

# INNOVATIONS

## IN HEALTH RESEARCH



**PATIENT  
SAFETY**

Reimagining the patient-provider relationship

**CARDIOVASCULAR  
RESEARCH**

Utilizing cutting-edge technology to promote heart health

**HEALTH  
DISPARITIES**

Filling in the gaps in health research

**BONE-MUSCLE  
RESEARCH CENTER**

Tackling aging and accelerating healing after injury





Dr. Cindy Trowbridge is using pulsed shortwave diathermy to provide deep heat to the knee joint and is using an automated flexibility machine to promote knee extension.

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**INNOVATIONS**

**IN HEALTH RESEARCH**

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## A MESSAGE FROM DEAN MERWIN

**T**hank you for picking up a copy of *Innovations*, The University of Texas at Arlington College of Nursing and Health Innovation's first collection of its recent research endeavors. I am excited to share this new publication that brings together and highlights the significant and trailblazing research happening in our college.

Located in the Dallas-Fort Worth metroplex, our college is on the cutting-edge of scientific advancement. Innovation is not just what we do, it is who we are. Our esteemed researchers push the bounds of current knowledge, ask difficult questions, and collaborate with colleagues across the globe to make groundbreaking discoveries. From virtual reality to 3D printing, from nursing to kinesiology, from basic sciences to community-based research, we are redefining what it means to advance health and the human condition.

Collectively our researchers bring hundreds of years of experience to our established research programs and have expertise across varying disciplines, including nursing, engineering, biostatistics, epidemiology, exercise physiology, genomics, public health, and health informatics, to name a few. Their interests vary broadly from cardiovascular disease to bone and muscle health, telehealth, patient outcomes, patient safety, reducing health disparities, and other health-related issues.

Most recently, research in our college was further enhanced by the addition of the new Science & Engineering Innovation & Research (SEIR) building, a state-of-the-art 229,000 square-foot research space that promotes an interdisciplinary research approach. The new SEIR building helps our researchers advance health science discoveries and understand the most pressing health issues we face today.

I hope you enjoy this first edition of *Innovations*, which highlights only a fragment of our most groundbreaking research happening in the college and provides an extensive overview of our many labs, centers, recent publications, and active projects.

*Elizabeth Merwin, Ph.D., RN, FAAN*  
Dean, College of Nursing and Health Innovation







Dr. Xiangli Gu is exploring ways technology and virtual reality can help tackle a wide variety of health issues in her Movement & Physical Activity Epidemiology Laboratory.

# SELECTED PROJECTS

## Active Grants for Fiscal Year 2021

**BROTHERS, R. MATTHEW, Kinesiology**  
 National Institutes of Health/NHLBI R15, Neural and Vascular Mechanisms of Elevated Cardiovascular Disease Risk in African American Women, 03/01/21–02/28/23, **\$447,615**

**FADEL, PAUL, Kinesiology**  
 UT Southwestern/NIH P01 Subaward/PROJECT 2, Mechanisms of Exercise Intolerance in Heart Failure with Preserved Ejection Fraction, 02/09/19–01/31/24, **\$1,382,794#**

**GREANEY, JODY, Kinesiology**  
 National Institutes of Health/NHLBI R00, Peripheral and Central Mechanisms of Neurovascular Dysfunction in Human Depression, 04/01/19–03/31/22, **\$745,812**

**GU, XIANGLI, Kinesiology**  
 Zhejiang Institute of Mechanical and Electrical Engineering Research Fund, Developing “Healthy Campuses” through University-School Partnerships: The Comprehensive School Physical Activity Program (CSPAP) Intervention, 12/15/17–12/31/21 (NCE), **\$45,466**

**KIM, YEONWOO, Kinesiology**  
 Department of Health and Human Services, The Fragile Families and Child Wellbeing Study, 09/01/20–05/31/21, **\$114,359**

**KINDRATT, TIFFANY, Kinesiology**  
 National Institutes of Health, The Prevalence of Diagnosed and Undiagnosed Alzheimer’s Disease and Related Dementias Among Arab Americans, 03/15/21–02/28/22, **\$154,001**



RANKED

#32



**IN NIH FUNDING AMONG SCHOOLS OF NURSING FOR 2020**  
(BLUE RIDGE INSTITUTE FOR MEDICAL RESEARCH)



**ACTIVE RESEARCH GRANTS FY 2020/2021**

**52**

**GRANTS  
AWARDED**

**\$20,458,359**

**DISTRIBUTED  
THROUGH 4/20/21**

**\$29,325,382**

**TOTAL \$  
AWARDED**



**AMONG ACTIVE RESEARCH GRANTS: NIH-ONLY FY 2020/2021**

**27**

**GRANTS  
AWARDED**

**\$15,006,586**

**DISTRIBUTED  
THROUGH 4/20/21**

**\$20,368,295**

**TOTAL \$  
AWARDED**

**TROTT, DANIEL, Kinesiology**

National Institutes of Health/K01, T cells mediate age related arterial dysfunction, 04/15/19–03/31/24, \$634,499

**NELSON, MICHAEL, Kinesiology**

National Institutes of Health/R01, Mechanism and Modulation of Sex Differences in Myocardial Steatosis Induced Left Ventricular Dysfunction, 02/01/18–01/31/23, **\$2,711,937**

**PRISBY, RHONDA, Kinesiology**

National Science Foundation via UT Dallas/ Subaward, Collaborative Research: Wireless-Powered Implantable Bone Intramedullary Fluid Modulator for the Treatment of Osteoporosis and Fracture Repair, 07/01/17–6/30/22 (NCE), **\$250,000#**

**ZHOU, JINGSONG, Kinesiology**

Department of Defense, Restoring Neuromuscular Junction Integrity to Alleviate ALS Progression, 09/30/18–09/29/21, **\$695,130**

**BROTTO, MARCO, Nursing**

Indiana State University/NIH P01 PPG Subaward, Osteocyte Regulation of Bone/ Muscle With Aging, 09/30/18–05/31/23, **\$1,771,279#**

**DANIEL, KATHRYN, Nursing**

Deerbrook Charitable Trust, Accelerating Adult Gerontology Health Care, 05/01/19–04/30/23, **\$3,243,557**

**MERWIN, ELIZABETH, Nursing**

National Institutes of Health/R01, Reducing Health Disparities in SMI, Rural and Minority Populations, 04/01/19–11/30/21 (NCE), **\$527,271#**

**ROGERS, MEAGAN/ROYE, JENNIFER, Nursing**

Texas Higher Education Coordinating Board, Nursing & Allied Health–Supporting Clinical Learning to Mitigate Impediments due to COVID-19, 11/02/2020–11/30/2022, **\$149,136**

