coordination.

With the endowment, Kang said she will continue to aid TTUHSC’s effort to increase the

visibility of the excellent research conducted at its schools and to sustain the administrative support she provides to colleagues as associate vice president for research. She also intends to conduct cutting-edge research into pediatric cancer, and the endowment will help maintain her research and administrative expertise in assisting colleagues and the university as a whole.

Douglas Stocco, Ph.D., a recipient of the Grover E. Murray Professorship and a University Distinguished Professor, served in many leadership roles during his 40-year tenure at TTUHSC. In addition, the Journal of Biological Chemistry in September 1994 published a paper that, for the first time, described the cloning, sequencing and naming of the Steroidogenic Acute Regulatory (StAR) protein. That research was conducted in Stocco’s TTUHSC lab, and the paper (“The Purification, Cloning, and Expression of a Novel Luteinizing Hormone-induced Mitochondrial Protein in MA-10 Mouse Leydig Tumor Cells: Characterization of the Steroidogenic Acute Regulatory Protein”) has been cited more than 1,400 times since that initial publication.

# Board of Regents Approve Appointment of Grover E. Murray Professor



In August, the Texas Tech University System Board of Regents approved the appointment of Volker Neugebauer, M.D., Ph.D., from the TTUHSC School of Medicine, as a Grover E. Murray Professor. The professorship is named in honor of Grover E. Murray, the first president of Texas Tech University Health Sciences Center, and is intended for faculty members who have attained national and international distinction in their fields for outstanding research, excellence in scholarship and creative achievement.

Neugebauer, a University Distinguished Professor and chair of the Department of Pharmacology, is founding director of the Center of Excellence for Translational Neuroscience and Therapeutics and executive director and chief scientific officer of the Garrison Institute on Aging. He also holds the Giles McCrary Endowed Chair in Addiction Medicine and the Mildred and the Shirley L. Garrison Endowed Chair in Aging.

In 2014, Neugebauer joined the TTUHSC School of Medicine, where he initiated collaborative basic science projects and studies in humans on mechanisms, biomarkers and interventions for pain and aging-related health issues, including mental health, Alzheimer's disease and other dementias. The overall goal of Neugebauer's translational research is the better understanding of mechanisms of neurological and psychiatric disorders to improve brain health through innovative diagnostic and therapeutic strategies.

Neugebauer is an internationally recognized expert in neuroscience, particularly in understanding neuroplasticity and identifying novel therapeutic targets. He has been continuously funded by the National Institutes of Health since 1999, including 19 grants totaling approximately \$21 million. He also received 18 foundation/industry grants and two U.S. Department of Agriculture grants totaling nearly \$2 million. His innovative research has resulted in two patents. To date, his work has been published in 149 peer-reviewed research manuscripts and more than 350 scientific abstracts. He also has presented in 160 invited lectures at regional, national and international venues and conferences.

In addition, Neugebauer oversees the Garrison Institute on Aging Brain Bank, Project FRONTIER, a longitudinal epidemiological study on aging and cognitive decline in a multi-ethnic sample of adults in rural communities, and community outreach programs to educate and improve the mental health of patients with Alzheimer's disease and Alzheimer's disease-related dementias and their caregivers. Under his leadership, a comprehensive memory clinic opened at TTUHSC to provide assessments, treatment and support under one roof. Thus, Neugebauer's work covers the full spectrum, from basic research to translational approaches and clinical studies to community engagement.



Left to right: Texas Tech University System Chancellor Tedd L. Mitchell, M.D., Lisaann S. Gittner, Ph.D., Sanjay K. Srivastava, Ph.D., Courtney M. Queen, Ph.D., and TTUHSC President Lori Rice-Spearman, Ph.D.

# Trailblazers in Health Care Discoveries

TTUHSC FACULTY RECEIVE CHANCELLOR'S COUNCIL  
DISTINGUISHED TEACHING AND RESEARCH AWARDS

In February, Texas Tech University System (TTU System) Chancellor Tedd L. Mitchell, M.D., TTUHSC President Lori Rice-Spearman, Ph.D., and TTUHSC Provost and Chief Academic Officer Darrin D'Agostino, D.O., presented the 2023 Chancellor's Council Distinguished Teaching and Research Awards. The awards are the most prestigious granted to faculty throughout the TTU System.

TTUHSC recipients for the 2024 Research Awards include Courtney M. Queen, Ph.D., an assistant professor at the Julia Jones Matthews School of Population and Public Health, and Sanjay K. Srivastava, Ph.D., a University Distinguished Professor who chairs the Department of Immunotherapeutics and Biotechnology on TTUHSC's Abilene campus.

Queen is a Fulbright Scholar, a National Institutes of Health (NIH) National Institute on Minority Health and Health Disparities scholar and Health Equity Leadership Institute scholar

who focuses her research on eliminating health disparities for the medically underserved, primarily for rural and hard-to-reach individuals, through the development of non-invasive, low-cost, end-user devices for the early detection and management of disease.

Srivastava holds the James A. "Buddy" Davidson Endowed Professorship in Pediatric Pharmacology and Oncology in the Jerry H. Hodge School of Pharmacy. His research has been funded by the National Cancer Institute at the NIH and other agencies. Srivastava is considered a leader in the fields of cancer chemoprevention and cancer therapeutics. He is a serial innovator with several patents to his credit and has been named in Stanford University's list of the World's Top 2% Scientists. He also has authored more than 160 research articles in high-impact journals with more than 11,400 citations and has an h-index of 59.



# Rumbaugh Named Fellow by American Academy of Microbiology



Kendra P. Rumbaugh, Ph.D.

Kendra P. Rumbaugh, Ph.D., a professor in the TTUHSC School of Medicine's Department of Surgery, has focused her research career on investigating bacterial biofilms and their role in wound infections. Those efforts were recognized in February by the American Academy of Microbiology (AAM), which named Rumbaugh one of its 65 new Fellows for 2024. AAM Fellows are elected annually through a highly selective, peer-review process based on their records of scientific achievement and original contributions that have advanced microbiology. AAM is an honorific leadership group within the American Society for Microbiology (ASM), which is comprised of 36,000 scientists and health practitioners, making it one of the largest professional societies dedicated to the life sciences.

Rumbaugh, whose lab is currently studying potential biofilm dispersal agents that can induce microbes to leave the safety of the protective biofilm and become more susceptible to antibiotics, has been an ASM member since 1996 when she was a TTUHSC graduate student. Her service to the organization includes as president-elect (2011-13) and president (2013-2015) for ASM's Texas Branch.

Approximately 2,600 scientists have become AAM Fellows over the last 50 years. Rumbaugh is the second TTUHSC microbiologist to receive AAM Fellow status, following David Straus, Ph.D., who retired in 2013 and was the first in 1996.



Sue Ann Lee, Ph.D.

# Sue Ann Lee Named Fellow of the American Speech-Language-Hearing Association

Sue Ann Lee, Ph.D., a professor of speech, hearing and hearing sciences at the TTUHSC School of Health Professions, was named a Fellow of the American Speech-Language-Hearing Association (ASHA) in 2024, one of the highest honors the organization can bestow. This lifetime recognition is awarded to ASHA members who have made outstanding contributions to the professions, both within and beyond their local communities. The Fellowship is reserved for those who have fulfilled their professional responsibilities competently and distinguished themselves through exceptional contributions that significantly impact the field of speech-language pathology and audiology.

Internationally recognized, Lee's research focuses on examining speech characteristics in children with and without speech sound disorders and speech therapy efficacy using various technology such as ultrasound and telepractice.

Since joining the university in 2010, Lee has received external grant funding from various agencies, including the National Institutes of Health (NIH) and several local foundations. Her current NIH research (Speech Intervention via Telepractice for Children with Repaired Cleft Palate: Randomized Controlled Trial and Assessment of Speech Production and Perception Skills) is funded through 2027. Her work has been published in multiple high-impact journals such as the Journal of Child Language, Journal of Speech-Language and Hearing Research, International Journal of Bilingualism and Speech Communication.



Sharilyn Almodóvar, Ph.D.

## Leaders in NIH-Funded Studies

### ALMODÓVAR RECEIVES NIH GRANT TO STUDY PULMONARY HYPERTENSION IN HIV

Approximately 76% of the more than 39 million people globally living with the Human Immunodeficiency Virus (HIV) have access to antiviral therapy that allows them to live with HIV as a chronic disease. However, Sharilyn Almodóvar, Ph.D., from the Department of Immunology and Molecular Microbiology at the TTUHSC School of Medicine, said that even with the widespread availability of therapy, people living with HIV are facing challenges from comorbidities such as neurological and metabolic disorders, liver and kidney diseases, cancers and cardiovascular diseases. These comorbidities also include pulmonary hypertension, a condition in the lungs caused by severe narrowing of the arteries that is currently the focus of her lab's research.