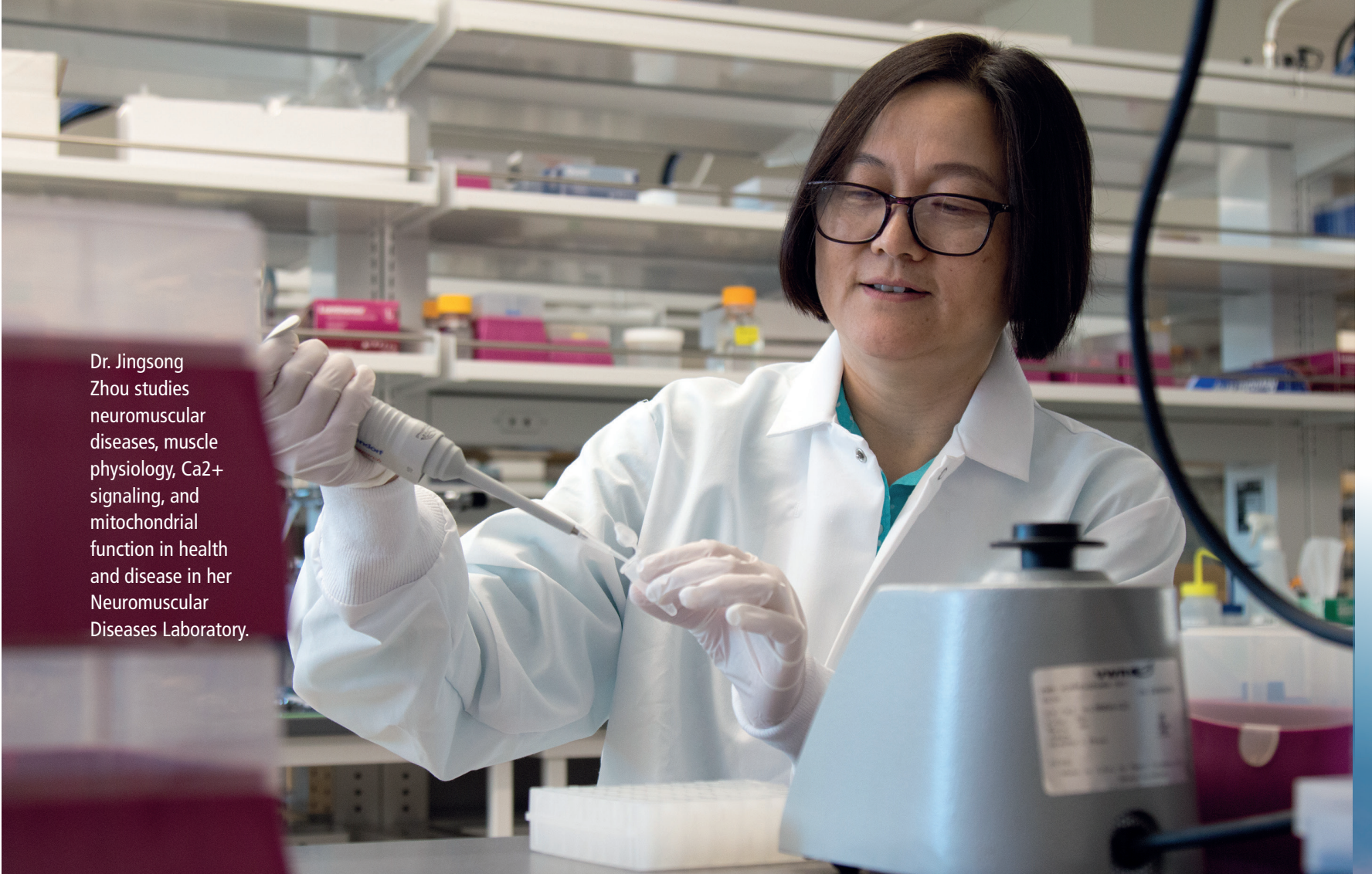
**XIAO, YAN, Nursing**

Agency for Healthcare Research and Quality, PROMIS Learning Lab: Partnership in Resilience for Medication Safety, 09/30/19–09/29/23, **\$2,499,351**

\* All amounts reflect total awarded, including direct and indirect costs

# Portion of Total Grant to UTA





Dr. Jingsong Zhou studies neuromuscular diseases, muscle physiology, Ca<sup>2+</sup> signaling, and mitochondrial function in health and disease in her Neuromuscular Diseases Laboratory.

## NEW FRONTIERS IN RESEARCH PROGRAMS

### **NURSING**

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#### **MARCO BROTTO**

**LABORATORY** works to devise new strategies to diagnose and treat musculoskeletal diseases.

#### **KATHRYN DANIEL**

**LABORATORY** (i.e. SmartCare Apartment) focuses on technology development to assist older adults in safe independent living in the community.

#### **KRISTIN GIGLI**

**LABORATORY** conducts research, advocacy, and education to improve pediatric health outcomes by optimizing care delivery systems' utilization of nurse practitioners and through evaluation of health policies.

#### **ZUI PAN LABORATORY**

focuses on intracellular calcium signaling and its pathophysiological implications in human diseases.

#### **ELIZABETH MERWIN**

**LABORATORY** focuses on improvements in health outcomes and reduction of health disparities in rural, minority, and vulnerable populations, using large, national health care datasets for population health studies.

#### **JAQUETTA "JADA" REEVES**

**LABORATORY** focuses on addressing disparities and health inequities related to sexual health and consistent condom use among urban minority youth and young adults.

#### **JESSICA SMITH**

**LABORATORY** focuses on generating knowledge about how nursing resources could be modified to result in safer care for rural communities.



## **NURSING**

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### **venu varanasi**

**LABORATORY** conducts research on the effects of oxidative stress as it relates to traumatic injury repair and tissue regeneration.

### **UTA HEALTHCARE INNOVATION**

**LABORATORY** led by Yan Xiao develops and tests innovative technology solutions for health care delivery to improve quality, safety, and engagement in health.

## **KINESIOLOGY**

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### **APPLIED PHYSIOLOGY AND ADVANCED IMAGING LABORATORY**

led by Michael Nelson focuses on questions relating to human health and cardiovascular disease.

### **BONE VASCULAR AND MICROCIRCULATION**

**LABORATORY** led by Rhonda Prisby examines the interaction between blood vessels and bone in states of health and disease.

### **DEVELOPMENTAL MOTOR COGNITION LABORATORY**

led by Priscila Tamplain investigates the development of motor behavior in children and adolescents.

### **HUMAN NEURAL CARDIOVASCULAR CONTROL LABORATORY**

led by Paul Fadel investigates neural cardiovascular control in human health and disease.

### **INTEGRATIVE IMMUNOLOGY**

**LABORATORY** led by Daniel Trott focuses on how the immune system interacts with other tissues to regulate cardiovascular and metabolic function.

### **INTEGRATIVE VASCULAR PHYSIOLOGY LABORATORY**

led by R. Matthew Brothers investigates the mechanisms of impaired autonomic and vascular function in selected at-risk/diseased populations.

### **MATERNAL AND CHILD HEALTH EQUITY**

**LABORATORY** led by Kyrah Brown examines the factors that shape the birth outcomes and health of Black women across the lifespan.

### **MOVEMENT AND PHYSICAL ACTIVITY EPIDEMIOLOGY**

**LABORATORY** led by Xiangli Gu seeks to improve the health and well-being of children and adolescents.



The Science & Engineering Innovation & Research building on UTA's campus is a state-of-the-art teaching and research space that houses various CONHI research labs and the North Texas Genome Center.



## **KINESIOLOGY**

### **NEUROMUSCULAR DISEASES LABORATORY**

led by Jingsong Zhou focuses on calcium signaling and mitochondrial function in striated muscle pathophysiology and neuromuscular diseases, particularly Amyotrophic Lateral Sclerosis (ALS).

### **NEUROVASCULAR PHYSIOLOGY LABORATORY**

led by Jody Greaney studies neurovascular dysfunction related to depression to address depression-associated cardiovascular disease risk.

### **NICOTINE AND TOBACCO RESEARCH LABORATORY**

led by Ziyad Ben Taleb focuses on emerging tobacco products like hookahs and e-cigarettes and their effects on health.

### **PHYSICAL ACTIVITY AND WEARABLE SENSORS LABORATORY**

led by Yue Liao promotes active living using wearable sensors for chronic disease prevention.

### **SOCIAL DETERMINANTS OF HEALTH LABORATORY**

led by Yeonwoo Kim investigates how neighborhood environments impact health outcomes and behaviors.

### **THERAPEUTIC INTERVENTIONS RESEARCH LABORATORY**

led by Cynthia Trowbridge investigates the clinical efficacy and therapeutic intervention in athletic injury.



Dr. Jody Greaney uses intradermal microdialysis coupled with laser Doppler flowmetry to assess the mechanisms contributing to the regulation of cutaneous microvascular function. Her laboratory is currently investigating the mechanisms underlying neurovascular dysfunction in human depression.



Dr. Marion Ball



Dr. Gabriela Mustata Wilson

## **TRANSFORMING SICK CARE INTO HEALTH CARE**

The Multi-Interprofessional Center for Health Informatics (MICHI) is a University-wide research center established in 2020 and led by Dr. Marion Ball, Presidential Distinguished Professor in Graduate Nursing and Executive Director, and Dr. Gabriela Mustata Wilson, Professor in Kinesiology and Co-Director. The Center's vision is to achieve 21st-century leadership in health informatics and intelligence by taking a multidisciplinary and interprofessional approach to research and education.

They have recently been awarded a grant from Tarrant County Public Health funded by the Centers for Disease Control and Prevention to address COVID-19-related health disparities and advance health equity in Tarrant County. The funding will serve to develop health literacy materials that will contribute to expanding capacity and services to prevent and control COVID-19 among populations at higher risk including the underserved, racial, and ethnic minority groups and people living in rural communities.

"For us, the main goal in putting the Center together was to move from sick care into health care, where people can take control of their lives and health. To achieve that, you cannot do it alone. It takes community centers, hospitals, multiple disciplines from computer science, public health, business, and everyone in between," said Dr. Mustata Wilson. ■



# NEW RESEARCH FACULTY

The College of Nursing and Health Innovation prides itself on attracting cutting-edge research and teaching faculty. The college's pioneering spirit is driven by the excellence of its health care professionals, and we remain committed to continued growth and innovation in academic programs, health research labs, and research opportunities.

Recently, new faculty members have joined the college in the departments of Graduate Nursing and Kinesiology. These additions have facilitated expanded research in areas related to pediatric health outcomes, health inequities, social determinants of health, and health promotion, demonstrating the importance of community-focused health care.

Read more about each of these outstanding new researchers' areas of expertise below.



**Dr. Kristin Hittle Gigli**  
*Assistant Professor in Graduate Nursing*

Pediatric critical care and acute care

Pediatric workforce development, including the utilization of nurse practitioners and other advanced-practice providers in hospital-based care

Health policy and its influence on health outcomes for hospitalized children



**Dr. Jaquetta "Jada" Reeves,**  
*Assistant Professor in Graduate Nursing*

Health inequities among urban minority youth

Advocacy for high-quality, comprehensive sexual health care

Adolescent and young adult health care, health promotion, and disease prevention within school-based health centers and community health organizations



**Dr. Yeonwoo Kim**  
*Assistant Professor in Kinesiology*

Social determinants of health and social health disparity

Neighborhood impacts on cardiovascular disease and its risk factors

The health effects of community walkability, access to affordable healthy food, parks and playgrounds, housing values, segregation, and other community factors

Director of the Social Determinants of Health Lab



**Dr. Yue Liao**  
*Assistant Professor in Kinesiology*

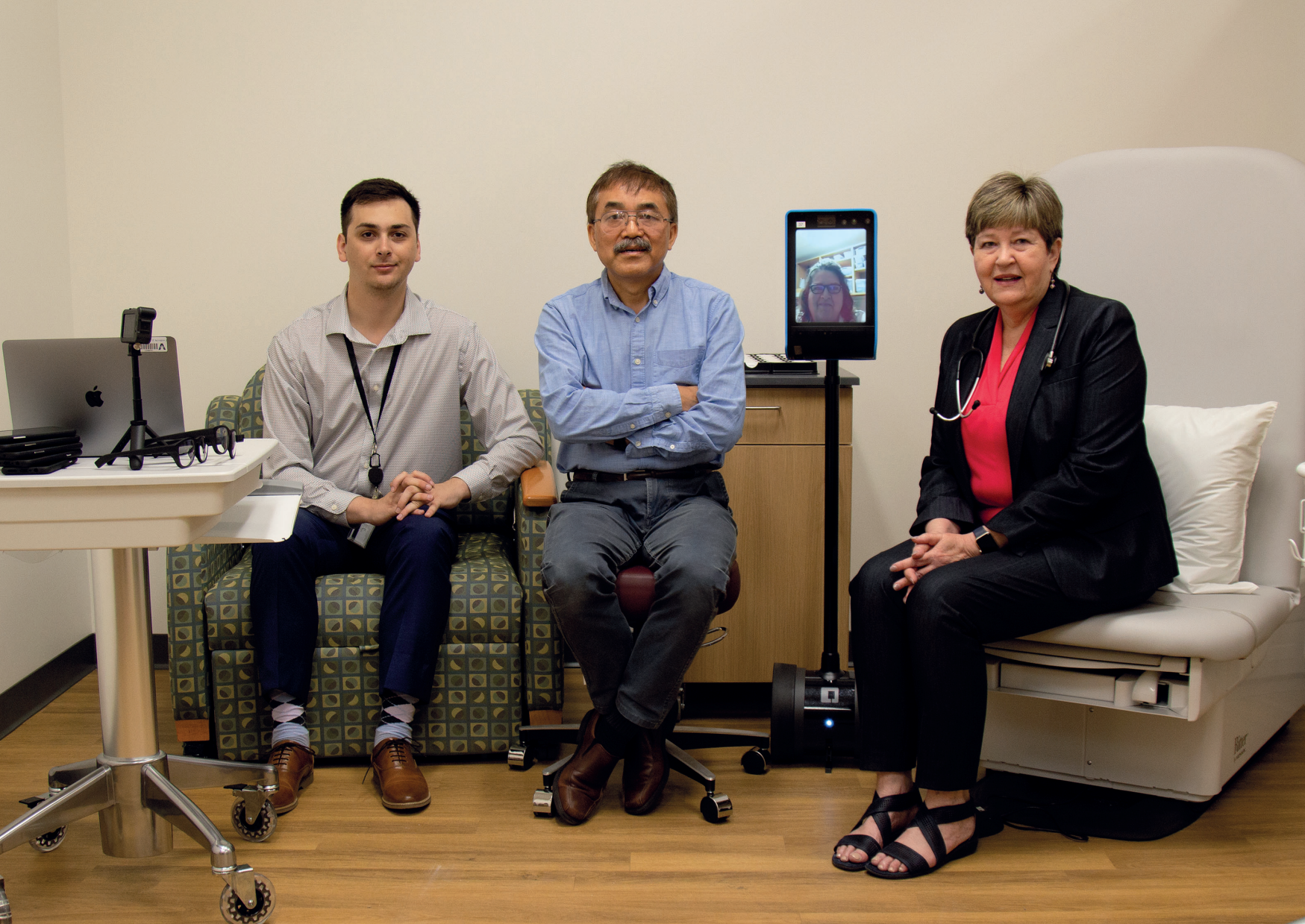
Public health and behavioral science

Health promotion regarding physical activity, sedentary behavior, eating, sleep, and energy balance

Mobile technology and wearable sensors and how they can be used to investigate psychosocial determinants of health behaviors

Director of the Physical Activity and Wearable Sensors Lab





# PARTNERSHIP IN PRIMARY CARE

Dr. Yan Xiao and his collaborators are reimagining the patient-provider relationship, from nixing the term “patient” to expanding telehealth.