To better understand the relationship between HIV and pulmonary hypertension, the National Heart, Lung and Blood Institute at the National Institutes of Health in 2024 awarded Almodóvar a four-year, \$2.67 million grant ("Role of HIV gp120 and Nef in Transcriptome Dysregulation and Pulmonary Vascular Remodeling") to study how HIV virus damages the normal interactions between different cell types in the lung arteries that lead to the condition.

For this project, Almodóvar will work with a multidisciplinary team that includes co-investigators Igor Ponomarev, Ph.D., and Ebtessam Islam, M.D., Ph.D., from the TTUHSC School of Medicine; Michael Melkus, Ph.D., and Jacob Nichols, M.D., also from the TTUHSC School of Medicine; Duke Appiah, Ph.D., MPH, from the TTUHSC Julia Jones Matthews School of Population and Public Health; and Jeremy Goettel, Ph.D., from Vanderbilt University.

Almodóvar said one of the study's novel aspects will be the use of a mouse model with a humanized immune system. These mice allow researchers to study the complex roles of infection, immunodeficiency and pulmonary vascular biology in a system that mimics the physiology of primates. The research for this project will occur at the interface of infectious diseases and pulmonary medicine, providing opportunities for training the next generation of scientists and physician-scientists who are interested in researching this field and are learning how to operate under high biosafety research standards.



Lan Guan, Ph.D.

## TTUHSC's Guan Receives NIH Grant to Continue Cell Transport Research

To help fill in some of the knowledge gaps related to cell transporters and transport mechanisms, especially secondary active transporters, the National Institute of General Medical Sciences at the National Institutes of Health (NIH) in May awarded Lan Guan, M.D., Ph.D., a professor in the Department of Cell Physiology and Molecular Biophysics at the TTUHSC School of Medicine, a five-year, \$1.96 million MIRA (Maximizing Investigators' Research Award) R35 grant ("An integrated approach to understanding the molecular mechanisms of cation-coupled transport"). MIRA grants seek to provide investigators with greater stability and flexibility to enhance the chance for important breakthroughs.

Secondary active transport coupled to cations (positively charged chemicals) is a mechanism by which molecules and ions are co-transported across a membrane via a favorable electrochemical energy gradient. Symporters are one type of secondary active transport proteins which moves two different molecules (e.g., sodium and sugar molecules) simultaneously in the same direction. This symport process plays a critical role in many aspects of cell physiology and biochemistry. It also is involved

in many serious diseases such as cystic fibrosis and diabetes.

Guan, who also serves as co-director of TTUHSC Center for Membrane Protein Research, has for years investigated fundamental questions of cation-coupled sugar symport. She has accomplished this by using a prototype bacterial transporter known as MelB, which is a sodium-coupled melibiose symporter.

With this MIRA grant, Guan's lab team will expand their research over the next five years to include the study of SLC6A14, a mammalian sodium-coupled epithelial amino acid co-transporter involved in cancer and several other chronic diseases. The state-of-the-art microscopic technique known as CryoEM will be used to paint a more accurate picture of molecules — and impart a greater understanding of biological function — because it allows images of frozen molecules for 3D high-resolution construction without using crystallization. Guan said this research can significantly impact the development of new therapeutic strategies for a broad range of chronic diseases, including cancer.

# THE FUTURE OF HEALTH

## TTUHSC ALUMNA PRESENTS RESEARCH ON SPINAL MANIPULATION, MOBILIZATION IN CHILDREN



Jenifer L. Dice, P.T., Sc.D.

Jenifer L. Dice, P.T., Sc.D., a board certified pediatric clinical specialist in orthopedic manual therapy and an alumna of the TTUHSC School of Health Professions Doctor of Science in Physical Therapy program, traveled to Switzerland this summer to present her most recent Delphi study (“Spinal manipulation and mobilization among infants, children and adolescents: an international Delphi survey of expert physiotherapists”). Delphi studies employ a series of questionnaires to gather opinions from experts and reach a consensus on a topic.

For this Delphi study, the second Dice has completed, she collaborated with a task force within the International Federation of Orthopaedic

Manipulative Physical Therapists (IFOMPT). The study focused on the appropriateness of using spinal mobilization and manipulation among infants, children and adolescents, with each age group broken down even further into three different segments of the spine: cervical, thoracic and lumbar.

Dice said the task force worked on three projects: the Delphi study, a clinimetrics review and a scoping review regarding the use of spinal mobilization and manipulation in the pediatric populations. Each part came together to inform essentially a position statement for IFOMPT to identify when it might or might not be appropriate to use spinal mobilizations and manipulations in the pediatric population. Their major finding was that spinal manipulation should not be administered in children or infants, regardless of their condition or impairment.

Dice’s previous Delphi study among U.S. physical therapists found that joint mobilizations could potentially be utilized for children that have specific impairments, such as joint hypomobility, muscle or myofascial pain. However, that survey only looked at ages 13 and below and didn’t delineate between children and infants.

According to Dice, while there was a consensus when it came to the use of mobilization, the use of joint manipulation had pediatric and manual therapists split. Manual therapists were open to using joint manipulation when clinically applicable, while the majority of pediatric therapists were opposed.

Dice said future research will emphasize a systematic approach to evaluate the patient’s impairment, the potential benefits or harm to the patient and the availability of alternative approaches to ensure the benefits outweigh any potential risks.

# THE FUTURE OF HEALTH

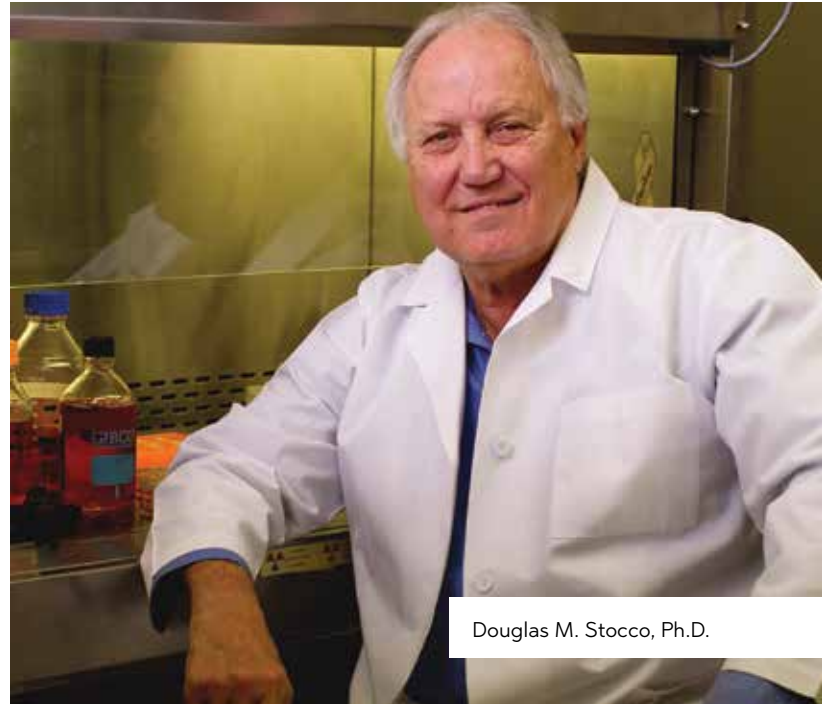
## JOURNAL'S SPECIAL EDITION RECALLS LANDMARK DISCOVERY MADE IN TTUHSC LAB

In September 1994, the *Journal of Biological Chemistry* published a paper that for the first time described the cloning, sequencing and naming of the Steroidogenic Acute Regulatory (StAR) protein. That paper (“The purification, cloning, and expression of a novel luteinizing hormone-induced mitochondrial protein in MA-10 mouse Leydig tumor cells. Characterization of the steroidogenic acute regulatory protein”) has been cited more than 1,400 times since its initial publication.

The landmark research, conducted at the TTUHSC School of Medicine in the Department of Biochemistry laboratory of Douglas M. Stocco, Ph.D., showed that the StAR protein controls the movement of cholesterol across the mitochondrial membrane, thus regulating steroid biosynthesis in the body. Cholesterol is the precursor of all steroids, and the cholesterol conversion process discovered by Stocco is the first enzymatic step in steroid hormone biosynthesis.

When StAR is expressed in steroidogenic cells, it has been demonstrated that the steroids produced are critical for normal reproductive function and the homeostasis of other bodily functions. Expression of StAR in steroidogenic cells experimentally also can increase steroid production in those cells even in the complete absence of external stimulation.