BY FORREST MEYER

**W**hen patients and health care professionals see each other and behave as full partners in the journey to health, all involved can achieve improved outcomes in patient safety and well-being. Researchers in the College of Nursing and Health Innovation at The University of Texas at Arlington are leading a four-year, federally funded project exploring the potential of this partnership model in primary care to improve patient safety in medication management and more.

The project’s leaders say the key is test-proven designs of behavioral systems and environments—physical and virtual—that can set up these crucial partnerships for the best chance of success.

CONHI faculty members Dr. Yan Xiao and Dr. Kathryn Daniel serve as the project’s principal investigator and co-principal investigator, respectively. As of spring 2021, they have interviewed around 20 Texans aged 65 and older, speaking both English and Spanish, as well as dozens of primary care physicians, advanced practice providers, nurses, medical assistants, community pharmacists, and administrative staff from around the country.

The project expands beyond CONHI, with faculty from the UTA Colleges of Engineering, Business, and Liberal Arts also on the team.



Noah Hendrix, Dr. Yan Xiao, Jennifer Roye (via telepresence robot), and Dr. Kathryn Daniel in the Healthcare Innovation Lab, which is designed to simulate the primary care setting. The team is working on a project titled PROMIS Learning Lab: Partnership in Resilience for Medication Safety, along with a one-year supplemental grant on COVID-19, both from the Agency for Healthcare Research and Quality.

“Research in this project is a team sport, just as our model of partnership in patient safety is,” said Dr. Daniel, Associate Professor and Associate Dean for Academic Affairs in Nursing. “The many interviews and focus groups we are conducting in this phase are helping us to triangulate, to look at the same problems and issues from different perspectives. This requires a great deal of teamwork, which will help us arrive at solutions that are most likely to work.”

The multi-site research project being coordinated from UTA is funded by a four-year, \$2.5 million grant made in 2019 by the Agency for Healthcare Research and Quality (AHRQ), a division of the U.S. Department of Health and Human Services. AHRQ funds a national network of patient safety learning laboratories. In 2020, AHRQ provided the UTA-led project with a one-year supplemental grant that will help researchers assess the impact of the COVID-19 pandemic on health delivery systems and methods (such as telehealth) and patients’ ability to manage their medications safely.

“The mentality of health care for quite a while now has been a one-way delivery model. The patient is passive; you are an object of being cared for,” said Dr. Xiao, a Professor in Undergraduate Nursing who

across the several clinics and centers that are part of the project’s consortium. Patient participants and clinicians engage with each other in actual health care encounters that researchers study and assess.

Another key part of this research project, however, is what most people might think of as a laboratory—a single physical location where scientific questions are explored in controlled conditions. The Healthcare Innovation Lab (HI Lab) on the UTA campus is a simulation setting that consists of two exam rooms of different sizes and types, a consultation room, and a participant-patient entry and receiving area. Technology supporting telehealth visits is incorporated in the lab. Jennifer Roye, Assistant Dean of Simulation and Technology, is part of the team, along with other members involved in the design of the HI Lab including behavioral systems engineers and architects.

Noah Hendrix, research project manager, describes the HI Lab as “essentially a near-functional primary care setting.”

“The idea is to be able to use participant-provider simulations to standardize primary care visits and be able to manipulate different variables,” Hendrix said. “The two exam rooms are very different. The smaller one is more of the typical primary care visit experience as you

**“This partnership becomes a driving force for our interpretation of a new type of medicine. As an engineer, I think in terms of designs of systems. How do you get a system that will operate with the assumption of seeing a patient as a partner and not as some passive recipient? We are trying to get to a place where the health care professionals can do their best part to help patients get better. So, there are many partners involved.” —Dr. Yan Xiao**

oversees the Partnership in Resilience for Medication Safety Learning Lab, or PROMIS lab. “The things that patients receive passively from health care professionals have very little impact on the final outcome.” This is especially true for medication management at home, Dr. Xiao said.

Up to now, according to Dr. Xiao, the practice for the most part has been, “You as a patient have a problem; you come to me, the health professional; I give you a solution; and that’s the end of the story. But to work in the best way, health care really has to be designed quite a bit differently than a transaction like buying a consumer product.”

In addition to the elderly adult community-dwelling patient participants, the team making up the PROMIS Lab consortium include researchers in public health and pharmacology from The University of North Texas Health Sciences Center in Fort Worth; clinicians in the John Peter Smith system, also in Fort Worth; a human factors engineer, a geriatrician, and a patient services expert from Johns Hopkins University in Baltimore; a North Texas primary care research network; and a patient safety advocacy leader who is an expert in patient advocacy and representation.

Dr. Xiao describes the PROMIS lab as an “*in situ* lab,” dispersed

might have it today, and then there’s the larger one, which is more idealized or theoretical in that it is larger and has better equipment, and then we can compare how these two exam room settings perform relative to each other, and where the areas for improvement are.”

Dr. Xiao said selected participants—community-dwelling individuals 65 or older who live at home independently—who would traditionally be referred to as “patients” are invited to the HI Lab to simulate clinic or office visits with their clinician in a partnership.

He said that in these simulated interactions, the term “patient” is avoided as much as possible because it does not fit with the partnership experience they are seeking and because it is a term more accurately associated with hospital stays.

Terminology matters throughout this project. For example, the area in the HI Lab where participants first arrive for their visits is by intention not called a “waiting room,” because the notion of waiting feeds the current dynamic that can make the participant feel like a passive recipient of health solutions that are merely dispensed to them.

“It can feel like you are just there wasting your time, or having your time wasted, while you wait,” Dr. Xiao said. The architect in the project helped design that space to make it a more engaging area where partici-





In a separate project, Dr. Kathryn Daniel speaks with an engineering student who is assisting with the mechanics of the SmartCare Apartment. The SmartCare Apartment is a living laboratory apartment in a nearby senior living community that uses state-of-the-art technology to collect information about the well-being of the person living there temporarily.

pants might, for example, take part in meaningful educational activities about their condition or about general health and well-being.

The COVID-19 pandemic has, of course, greatly increased the use of telehealth. In many cases, this has made maintenance of key health care relationships possible, but it also has presented challenges for the population being studied because of the barriers to access to telehealth that many elderly people and others face.

The HI Lab can study the effectiveness of telehealth interaction by running the experience through different scenarios. In one of these, the patient-participant may live close to the clinic, while their health care professional may live too far away to get to the clinic easily. The patient then goes to the clinic lab and has a telehealth session while sitting in the lab's well-equipped consultation room. Conversely, it might be the clinician who can work from the lab clinic, and the participant does the telehealth appointment from her or his home. In some situations, the telehealth appointment could take place with neither clinician nor patient-participant being at the clinic lab, but both in remote locations.

If the HI Lab represents the ideal for best practices, then the "real world," *in situ* portion of the PROMIS Lab project is a complement to that. Operational clinic practices allow researchers to see how much the envelope of existing parameters and realities can be pushed.

In one part of the project, the PROMIS lab researchers are working with two clinics. One is a small private practice of the type that many of the study participants visit for primary care. The other is a primary care clinic within a large academic medical center.