The findings from the Stocco lab have transformed the steroid hormone biosynthesis field by solidifying StAR's vital role in steroid hormone biosynthesis. Scientists also now have a better understanding of other StAR-like proteins that can influence cholesterol transport in both steroidogenic and non-steroidogenic cells, which could lead to potentially targeting StAR and regulating the mitochondria cholesterol levels associated with other disease pathologies such as neuropathies, atherosclerosis and certain liver disease.



Douglas M. Stocco, Ph.D.

A special edition was published in September by the UK journal of *Endocrinology* and *Journal of Molecular Endocrinology* to commemorate the 30th anniversary of the StAR discovery and to highlight the contributions StAR has made to our understanding of the control of steroid hormone production in steroidogenic cells.

“Thirty years ago, the StAR protein was cloned and sequenced and, when expressed in steroidogenic cells, shown to increase steroid production in the complete absence of external stimulation,” Stocco said. “Shortly thereafter, it was demonstrated that mutations in the StAR gene caused the potentially lethal condition known as lipoid congenital adrenal hyperplasia, which results in the complete loss of steroid synthesis in afflicted newborns. For these reasons, it was concluded that the StAR protein is an indispensable component in steroid hormone biosynthesis, a finding that has solved the mystery of how steroid hormone biosynthesis is regulated.”

# THE FUTURE OF HEALTH

## MEDICAL STUDENT RECEIVES ALPHA OMEGA ALPHA RESEARCH FELLOWSHIP



Sai Pranathi Bingi

Sai Pranathi Bingi, a third-year School of Medicine student, was awarded a 2024 Carolyn L. Kuckein Student Research Fellowship by Alpha Omega Alpha, the national medical honor society founded in 1902. The award includes \$5,000 to support Bingi's research project titled, "The Impact of *Clostridioides difficile* Testing Method on the Incidence of Healthcare-Associated Infection."

*Clostridioides difficile* is a spore-forming bacterium most commonly found in the intestines. It is highly transmissible, especially within health care and shared living facilities. It is a Gram-positive bacteria, which means it has a thick cell wall that protects it from antibiotics and common disinfectants.

Stephanie Stroever, Ph.D., director of research for the TTUHSC School of Medicine's Emergency Medicine Division, said Bingi's project will seek to compare the diagnostic practices of U.S. hospitals from 2011-2021 by focusing on the

use of any two-step algorithm to improve the accuracy of diagnosing active *Clostridioides difficile* infections (CDIs). The first step is to use a molecular test to determine if there is any *Clostridioides difficile* DNA present in a stool sample. If yes, the second test specifically looks for the toxin that causes symptoms. People often have the bacteria without the disease, so using two steps prevents a person from being treated simply for having the bacteria in their gut.

Bingi's hypothesis is that less than 20% of U.S. hospitals used a two-step algorithm before 2017 when the Infectious Disease Society of America and the Society for Healthcare Epidemiology of America published an update of the Clinical Practice Guidelines that sparked a significant increase in the proportion of hospitals that reported using a two-step algorithm after 2017.

In addition, Bingi will seek to determine the extent to which two-step algorithms have impacted on CDIs which were reported to the National Healthcare Safety Network from 2011-2021. Her working hypothesis is that the incidence of *C. difficile* events was reduced significantly within hospitals that transitioned to two-step algorithms. In health care epidemiology, Stroever said it is critical to understand the determinants of change and the factors that contribute to that change. This study is the first step in understanding to what extent the downward trends in CDI are due to changes in testing method versus other factors such as improved antimicrobial stewardship methods, environmental cleaning and transmission-based precautions.



Kendra P. Rumbaugh, Ph.D.

# Advances in Wound Infection Research

## NIH GRANT TO AID RUMBAUGH'S BIOFILM DISPERSAL RESEARCH

Biofilms, which are composed of many different microorganisms that congregate as a mass, are thought to be associated with up to 80% of infections, and their ability to stick together makes the biofilm and infection exceptionally difficult to kill. To combat this health care challenge, the National Institute of Allergy and Infectious Diseases at the National Institutes of Health in December 2023 awarded Kendra P. Rumbaugh, Ph.D., a professor in the TTUHSC School of Medicine's Department of Surgery, a two-year, \$434,938 grant ("Bacterial and host response to biofilm dispersal in wound infections").

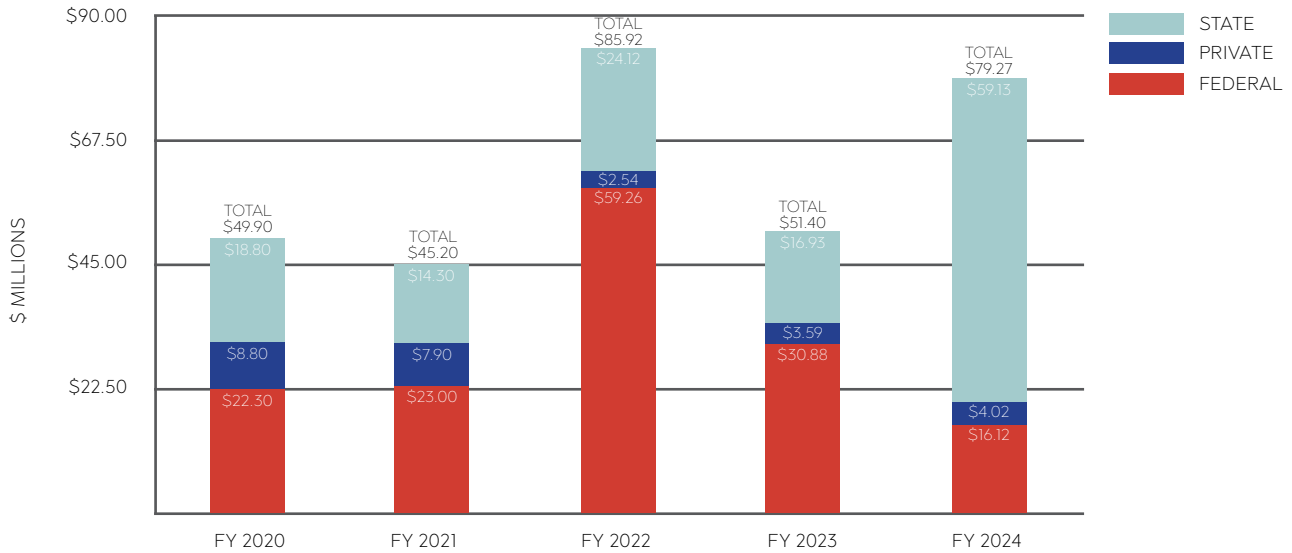
Rumbaugh's lab has for years focused on researching biofilms — specifically, bacterial biofilms — and their role in wound infections. Even though the bacteria become dormant in the biofilm, Rumbaugh said past research indicates that the immune system knows the bacteria and the biofilm are there, and it's responding by producing a variety of things that are supposed to kill the bacteria. However, because the bacteria are embedded in this biofilm, none of those things work, which leads to prolonged inflammation and inhibited wound healing.

In previous studies, Rumbaugh's lab has examined enzymes they hypothesized would break up the biofilm. Rumbaugh believes these enzymes, called glycoside hydrolases, actually will break up the sticky extracellular polymeric substance that covers and protects the biofilm, which will uncover the bacteria so it can be killed by antibiotics. With this new grant, Rumbaugh's lab will use certain enzymes as tools to understand what happens to bacteria when they're dispersed from a biofilm.

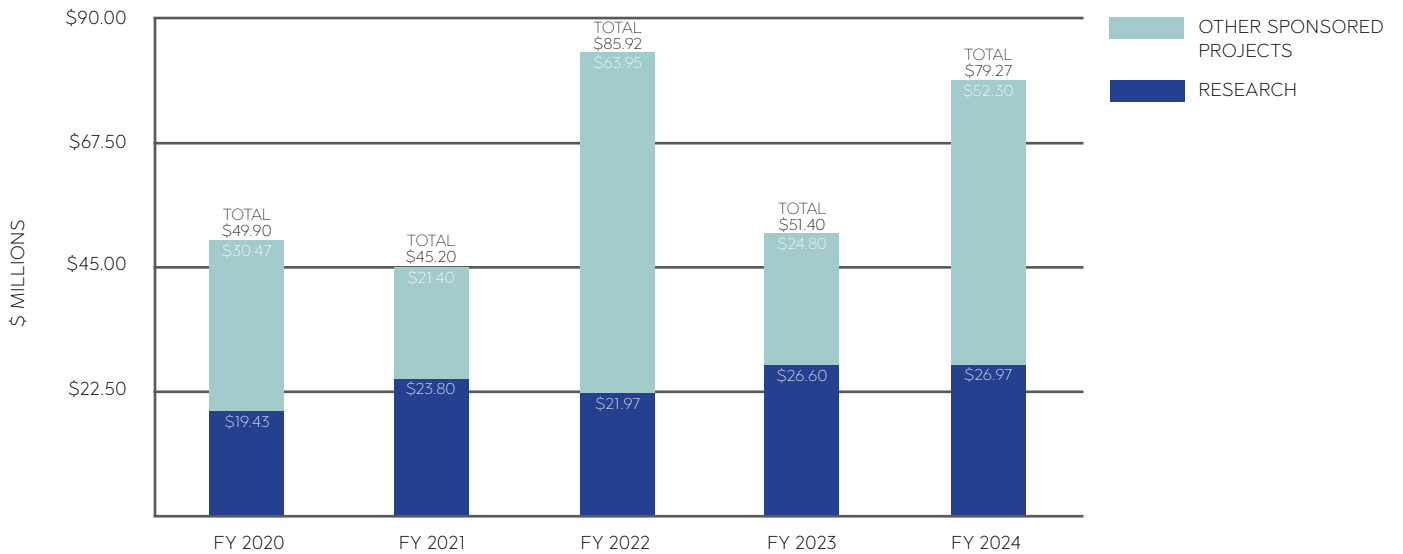
Rumbaugh's lab also will compare several passive and active dispersal methods using different chemical signals, enzymes and processes. Rumbaugh said they will investigate whether dispersal alters and influences the bacteria's susceptibility to antibiotics and other drugs based on the dispersal method being employed. She said this project will provide a basic science understanding of bacterial dispersal from biofilms, including how the bacteria and the host react to dispersal.

# RESEARCH AT A GLANCE

## TTUHSC EXTERNAL AWARDS RECEIVED BY FUNDING SOURCE

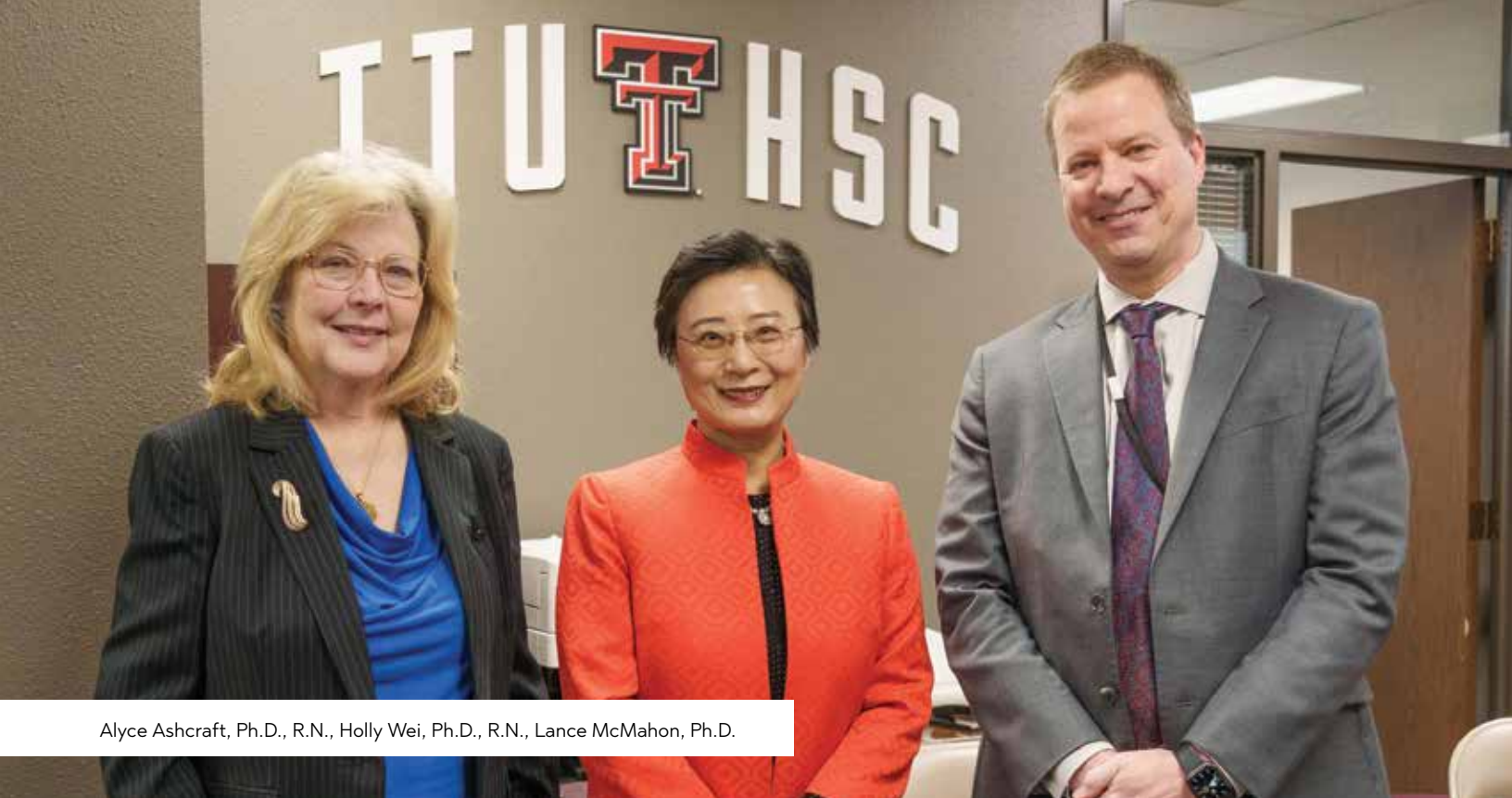


## TTUHSC EXTERNAL FUNDING AWARDS RECEIVED RESEARCH PROJECTS VS OTHER SPONSORED PROJECTS



SOURCE: TTUHSC OFFICE OF SPONSORED PROGRAMS





Alyce Ashcraft, Ph.D., R.N., Holly Wei, Ph.D., R.N., Lance McMahon, Ph.D.

# Transforming Nursing with Research

EXAMINING CHOICES FOR BETTER HEALTH

The TTUHSC School of Nursing in March established the Center for Nursing Research, Collaboration and Innovation to promote TTUHSC's and the School of Nursing's strategic objectives and academic missions, and to foster interprofessional collaboration. It will do so by supporting the professional development of School of Nursing researchers and providing the infrastructure necessary for the school's faculty and staff to write manuscripts and grants.

The School of Nursing is recognized for its ability to educate and train highly competent nurses who are ready to enter practice from the moment they receive their degree. Alyce Ashcraft, Ph.D., R.N., the School of Nursing's Mildred & Shirley Garrison Endowed Professor and Associate Dean for Research and Scholarship, said now is the time for the school to expand its research efforts.

Ashcraft said laboratory research is not an area in which the new center will focus, at least initially. Instead, center researchers will compete for educational grants and funding for clinical research.

The Center for Nursing Research, Collaboration and Innovation also will manage the Ken Ketner Sabbatical Award. Several years ago, Ketner established a \$1 million endowment to allow School of Nursing faculty to hone their research, clinical or teaching skills. The School of Nursing selects two faculty for the award each year, and Ashcraft said the award pays for a person to teach the recipient's classes so the recipient can then devote time to enhancing their classroom, clinic or research skills.



# ADVANCING MEDICAL DISCOVERIES:

## A TOUR OF TTUHSC CENTERS AND INSTITUTES

### TTUHSC CENTERS

#### **School of Medicine Cancer Center**

Studies cancer developmental therapeutics, laboratory and childhood cancers, patient-derived model development, antibody therapy of neuroblastoma, and telomere maintenance mechanisms.

Director: C. Patrick Reynolds, M.D., Ph.D.

Year established: 1998

Location: Lubbock, Texas

#### **Center for Membrane Protein Research**

Advances knowledge of the structure, function, and regulation of membrane proteins.

Director: Lan Guan, Ph.D.

Year Established: 2001

Location: Lubbock, Texas

#### **Center for Rehabilitation Research**

Research focus areas include physical rehabilitation, occupational therapy, speech therapy, and other forms of therapeutic intervention.

Director: C. Roger James, Ph.D.

Year established: 2002

Location: Lubbock, Texas

#### **Center for Speech, Language, and Hearing Research**

Advances research, education, and clinical services in the areas of speech-language pathology and audiology.

Director: Leigh Ann Reel, Au.D., Ph.D.

Year established: 2004

Location: Lubbock, Texas

#### **Infant Risk Center of Excellence**

Focuses on breast milk, breastfeeding and pregnancy-related research topics.