"We have an opportunity to work with these clinics within the restraints of their spaces and the real conditions of their practice," Hendrix said. "Working within what they currently have is one of our goals. We are seeking those interventions that the clinicians and the administrators want, and if they feel confident in those since they've been involved from the start in our exploration phase, then they are receptive to trying new things."

Dr. Xiao concurred. "We try things in real life and see how they work. We design together with professionals working in those clinics,"

he said. "Will this work for you? Let's give it a try? That is the spirit of the collaboration."

He adds that AHRQ, the federal funding agency for the project's grant, "has given us a long leash in exploration of what works and what doesn't. They have given us as investigators the freedom to go where we think the research will lead. AHRQ is very prescient in thinking that we cannot limit the research to any single component of medication management at home. We should allow a network of researchers to explore many ways and factors that can contribute to patient safety."

While a primary focus of the project is learning how to minimize preventable errors related to medication use, Dr. Xiao said that medication errors by patients at home are "only a symptom of the lack of partnership" in the wider health care system.

"This partnership becomes a driving force for our interpretation of a new type of medicine," Dr. Xiao said. "As an engineer, I think in terms of designs of systems. How do you get a system that will operate with the assumption of seeing a patient as a partner and not as some passive recipient? We are trying to get to a place where the health care professionals can do their best part to help patients get better. So, there

**"For so many older adults, their conception of health care is 'I need the doctor to tell me what to do.' They tend not to ask questions ... We need to encourage these people by telling them, 'You have a role here and we need your active participation in this job of helping you to be healthy.'" —Dr. Kathryn Daniel**

are many partners involved."

Dr. Daniel, the project's co-principal investigator, agreed. "So many players have a piece of the pie in patients' medication management."

She has seen this up close in her careers as an academic and a clinician. Early in her career as a nurse, Dr. Daniel spent much of her time tending to the needs of elderly patients. Later as a nurse practitioner, she worked for a decade with patients similar to those in the study. She has both a mind and a heart for this work.

"This is a growing population, and in many ways, it seems to have become a vulnerable, forgotten, and undervalued population," Dr. Daniel said. "For so many older adults, their conception of health care is 'I need the doctor to tell me what to do.'"

"They tend not to ask questions and can leave appointments with some lingering confusion. But then they just have to do the best they can on their own at home. We need to do a much better job with patient education. We need to encourage these people by telling them, 'You have a role here and we need your active participation in this job of helping you to be healthy.'"

The hope reflected in the name of the Partnership in Resilience for Medication Safety Learning Lab is that health care can become its best when every person in the endeavor is empowered to do their part. ■

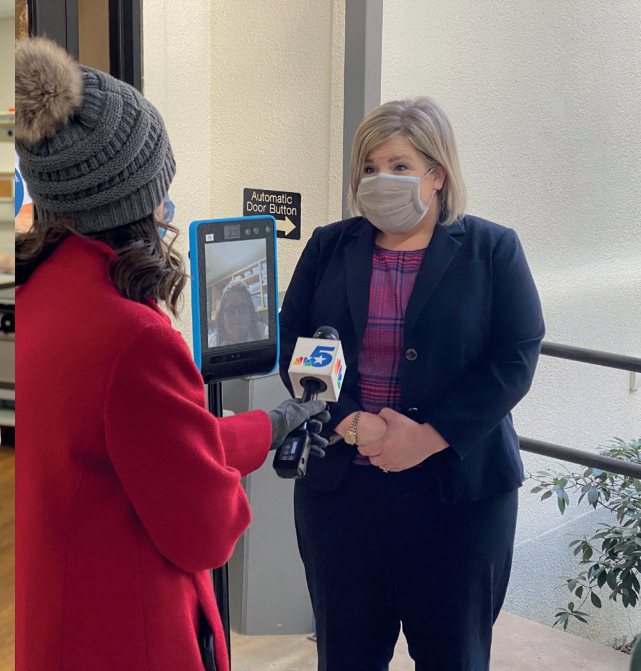




Meagan Rogers



Jennifer Roye



RESEARCH SPOTLIGHT

# TELEHEALTH AND NURSING EDUCATION DURING COVID-19

How two researchers are using telepresence technology to aid nursing education during the pandemic and beyond. BY MIKE KUHNENBECK

**T**he COVID-19 pandemic created daunting obstacles for nursing students, challenging two College of Nursing and Health Innovation researchers to discover innovative ways to facilitate clinical learning through the aid of telepresence technology.

CONHI researchers Jennifer Roye, Assistant Dean of Simulation and Technology, and Meagan Rogers, Ph.D., Undergraduate Nursing Associate Chair, received a \$149,136 grant from the Texas Higher Education Coordinating Board's Nursing Innovation Grant Program (NIGP) for their research on "Patient Remotely Operated Technology Education and Clinical Training (PROTECT) due to COVID-19."

According to Rogers, the research component of their grant is designed to evaluate variations in student outcomes when robots are used in place of hands-on patient care.

"We are interested in how the learning experiences differ when students are observing remotely using the robot instead of providing direct patient care," Rogers said.

Their research includes the use of telepresence robots, which are mobile computer tablets attached to wheels allowing for two-way video and audio communication. Devices such as these help enable faculty members or students

to engage with patients and caregivers in a clinical space without physically being present.

"With the use of the telepresence robots, we are able to offer entire clinical groups the opportunity to interact with residents in facilities that might be more vulnerable to COVID with-

**"The pandemic forced telehealth to the forefront of health care out of necessity. Understanding how we can educate nurses and provide unique learning experiences to our students despite the pandemic challenges helps us produce a diverse and competent future workforce."**

**—Meagan Rogers**

out putting anyone in harm's way," Roye said.

Students have the opportunity to learn at the Smart Hospital, a clinical simulation education facility. There, students can practice conducting assessments, completing nursing procedures, and participating in clinical scenario simulations. The Smart Hospital also provides a location for students to observe re-

mote interactions via the telepresence robots.

The grant has allowed Roye and Rogers to increase their stock of advanced training devices and telepresence robots, some of which have been deployed to a dementia care center where onsite nurses and patients virtually interacted with student participants, observing care-planning and enrichment activities for patients.

"This improves their assessment skills but also fosters a deeper understanding of the team dynamics involved in health care delivery," Rogers said. "Students often spend so much time with hands-on care in the hospital setting that they are unable to see the non-verbal dynamics between patients and health care providers as well as reflect on how communication is perceived by others."