Director: Kaytlin Krutsch, Pharm.D., M.B.A.

Year established: 2010

Location: Amarillo, Texas

#### **Center for Tropical Medicine and Infectious Diseases**

Promotes an environment that inspires passion, especially in finding novel cures for diseases that recognize no human-made borders.

Director: Afzal Siddiqui, Ph.D.

Year established: 2014

Location: Lubbock, Texas

#### **Center of Excellence for Diabetes and Endocrinology**

Focuses on comprehensive care, research, and education on diabetes and other endocrine disorders.

Director: Rama Chemitiganti, M.D.

Year established: 2016

Location: Midland/Odessa, Texas

#### **Center of Excellence for Translational Neuroscience and Therapeutics (CTNT)**

Focuses on the translation of neuroscience research into therapeutic applications.

Director: Volker Neugebauer, M.D., Ph.D.

Year established: 2016

Location: Lubbock, Texas

#### **Center of Excellence for Integrative Health**

Strives to improve the health of individuals through integrative health research discoveries and education.

Director: Leslie Shen, Ph.D.

Year established: 2017

Location: Lubbock, Texas

#### **Surgery Burn Center of Research Excellence**

Advances research and treatment in burn care.

Director: Kendra Rumbaugh, Ph.D.

Year established: 2019

Location: Lubbock, Texas

# ADVANCING MEDICAL DISCOVERIES:

## A TOUR OF TTUHSC CENTERS AND INSTITUTES

### TTUHSC CENTERS (CONT.)

#### **Center of Excellence in Real-World Evidence**

Emphasizes research in the areas of health care delivery, outcomes, and the effectiveness of interventions in real-world settings.

Director: Carlos Alvarez, Pharm.D., M.Sc.

Year established: 2020

Location: Dallas

#### **Center for Tumor Immunology and Targeted Cancer Therapy**

Advances research in tumor immunology and developing targeted therapies for cancer treatment.

Director: Maciej Markiewski, M.D., Ph.D.

Year established: 2018

Location: Abilene, Texas

#### **Brain Drug Discovery Center (New)**

Focuses on discovering novel drug targets and treatments for neurodegenerative diseases by combining a proud tradition of blood-brain barrier excellence with new expertise in CNS drug discovery.

Director: Tom Abbruscato, Ph.D.

Year established: 2024

Location: Amarillo, Texas

#### **Center of Excellence for Nursing Research, Collaboration, and Innovation (New)**

Advances knowledge in nursing-related issues such as burnout, mental health and improvements in education and patient treatment.

Director: Alyce Ashcraft, Ph.D., R.N.

Year established: 2024

Location: Lubbock, Texas

### TTUHSC INSTITUTES

#### **F. Marie Hall Institute for Rural and Community Health**

Collaborates with the people of West Texas to advance health through imaginative and scholarly research, innovative use of technology, comprehensive education and outreach.

Director: Billy U. Philips, Ph.D.

Year established: 2006

#### **Garrison Institute on Aging**

Focuses on age-related research, education, and outreach to promote healthy aging.

Director: Volker Neugebauer, MD., Ph.D.

Year established: 1999

#### **Institute of Telehealth and Digital Innovation**

Building a digital health ecosystem that engages people, processes and technologies to transform delivery of health care in West Texas and eventually around the world.

Director: John Gachago, DHA

Year established: 2023

#### **Laura W. Bush Institute for Women's Health**

Dedicated to advancing women's health through research, education, and outreach.

Director: Connie Tyne

Year established: 2007

#### **Clinical Research Institute (CRI)**

Supports and promotes clinical research activities across TTUHSC.

Director: John Griswold, M.D.

Year established: 2009

#### **Institute of Anatomical Sciences**

Provides resources for the study and teaching of anatomical sciences.

Director: Kerry Gilbert, PT, ScD.

Year established: 2014

#### **Institute for One Health Innovation (New)**

Studies the impacts of human health, veterinary health and environmental health on communities to achieve optimal health outcomes for animals and people.

Director: Naima Moustaid-Moussa, Ph.D.

Year established: 2024

# New TTUHSC Centers and Institutes

## MOUSTAÏD-MOUSSA READY TO LEAD COLLABORATIVE INSTITUTE FOR ONE HEALTH INNOVATION

Definitions for the One Health concept have been put forward by several health care organizations, including the Centers for Disease Control and Prevention and the World Health Organization. Regardless of the definition, Naïma Moustaid-Moussa, Ph.D., the inaugural executive director of a collaborative effort between TTUHSC and Texas Tech University (TTU) known as the Institute for One Health Innovation (IOHI), said they all advocate for the same basic ideas.

“One Health is really an integrated and sustainable approach that recognizes that the health of humans, animals, plants and the environment are all interconnected,” Moustaid-Moussa said. “That means if you want to have healthy humans, you need to make sure the environment around them is healthy.”

Moustaid-Moussa is a Paul W. Horn Distinguished Professor of Nutritional Sciences at TTU, a professor in the TTUHSC Department of Cell Biology and Biochemistry (CBB) and founding director of TTU’s Obesity Research Institute, which she co-directs with Jannette Dufour, Ph.D., a University Distinguished Professor and CBB chair. Moustaid-Moussa said providing optimal patient care is at the heart of the One Health concept, especially for rural West Texas. To achieve that goal, practitioners are to be educated about One Health approaches and consider factors that may affect a patient’s health, such as their home, family and outside environment and community; conditions and factors to which they are exposed; and the quality and safety of the food they eat and air they breathe.

Moustaid-Moussa described two patients being treated for cardiovascular disease who may require somewhat differing treatment plans because of where they live. One patient’s condition may be amplified because they live in a rural area with extreme heat and dust or exposure to wild animals, while the second patient lives in an urban environment with poor air quality caused by heavy traffic and industrial processes.

Though not currently applied broadly in medicine, Moustaid-Moussa said the One Health concept is gaining momentum nationally and globally. She recently returned from a North American One Health University Network meeting coordinated by Colorado State University and North Carolina State University that brought together individuals from various North American institutions that have One Health programs, centers or institutes focused on research, education and/or service/outreach. In addition to actively engaging in One Health networks with other universities and their researchers, Moustaid-Moussa envisions expanding the overall TTU System IOHI beyond zoonotic and infectious diseases to include, for example, how climate and environmental factors (such as man-made chemicals, microplastics and other contaminants) affect animal and human health.

“We have expertise in infectious diseases and in other important areas where One Health must be applied, such as metabolic health, brain health and cancer,” Moustaid-Moussa said. “We need to work together to elevate what we do to include an understanding of how environmental factors in our area and beyond affect our human health.”



Naïma Moustaid-Moussa, Ph.D.



# New TTUHSC Centers and Institutes

## TTUHSC'S JERRY H. HODGE SCHOOL OF PHARMACY ESTABLISHES BRAIN DRUG DISCOVERY CENTER

After more than a decade of research growth and recruiting efforts to build strong, collaborative research programs, the Jerry H. Hodge School of Pharmacy in 2024 developed the Brain Drug Discovery Center, the newest TTUHSC research center. Created from two existing pharmacy school centers — the Center for Blood-Brain Barrier Research and the Cancer Biology Research Center — the Brain Drug Discovery Center will focus on discovering novel drug targets and treatments for a variety of central nervous system diseases by combining the long-standing blood-brain barrier research expertise from the previous centers with the new faculty researchers hired by the school in the area of brain drug discovery.

Thomas Abbruscato, Ph.D., the Brain Drug Discovery Center's inaugural director, said the pharmacy school is fortunate that many of its pharmaceutical sciences faculty have research expertise in areas such as brain stroke, neuropathic pain, addiction, cell-based therapies, brain cancer and blood-brain barrier science.

An example of the School of Pharmacy's highly developed drug discovery infrastructure is its Nuclear Magnetic Resonance core, which can determine the structure of small molecules, an important step in drug discovery. The school's Avance Neo 400 MHz NMR Spectrometer Nano was updated in July to enhance the core capabilities in structural elucidation, offering researchers high-resolution data, advanced analysis and cutting-edge technological analytical tools. The School of Pharmacy also houses a molecular

modeling core and a synthetic chemistry core, critical components of the drug discovery process that will play pivotal roles in the Brain Drug Discovery Center, which will unify these cores to engage drug discovery efforts throughout TTUHSC and beyond.

The center also will seek to generate and coordinate multidisciplinary efforts in medical chemistry, pharmacology, drug delivery, formulation and drug repurposing in an effort to translate TTUHSC's basic science into therapeutic intervention for human and animal disease. The primary focus will be on establishing a robust pipeline of collaborative projects with faculty from the TTUHSC Schools of Pharmacy and Medicine and the Texas Tech University School of Veterinary Medicine.

The inaugural Brain Drug Discovery Center members include Abbruscato, Abraham Al-Ahmad, Ph.D., Mahmoud Ahmed, Ph.D., Ulrich Bickel, M.D., Hiranmoy Das, Ph.D., Nadia German, Ph.D., Lance McMahon, Ph.D., Samuel Obeng, Ph.D., Quentin Smith, Ph.D., Heidi Villalba, Ph.D., Ming-Hai Wang, M.D., Ph.D., and Jenny Wilkerson, Ph.D. Moving forward, the center will work to expand membership across departments and schools to form collaborative drug discovery efforts.



Thomas J. Abbruscato, Ph.D.



Mahmoud Salama Ahmed, Ph.D.

## Groundbreaking Research Publications Unveiled

TTUHSC'S AHMED INVESTIGATING CARDIAC CELL  
REGENERATION: LATEST STUDY PUBLISHED IN NATURE  
CARDIOVASCULAR RESEARCH

When a patient experiences heart failure, their once-flexible cardiac cells develop into stiffening fibrotic cells that are no longer able to contract and relax, compromising their ability to carry blood efficiently to the rest of the organs in the human system. Because humans cannot regenerate these cardiac cells, the patient faces a long road to recovery marked by preventative or symptomatic treatments. However, some mammals do have the ability to regenerate cardiac cells, though generally for a specific amount of time immediately following birth.

With that in mind, Mahmoud Salama Ahmed, Ph.D., and an international team of researchers have completed an investigation to uncover novel therapeutics or existing therapeutic regimens previously approved by the Food and Drug Administration (FDA) for cardiac regeneration. Their study ("Identification of FDA-approved drugs that induce heart regeneration in mammals") was published in March in *Nature Cardiovascular Research*. Ahmed, an assistant professor of pharmaceutical sciences at the TTUHSC Jerry H. Hodge School

of Pharmacy, worked on the study while at UT Southwestern Medical Center. He said the current research is based upon findings from a 2020 study from the UT Southwestern Medical Center laboratory of Hesham Sadek, M.D., Ph.D. In that study, investigators demonstrated that mice can indeed regenerate cardiac cells upon genetic deletion of two transcription factors: *Meis1* and *Hoxb13*. Armed with that information, Ahmed and his collaborators started their latest study in 2018 by targeting *Meis1* and *Hoxb13* using paromomycin and neomycin, two antibiotics from the aminoglycoside class.

The team collaborated with scientists from the University of Alabama at Birmingham to administer paromomycin and neomycin to pigs suffering from myocardial infarction. They discovered the treated pigs had better contractility, ejection fractions and overall improved cardiac output. In future research, Ahmed is interested in combining the binding profiles of paromomycin and neomycin into one molecule rather than two. If successful, he said the new molecule will be able to avoid any adverse or potentially adverse effects associated with antibiotic resistance.



Luis Castro, M.D., MPH

## TTUHSC Medical Student Part of NIH Research Team's JAMA Publication

When Luis Castro received his dual M.D./MPH degree in May from the TTUHSC's School of Medicine and Julia Jones Matthews School of Population and Public Health, he was able to recount an experience known to very few medical students: being part of a research team whose work was published by the Journal of the American Medical Association (JAMA), one of the most impactful peer-reviewed medical research journals in the world.

The opportunity arose in 2023 when Castro was completing a visiting student rotation at the National Institute of Neurological Disorders and Stroke at the National Institutes of Health (NIH) in Bethesda, Maryland, where he worked in a neurofibromatosis clinic that enrolls patients from all over the country in clinical studies. One of the projects included a case report that was submitted to and accepted by JAMA Neurology. The case report

focused on a young patient with neurofibromatosis type 1, a disorder known to cause changes in skin coloring and tumor growth along nerves in the skin, brain and other body areas. Castro said the patient came in with an unusual presentation of the Harlequin sign and the underlying Horner syndrome. Harlequin syndrome is marked by flushing in the face and upper torso. It often is associated with Horner syndrome, a rare condition where the patient experiences upper eyelid drooping, constricted pupils and loss of facial sweating caused by a disruption to the sympathetic nerve supply.

Having the opportunity to witness such an unusual presentation of an already relatively rare condition was one of the most academically interesting aspects of Castro's NIH research experience. He hopes the article will help clinicians investigate digital evidence more closely the next time a patient presents it in the clinical setting.



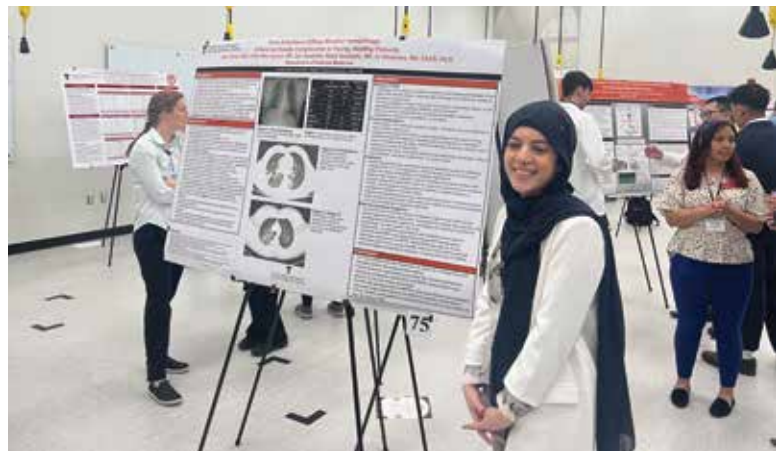
# SHOWCASING BREAKTHROUGH SCIENCE

## TTUHSC, TTU SCIENTISTS MEET AT INAUGURAL AMARILLO RESEARCH SYMPOSIUM

Traditionally, TTUHSC students, trainee researchers and faculty have showcased their research activities at events organized by individual schools or campus locations. In April, the TTUHSC Amarillo location added a twist to that tradition by hosting the inaugural Amarillo Research Symposium. The event brought together researchers from the TTUHSC School of Medicine, School of Nursing, School of Health Professions and the Jerry H. Hodge School of Pharmacy and the Texas Tech University School of Veterinary Medicine. Morning and afternoon sessions focused on the research accomplishments of students and faculty in their respective fields of study with poster and oral presentations.

Audrey DeLeon, program director of research collaboration for the TTUHSC Office of Research and Innovation and co-organizer of the symposium, said the goal was to create one research-centered event rather than having each school conduct its own.

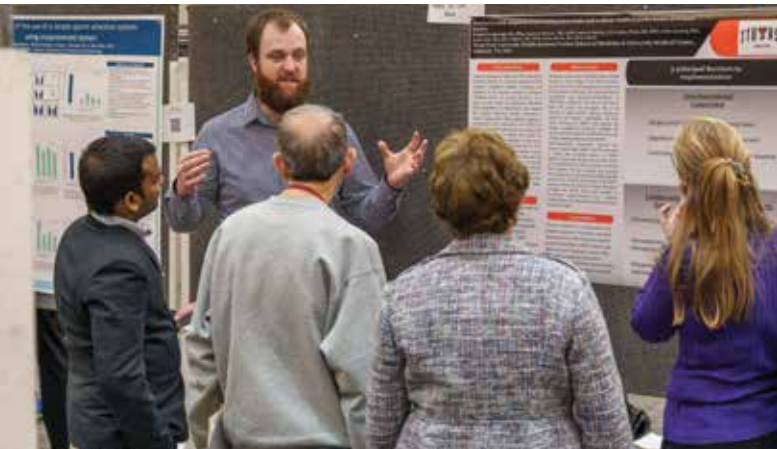
There were 113 students who presented their research at the symposium. Of those, 83 participated in poster presentations, 34 gave oral presentations and several students participated in both. DeLeon said the quality of the presentations, the overall attendance (more than 400 attendees) and the positive feedback could make the Amarillo Research Symposium a blueprint for similar events on other TTUHSC locations.