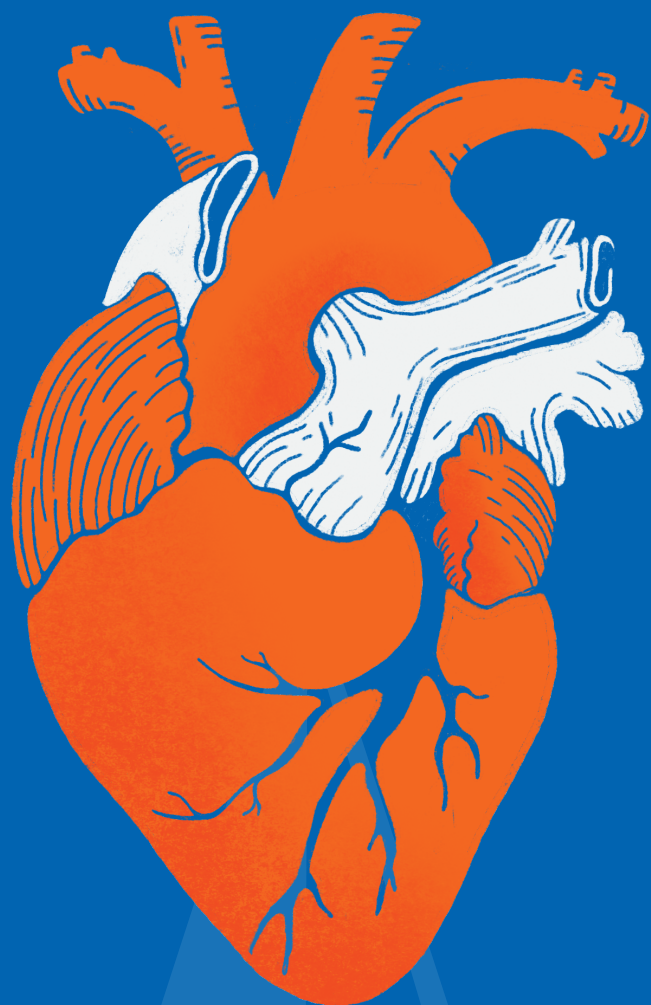
Partnering with multiple health care facilities, Roye and Rogers' research extends beyond the pandemic, seeking solutions for the lack of clinical experiences available to students during a time of nationwide nursing shortages and limitations in rural areas.

"We were looking at a way to provide robust clinical opportunities to our students in spite of these challenges," Roye explained. "We also hope to provide faculty with the skills and teaching strategies to deliver high-quality nursing education to students in rural areas."

By identifying the ways they can expand their educational reach, Roye and Rogers will develop a new curriculum based on this technology. Their goal is to provide safe and effective patient care to the diverse patient population, allowing them to train nurses all over Texas.

"Our current research is just the tip of the iceberg," Roye said. ■





# THE HEART OF THE HEART

Researchers at CONHI utilize rare technology to study cardiovascular diseases.

BY BRYCE JONES

**T**here are many realms to explore in the world of cardiovascular health—gender and racial disparities, heart disease, the long-term effects of COVID-19, and much more—and researchers at the College of Nursing and Health Innovation are at the forefront of it all. Their work delves into a variety of different diseases and the different ways they affect multiple populations.

With groundbreaking technology and a focus on timely projects, CONHI researchers are doing important work to improve health outcomes. According to Dr. Michael Nelson, Associate Professor and Director of the Applied Physiology and Advanced Imaging Laboratory at CONHI, the key to treatment starts with prevention.

“Ultimately, what we’d love to be able to do is prevent somebody from progressing to heart failure,” Dr. Nelson said. “And so a lot of our studies focus on understanding the pathophysiologic mechanisms of disease, because if we understand what is causing it, we can develop ways to prevent it.”

A team of graduate students, postdoctoral fellows, and faculty at the college dedicate their research to achieving this goal. “There’s so much great research going on in our college—we could be talking for 10 hours straight and not even scratch the surface,” Dr. Nelson said.

One such research area is that of Dr. Yaewon Seo, Assistant Profes-

**The pandemic has impacted people’s cardiovascular health in more outwardly apparent ways, too. Daily habits, like commuting to school, sporting events or work, have shifted to be more sedentary, and this has adverse effects on heart health. Research by Assistant Professor Dr. Jody Greaney also points to increased reports of depression and stress caused by COVID-19, conditions which have cardiovascular health implications.**

sor in Graduate Nursing. Dr. Seo studies ways to improve quality of life for heart failure patients by investigating how deep and slow breathing training may improve the shortness of breath these patients develop even during mild activities of daily living.

Dr. Paul Fadel, Associate Dean for Research and Professor in Kinesiology, also emphasized the breadth of CONHI’s cardiovascular research.

Recently, Dr. Fadel’s lab has been working on a project related to COVID-19. Researchers recruit subjects in the 18-29 age range through flyers, classes at the college, and hospitals or clinics to study COVID-19’s lingering effects, such as “COVID brain,” which is characterized by mental foginess and difficulty thinking. Due to his studies, Dr. Fadel





Dr. Paul Fadel discussing Doppler ultrasound assessment of vascular function with postdoctoral fellow Jasdeep Kaur in preparation for an experimental study.

believes there is a cardiovascular element to these lingering symptoms.

The pandemic has impacted people's cardiovascular health in more outwardly apparent ways, too. Daily habits, like commuting to school, sporting events, or work, have shifted to be more sedentary, and this has adverse effects on heart health. Research by Assistant Professor Dr. Jody Greaney also points to increased reports of depression and stress caused by COVID-19, conditions which have cardiovascular health implications.

Other cardiovascular research at the college includes an ongoing series of studies, conducted by Associate Professor in the Department of Kinesiology Dr. R. Matthew Brothers, comparing the health of Black and white college students. He has recently begun to investigate mechanisms of elevated cardiovascular disease risk in Black men and women. From a public health perspective, studying disease risk in Black women is particularly important, as they represent a historically understudied population despite having amongst the highest prevalence of cardiovascular disease.

Yet another researcher and public health faculty member, Assistant Professor Dr. Ziyad Ben Taleb, is collaborating with Drs. Fadel, Brothers, and Nelson on a series of studies evaluating the impact of vaping or e-cigarettes on cardiovascular health and the sympathetic nervous system. His work is expected to deliver guidance for public health policy pertaining to e-cigarettes.

Dr. Fadel's own research focuses on mechanisms that control the

autonomic nervous system. The college's labs have the ability to perform microneurography, or recordings of sympathetic nerve activity—something only about 30 labs in the world can do, he said.

This allows researchers to compare individuals with high and low sympathetic nerve activity, which has revealed that those with higher activity have worse cardiovascular health and higher morbidity and mortality. Figuring out why this is the case would allow doctors to help individuals suffering from heart failure, chronic kidney disease, type 2 diabetes, and obesity, all conditions associated with sympathetic overactivity.

“Our research is focused on trying to understand those disease states where there is sympathetic overactivity—where it's coming from, why it's overactive, and [if we can] figure it out. This would help design a treatment or a therapy that would allow us to lower sympathetic nerve activity in those people,” Dr. Fadel said.

Dr. Nelson also uses state-of-the-art technology in his work. The Applied Physiology and Advanced Imaging Lab focuses about 60 percent of its resources on cardiac function, mechanics, and metabolism and about 40 percent of its resources on peripheral blood flow regulation, but imaging is at the center of almost every project. In particular, they often use MRI for the high resolution images it provides, as well as important information about tissue composition.

“The heart is actually more complex than it's often given credit for,” Dr. Nelson said. “For example, the left ventricle has a unique fiber ori-



entation that actually causes it to twist and behave very differently than the right ventricle, or other muscles in the body. And so we're interested in what changes are modulating those functional and mechanical outcomes."

One study Dr. Nelson's laboratory is leading now uses MRI technology to quantify fat deposits inside cardiac cells of human volunteers. (He deems this research "pretty cool.") Their goal is to understand if too much fat in the heart causes cardiac dysfunction.

Understanding heart failure remains an important area of study at CONHI. Indeed, Dr. Nelson and Dr. Fadel are part of a large Program Project Grant sponsored by the National Institute for Health, with colleagues in the Dallas-Fort Worth area, to study patients that have a specific form of heart failure known as heart failure with preserved ejection fraction (HFpEF).

"The theme of the whole grant is that these patients are a growing population," Dr. Fadel said. "They're typically older, with women more affected than men. The treatments that we have for other forms of heart failure don't work in this group, so there's a need to better understand the underlying pathology. And so my lab is characterizing the sympathetic nervous system and its control. We are also studying oxygen delivery to the skeletal muscle, an often forgotten but equally important

target organ in heart failure."

Dr. Nelson's group is performing MRI in the same patients with heart failure to better understand changes in their hearts, lungs, and skeletal muscles. Unique to this group, much of the imagery is captured while the patient is exercising. This allows the researchers to better understand how the heart, lungs, and skeletal muscles are functioning during activities of daily living.

"It has always bothered me to study the body in a rested state," Dr. Nelson said. "Patient symptoms are often experienced when the individual is actually moving about their environment. That's what we try to do in the magnet, to simulate that experience and evaluate organ-specific outcomes under real-life conditions."

It is one of the only testing environments in the world like it, which makes it possible for the research lab to gain a new understanding of cardiovascular disease.

Learning about the diseases that affect cardiovascular health is what motivates researchers at CONHI. Their studies ultimately help find ways for patients to improve, and Dr. Fadel reflects on his own research to emphasize that.

"I think the more we can learn in terms of the regulation of the sympathetic nervous system in these different disease states, the better we're going to be equipped to treat," he said. "And I think that's important, because if you take any disease—although we do a much better job these days than maybe 20 years ago in having effective treatments—it can still be better." ■

Applied Physiology and Advanced Imaging Laboratory members Manall Jaffery, Dr. T. Jake Samuel, and Sauyeh Zamani join Dr. Michael Nelson at the Advanced Imaging Research Center at UT Southwestern Medical Center.







## RESEARCH SPOTLIGHT

# SEQUENCING THE PANDEMIC AT THE NORTH TEXAS GENOME CENTER

BY AVERY GREGURICH

Since the facility first opened its doors in 2018, the North Texas Genome Center has become a world-class research and teaching facility. A collaborative venture between multiple universities, medical centers, and corporate partners, the NTGC is housed in the Science & Engineering Innovation & Research (SEIR) Building on UTA's campus. The NTGC offers high-speed, low-cost library preparation and sequencing and bioinformatic services to enhance the biotechnology and biomedical research communities. The NTGC performs this work with two Illumina NovaSeq-6000 genome-scale sequencing systems, allowing the center to sequence over 10,000 human genomes annually.

Anajane Smith, MA, is the Program Manager Interdisciplinary Research at the NTGC. She has been responsible for acquiring the center's laboratory accreditations. The NTGC received its Clinical Laboratory Improvement Amendments certification in early 2020, allowing the center to work not only with companies and researchers in the genome sciences, but also in real-time with health care providers supplying clinical insights and diagnostics.

In early 2021, after an on-site lab inspection review, the NTGC received its College

of American Pathologists (CAP) accreditation. CAP is the world's largest organization of board-certified pathologists and a leading provider of laboratory accreditation and proficiency testing programs. Dr. Jon Weidanz, Professor in Kinesiology, Founding Director of the North Texas Genome Center, and Associate Vice President for Research, said "CAP regulations are the gold standard for clinical diagnostic labs."

The certification "confirms the workflow process, documentation, and data generated are reproducible and of high quality," he said.

When the pandemic began, the NTGC was asked to adapt its facility into a COVID-19 test site, focusing on processing PCR tests for its research staff and the student athlete population. Smith, along with Senior Research Scientist Zibiao Guo, Ph.D., executed the validation work and initial testing, and at its peak the Center tested over 400 samples per week from members of the UTA population.

The pandemic has provided the basis for some of the center's immediate future research projects. Smith said the center is in the early stages of getting the technology established in the laboratory to perform next generation sequencing on the COVID-19 samples that they

identify in the UTA population. Ultimately, she hopes this next generation sequencing will help identify COVID-19 variants that may appear on campus.

The center plans to perform DNA sequencing on the genes reported to be involved in the body's response to infection for individuals who have consented to participate. Smith credits the center's Medical Director, Professor in Graduate Nursing, and Executive Director of Health Research Dr. Florence Haseltine, with guiding the center's research toward an understanding of COVID-19 susceptibility and severity, and particularly, COVID-19 "long-haulers."

"Florence is very interested in the effect of sex difference in human disease. She's very passionate, has a deep understanding of the whole clinical situation, and the impact that genomics has on what's happening within the body," Smith said. "There's been a lot of information that men are more susceptible to COVID-19 than women, and so we're looking for differences between men and women by doing whole exome sequencing on individuals that have tested positive. Trying to understand the genomics of what's happening hopefully ultimately leads to better treatment and possibly overcoming those impacts." ■

Mural outside the North Texas Genome Center created by UTA Art students in October 2020





Ph.D. student Zachary Martin, M.S., conducting research inside the Integrative Vascular Physiology Laboratory led by Dr. R. Matthew Brothers.



## DISMANTLING DISPARITIES

CONHI researchers investigate new ways to provide care for marginalized populations.

MIKE KUHNENBECK

**D**espite remarkable strides in health care research, the field is still beset by disparities that can endanger patients' lives. Researchers at the College of Nursing and Health Innovation are developing groundbreaking research aimed at improving health outcomes for marginalized populations.

Medical and technological progress has improved Americans' health and increased longevity over the last century, but as noted by the National Institute on Minority Health and Health Disparities (NIMHD), these advancements have not benefited everyone equally.

According to NIMHD, health disparities disproportionately affect "racial and ethnic minority populations, individuals of less privileged socioeconomic status (SES), underserved rural residents, sexual and gender minorities (SGMs), and any subpopulations that can be characterized by two or more of these descriptions."

The COVID-19 emergency highlighted disparities that existed long before the pandemic. By harnessing decades of professional and personal experience in various areas of expertise, CONHI researchers have focused their investigations on groups that have been historically overlooked or neglected in health care research.

Dr. Elizabeth Merwin is a principal investigator of the study "Re-



ducing Health Disparities in SMI, Rural, and Minority Populations,” sponsored by the NIMHD. The project is a continuation of an effort Dr. Merwin started at Duke University five years ago, before assuming her current role as Dean of CONHI on Feb. 1, 2019.

When people think of Medicare recipients, they usually think of people over the age of 65, but younger people with mental and physical disabilities are also eligible for Social Security benefits. Dr. Merwin and her team’s research examines recipients under 65 in addition to the more traditionally studied population to compare their outcomes.

“It will be useful to understand any disparities in outcomes for those involved,” Dr. Merwin said. “We’re hoping to figure out what works for different sub-populations and what doesn’t to better meet

**The COVID-19 emergency highlighted disparities that existed long before the pandemic. By harnessing decades of professional and personal experience in various areas of expertise, CONHI researchers have focused their investigations on groups that have been historically overlooked or neglected in health care research.**

people’s needs. We are examining health trajectories of mortality over a 15-year period as well as other health outcomes for rural residents, those with serious mental illness, minority populations, and the disabled within the Medicare population.”

As CONHI is both the nation’s largest public university nursing program and the largest producer of baccalaureate-prepared nurses in the Lone Star State, they are especially invested in strengthening connections between health providers, patients, and their communities.

As reported by *Becker’s Hospital Review*, over 120 rural hospitals have closed across the United States since 2010; Texas has suffered the highest number of these closures with at least 20 rural hospitals shutting down in the same period. Populations in rural communities tend to be older and more impoverished, and on average, the residents of these communities have greater health risks but fewer resources for medical care, causing them to travel longer distances to get the care they need.