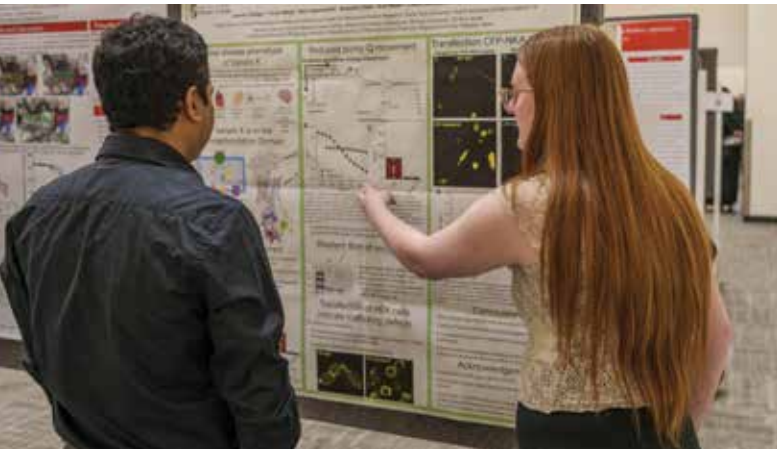


# SHOWCASING BREAKTHROUGH SCIENCE

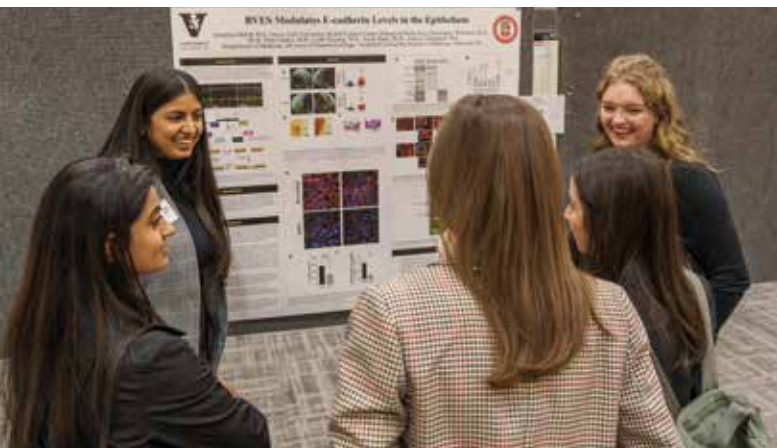
## TTUHSC'S GRADUATE SCHOOL OF BIOMEDICAL SCIENCES HOSTS 36TH STUDENT RESEARCH WEEK



Maintaining a delicate balance between neural excitation and inhibition is keys to healthy cognition and behavior. That message was delivered and demonstrated by student scientists Feb. 28-March 1 when the TTUHSC Graduate School of Biomedical Sciences hosted its 36th Annual Student Research Week. The theme for 2024 was, "Brain Wars: May the Neurons Be With You." Graduate School of Biomedical Sciences students Praneetha Panthagani and Neha Sawant served as co-executive directors. Other 2024 officers included Robert Barnes (vice director of poster competition), Manikantha Dunna (vice director of operations) and Megan Skains (vice director of marketing).



Student Research Week 2024 featured three keynote speakers: George Koob, Ph.D., the director of the National Institute of Alcohol Abuse and Alcoholism; George Perry, Ph.D., a professor of biology and chemistry at the University of Texas at San Antonio; and Allan Basbaum, Ph.D., a professor and chair in the Department of Anatomy at the University of California, San Francisco.



The 2024 event also included an interprofessional education opportunity in which four panelists discussed the effect of constant and immediate access to social media and news on the mental health of students and the population in general.

The annual poster competition is a highlight of every Student Research Week, and there were more than 260 entries for the 2024 contest. A new feature for 2024 provided an opportunity for student researchers to present a "Lightning Talk" between keynote speaker sessions. In addition, more than 96% of those who submitted abstracts in 2024 also presented their research in person, a record for this event.



Hongjun "Henry" Liang, Ph.D.

## National Academy of Inventors Names Liang a Senior Member

According to the Centers for Disease Control and Prevention, more than 2.8 million Americans contract antibiotic-resistant bacterial infections each year, and approximately 35,000 of those infections lead to death. To help improve those outcomes, Hongjun "Henry" Liang, Ph.D., a professor for the TTUHSC School of Medicine's Department of Cell Physiology and Molecular Biophysics, is developing novel hydrophilic nanoparticles known as nanoantibiotics that target bacterial infections, especially those that are resistant to treatment with known antibiotics.

In addition to his pioneering work with nanoantibiotics, Liang also holds several patents related to the development of new bionanotechnologies. He was recognized for these significant contributions to biomedical science and engineering when he was named to the 2024 class of Senior Members for the National Academy of Inventors (NAI), an organization with more than 6,000 individual inventor members and fellows representing 30 countries, including U.S. and international universities and governmental and nonprofit research institutes. The 2024 Senior Member class includes 124 academic inventors representing 60 NAI-member institutions across the U.S.

The nanoantibiotics created by the Liang team resemble tiny hairy particles composed of many hydrophilic polymer brushes grafted onto synthetic or natural nanoparticles of defined sizes and shapes. These synthetic compounds are designed to kill bacteria via membrane disruptions using a different mode of membrane remodeling that damages bacterial membranes while leaving mammalian cells intact. On July 26, 2022, Liang's most recent nanoantibiotics invention was issued U.S. Patent #11,395,804 ("Hydrophilic Nanostructured Membrane Active Antimicrobials with High Activity, Selectivity and Biodegradability").

Liang joins several other TTUHSC researchers in receiving NAI recognition. Samuel Prien, Ph.D., a professor of obstetrics and gynecology at the TTUHSC School of Medicine, became the university's first NAI Senior Member in 2018. Since then, Lindsay Penrose, Ph.D., an associate professor of obstetrics and gynecology and Ted Reid, Ph.D., vice chairman for the School of Medicine's Department of Ophthalmology and Visual Sciences, were named NAI Senior Members in 2023. In addition, Prien was named an NAI Fellow in 2021, an honor also received in 2023 by P. Hemachandra Reddy, Ph.D., a professor in the School of Medicine's Department of Internal Medicine.

# TRAILBLAZERS IN MEDICAL SCIENCE INNOVATION

Innovation is the culmination of a novel idea backed by successful research, a collaborative team, and a desire to translate discoveries into something that directly benefits the community we serve. Each year, the TTUHSC Research Innovation, Collaboration and Entrepreneurship (RICE) team, in conjunction with the Office of Research Commercialization and Innovation Hub groups, works to ensure that our learners and researchers have the resources they need to advance their ideas. From apps and software programs to medical devices and therapeutics, the TTUHSC community continues to drive groundbreaking solutions that improve health outcomes and enhance the well-being of society.

## FY2024 TTUHSC DISCLOSURES, IP FILINGS AND PATENTS

Filing Entity	Invention Disclosures	Provisional Patent Applications	Non-Provisional Patent Applications	Issued US Patents
TTUHSC	29	12	13	7
Joint TTU/HSC**	6	3	9	1
<b>Totals:</b>	<b>35</b>	<b>15</b>	<b>22</b>	<b>8</b>

\*\*Disclosures and patents that include inventors from both TTUHSC and TTU.

### RED RAIDER INVENTORS

Those who have disclosed in FY24 and have had three or more U.S. patents issued.

Lindsay Penrose\*  
Sam Prien\*  
Hemachandra Reddy\*  
Ted Reid\*

### MEMBERS

Those who have disclosed in FY24 and have been named on an issued U.S. patent.

Sanjay Srivastava  
Phat Tran

### ASSOCIATES

Those who have disclosed in FY24 and have been named on a pending U.S. patent.

Kumuda Das  
Hiranmoy Das  
Shreyas Gaikwad  
Roger Sutton

\* *Members of the National Academy of Inventors*  
Source: TTUS Office of Research Commercialization

# Transformative Innovation Achievements

TTUHSC COMMERCIAL  
VENTURE TKQUANT RECEIVES  
EUROPEAN PATENT

In 2018, TKQuant LLC, a company formed through TTUHSC, created a software algorithm that measures tissue kinematics, a field associated with biomechanics that calculates human motion and the tissue's response to the stress created by the motion. The company, established and trained through the National Science Foundation's Innovation Corps program and related offerings at the Texas Tech University (TTU) Innovation Hub at Research Park, uses existing video or images to decrease the risk of injury and misdiagnosis, and to reduce injury-related costs by improving diagnostic parameters.

More specifically, TKQuant's image-based technique quantifies a tissue's kinematic response to a procedure in real time while providing directions to clinicians regarding potential therapies and interventions for individual patients.

With guidance from TTU's Office of Research and Commercialization, the TKQuant co-founders — Phil Sizer Jr., P.T., Ph.D., and Kerry K. Gilbert, P.T., Sc.D., from the TTUHSC School of Health Professions; Suhas Pol, Ph.D., from TTU; and Richard Ellis, P.T., Ph.D., from Auckland University of Technology (New Zealand) — began the patent filing process in the United States and Europe.

In November 2023, the team was awarded the European patent (EP3678536 – System and Method for Measuring Real-Time Body Kinematics) for Germany, France, the United Kingdom and Netherlands. Receiving the European patent is an important step for TKQuant because it allows the company to continue to develop, test and market their technology without concern of another group trying to copy or use it without a licensing agreement from Gilbert, Sizer and their co-inventors. The EU patent also provides additional opportunities for TKQuant to develop the use of that technology in countries that have the potential for its use. The company's U.S. patent application is pending.



(Left to right) Suhas Pol, Ph.D., Phil Sizer Jr., P.T., Ph.D., and Kerry K. Gilbert, P.T., Sc.D.

 **TKQUANT**

PRECISION DIAGNOSTICS. IMPROVED OUTCOMES.

# TTUHSC Teams Excel in Innovation Hub's 2024-2025 Texas Tech Accelerator Competition

Four teams representing TTUHSC flexed their entrepreneurial muscles and earned a place among the 14 startup groups selected for the 2024-2025 Accelerator Cohort during the April 5 Texas Tech Accelerator Competition. Each year, the Texas Tech Innovation Hub at Research Park hosts the Texas Tech Accelerator Competition to encourage and support teams as they vie for a coveted spot in the Accelerator Program. The year-long program includes a \$25,000 business startup grant sponsored by the Lubbock Economic Development Alliance, a workspace provided by the Innovation Hub, a mentorship team and access to industry experts and investors to each startup team.

The 14 startups selected for the 2024-2025 Accelerator Program represent the Innovation Hub's eighth and largest cohort. Five of the 14 start-up teams are developing AI, machine learning or advanced manufacturing technologies and will have access to the Industry Advancement Technology Accelerator Track, a new addition to the Accelerator Program that is funded by Texas Tech University alumni. The 2024-2025 Accelerator Program officially began in May and runs through April 2025. The TTUHSC startup teams that advanced to the 2024-2025 Accelerator Program include:

- **Burn Length of Stay**, which seeks to revolutionize health care predictions utilizing machine learning technologies to predict hospital length of stay and prognosis to benefit physicians, patients, hospital administrators and insurance companies. Team members from the TTUHSC School of Medicine include Alan Pang, M.D., TTUHSC assistant professor of surgery, and medical students Jordan Kassab and Vishal Bandaru.
- **Medical Information Simulations**, which seeks to develop a web application Laboratory Information System (LIS) to provide career readiness and improve training for medical laboratory scientists in the laboratory information technology field. Team members include Tammy Carter, Ph.D., and Koy Kubala, Ph.D., from the TTUHSC School of Health Professions' Medical Laboratory Sciences program.
- **MelodiaSync**, which is an innovative software that facilitates relaxation by providing real-time, personalized beat responses while listening to audio. Team members, all from TTUHSC, include Jessica Blume, Ph.D., assistant director of the Office of Global Health; Samudani Dhanasekara, M.D., Ph.D., research assistant professor in the Department of Surgery; and Chanaka Kahathuduwa, M.D., Ph.D., resident physician in the Department of Neurology and clinical assistant professor in the Department of Psychiatry.
- **Neopurpose Therapeutics, Inc.**, which manufactures bio-printed tumor-on-chips that can be used for testing the safety and efficacy of potential anti-cancer drugs. Team members include Sanjay Srivastava, Ph.D., professor and chair in the Department of Immunotherapeutics and Biotechnology at the TTUHSC Jerry H. Hodge School of Pharmacy in Abilene, TTUHSC Graduate School of Biomedical Sciences students Shreyas Gaikwad and Mohamed Eltokhy and research associate Marina Curcic.

# EMERGING INVENTORS AND DISRUPTIVE TECHNOLOGIES



Burn Length of Stay



MelodiaSync



Medical Information Simulations



Neopurpose Therapeutics, Inc

# EMERGING INVENTORS AND DISRUPTIVE TECHNOLOGIES

## EMERGING INVENTOR: DR. CHANAKA KAHATHUDUWA



Chanaka Kahathuduwa, M.D., Ph.D.

Chanaka Kahathuduwa, M.D., Ph.D., is a resident physician and instructor in the Department of Neurology at TTUHSC. He also serves as a clinical assistant professor in TTUHSC's Department of Psychiatry. He holds a medical degree from the University of Peradeniya, Sri Lanka, an M.Phil. in cognitive neurophysiology and a Ph.D. in nutritional sciences from Texas Tech University, specializing in advanced neuroimaging techniques such as fMRI and biostatistics.

An accomplished scholar, Kahathuduwa has authored more than 45 peer-reviewed publications in high-impact journals, including *JAMA Pediatrics*, with research spanning neurology, autism and obesity. He is the co-founder and chief scientific officer of MelodiaSync LLC, a pioneering startup leveraging EEG data to optimize brain states for cognitive training and performance enhancement. He credits his success to the mentorship of esteemed colleagues and the unwavering support of his wife, Chathurika Dhanasekara, Ph.D.

## 2024 Most Disruptive Technology of the Year:

ADVANCED THERAPEUTIC APPROACHES FOR TARGETING ALTERNATIVE LENGTHENING OF TELOMERES (ALT) CANCERS



C. Patrick Reynolds, M.D., Ph.D.

This award highlights a technology with a high likelihood of profound impact on society. For 2024, the Office of Research Commercialization recognizes Patrick Reynolds, M.D., Ph.D., Balakrishna Koneru, Ph.D., and Shawn Macha, Ph.D., for their work on the development of new methods for treating cancers that demonstrate the alternative lengthening of telomeres (ALT) phenotype. This approach leverages an assay to detect ALT in patient samples and applies targeted drugs, including the clinical-stage compound PRIMA-1. The inventors have demonstrated that PRIMA-1 exhibits significantly greater efficacy against ALT-positive tumors compared to non-ALT counterparts, enhancing treatment precision for patients with a higher likelihood of response.

*Source: TTUS Office of Research Commercialization*



# Office of Research and Innovation:

## DIVISIONS OF SUPPORT



### Core Laboratory Facilities (CORE)

Core facilities are shared resources that provide state-of-the-art instrumentation and technologies to support research of all faculty.



### Research Innovation, Collaboration, Entrepreneurship (RICE)

RICE empowers and fosters a collaborative, innovative and dynamic research environment to cultivate advanced scholarship, innovation and entrepreneurial opportunities.



### Research Integrity Office (RIO)

RIO empowers the TTUHSC research community to act with the highest ethical standards and to maintain a culture of ethics compliance and integrity in all that we do.



### Laboratory Animal Resources Center (LARC)

LARC oversees and supports the procurement, housing, health and welfare of research animals at TTUHSC facilities in Lubbock, Amarillo and Abilene.



### Office of Sponsored Programs (OSP)

OSP assists and supports faculty and staff in identifying and obtaining funding opportunities through grants and contracts as well as promotes the successful management of awarded projects.

# TTUHSC: Research Oversight Committees

Through our committees, we oversee research to ensure compliance with federal and state laws, as well as institutional policies. The effectiveness of these committees relies heavily on the dedication and contributions of the individuals listed below.

**The Institutional Review Board (IRB)** monitors all TTUHSC research involving human subjects. The board evaluates risks to subjects and compliance with federal regulations and institutional policies.

- Amarillo IRB Chair: Ronald Hall II, Pharm.D., MSCS (2 years of service)
- Amarillo IRB Vice-Chair: Amy Choate, R.Ph. (Northwest Texas Healthcare System) (5 in this role; 15+ years with the IRB)
- Lubbock IRB Chair: Scott O'Banion, Pharm.D., BCNSP, CNSC (6 years in this role; 10+ years with the IRB)
- Lubbock IRB Vice-Chair: Rebecca Sleeper, Pharm.D. (6 years in this role; 10+ years with the IRB)

**Institutional Biosafety Committee (IBC)** develops and advises on standard policy and procedures for the safe use, handling and storage of hazardous chemical and biological materials.

- IBC Chair: Abraham Al-Ahmad, Ph.D. (4 years in this role)

**Quality Improvement Review Board (QIRB)** oversees the systematic collection and analysis of data and implementation of interventions to improve the quality of clinical care in our educational programs.

- QIRB Chair: Cindy Acton, DNP, R.N., NEA-BC (3+ years in this role).

**Embryonic Stem Cell Research Oversight Committee (ESCRO)** provides local oversight of standards and responsible use of human embryonic stem cells (hESC) or human pluripotent stem cells (hPSC) in research.

- ESCRO Chair: Samuel D. Prien, Ph.D.

**Institutional Animal Care & Use Committee (IACUC)** oversees federally-mandated policies and procedures regarding the humane care and use of lab animals.

- The Office of Research and Innovation thanks the Chair and Vice Chair for their service.

# Leadership



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



**ULRICH BICKEL, M.D.**  
Associate Dean of Science Jerry H.  
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



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



**KATIE JOPLIN**  
Assistant Vice President for  
Finance and Administration



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



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