“Hospitals in rural communities are important in providing health care and jobs,” Dr. Merwin said. “When hospitals close, it means people have to travel longer distances, which can delay emergency care and be a barrier to access to care. It is also difficult for providers to stay in rural communities.”

Dr. Jessica Smith, Assistant Professor in the Department of Undergraduate Nursing, told UTA’s student-run newspaper *The Shorthorn* last June that she worked as a registered nurse in a rural hospital until its

closure in 2015 and witnessed firsthand the impact on the community.

“It’s been an interest of mine to address the problem of rural hospital closure for not only the rural population and their health, but for the nursing workforce who lose their jobs,” Dr. Smith said.

Dr. Smith received a Center for Research & Scholarship Pilot Grant to compare rural nursing job trends and outcomes for rural communities with a hospital closure compared to those without a hospital closure and investigate “how nursing resources could be modified to result in safer care in rural communities” for patients and staff members.

The grant proposal, “Exploring the Impact of Hospital Closures on Rural Nurses and Residents in Texas,” was awarded a grant from the Texas Organization of Baccalaureate and Graduate Nursing Education. Dr. Smith, the project’s principal investigator, is working with project co-investigator Dr. Kyrach Brown, Assistant Professor in the Department of Kinesiology, with Dr. Merwin as senior mentor.

Dr. Brown’s work is focused on investigating maternal and infant health among racial minority women, such as diabetes in reproductive-age women. Dr. Brown is the director of the Maternal and Child Health Equity Lab, the primary focus of which to investigate “the individual, community, and systems-level factors that shape the health and birth outcomes of Black women across the life course.”

Dr. Brown’s research lab is investigating social and health system factors disproportionately impacting the birth outcomes and health of Black women by using community-based participatory methods, systems science, and secondary data analysis.

“Persistent racial and social inequities in maternal and child health remain a significant public health issue,” Dr. Brown said. “These inequities are driven largely by conditions in which women are born, grow, live, work, and age. Importantly, these conditions are created by structural forces such as systemic racism that manifest as policies and practices in social and health institutions. Black women, in particular, tend to experience higher rates of preventable chronic health conditions, maternal health complications, and adverse birth outcomes compared to other racial groups.”

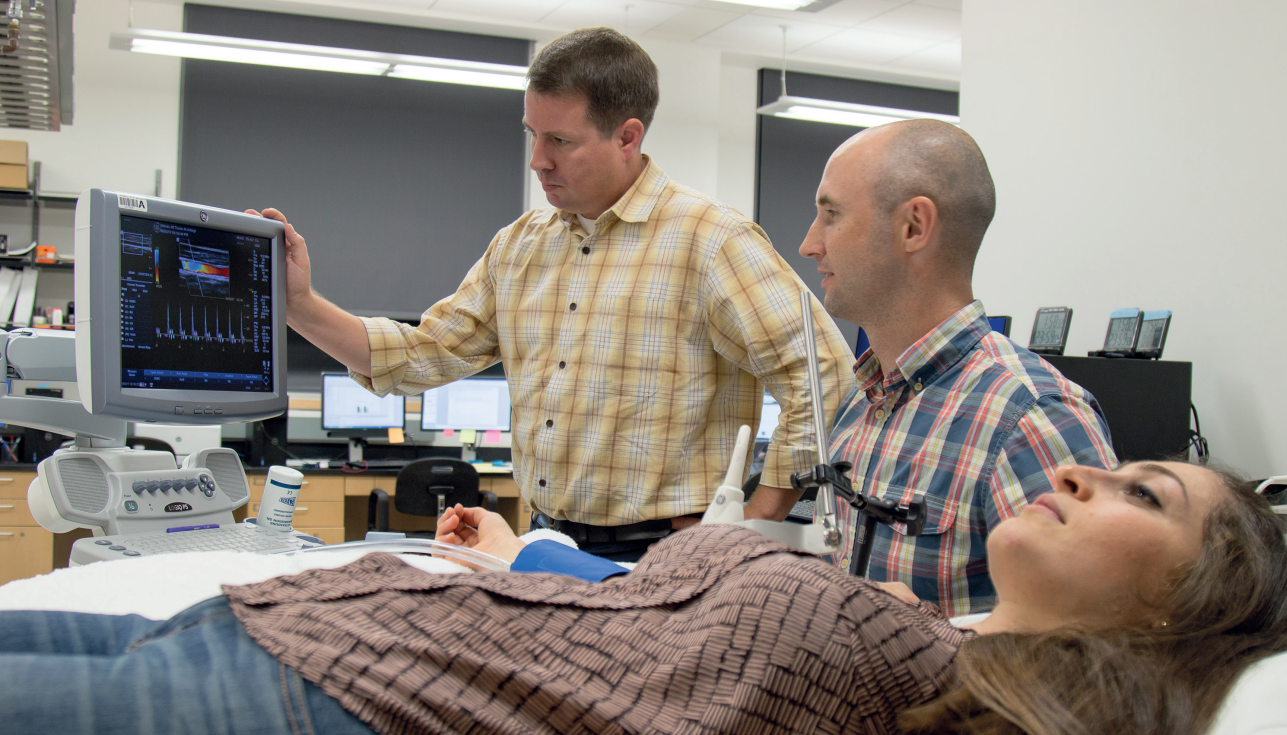
Historically, Black women have been left out of blood pressure research, which even in 2021 tends to primarily concentrate on men. Dr. R. Matthew Brothers, Associate Professor in Kinesiology and Lab Director for the Integrative Vascular Physiology Laboratory, said women in general and especially Black women have been understudied—a fact “that has been alarming to me and my colleagues,” he said.

To help fill the research gap, Dr. Brothers is working alongside Dr. Paul Fadel, Associate Dean for Research, and Dr. David Keller, Associate Dean and Chair for the Department of Kinesiology. The team is studying the neural and vascular mechanisms of elevated blood pressure and cardiovascular disease in Black women, with an emphasis on how alterations to blood pressure (using antioxidants and other interventions) affect its regulation and blood vessels’ ability to relax or dilate.

“The African American population always has the highest risk for cardiovascular diseases,” Dr. Brothers explained. “We’re moving to help the scientific community have a better understanding of why individuals are at risk.”

With Dr. Brothers serving as principal investigator, the research





Dr. R. Matthew Brothers and Dr. Jordan Patik are investigating mechanisms of impaired autonomic and vascular function in marginalized populations.

**“Hospitals in rural communities are important in providing health care and jobs. When hospitals close, it means people have to travel longer distances, and it’s difficult for providers to stay in rural communities.”**

**—Dean Elizabeth Merwin**

team received a National Institute of Health (NIH) R15 grant, examining “Vascular Mechanisms of Elevated Cardiovascular Disease Risk in African American Women,” and is recruiting research participants.

Dr. Tiffany Kindratt, Assistant Professor in the Kinesiology Department’s Public Health Program, is engaging in cutting-edge epidemiological research studies focused on Arab Americans. Dr. Kindratt examines factors such as how patient communication influences morbidity, mortality, and use of health services by utilizing big data methodologies.

In 2020, the *American Journal of Preventive Medicine* published an article by Nadia N. Abuelezam, Sc.D., who cites Kindratt’s scholarship in her explanation of the numerous reasons why Arab Americans may be at increased risk of COVID-19 infection, related complications, and even death.

According to Abuelezam, these factors include “exposure to xenophobia and stigma, pre-existing conditions, crowded living conditions, lack of social support for new immigrants, and poor adoption of prevention behavior.”

For example, the 2020 Census did not identify Arab Americans as a distinct racial and ethnic category. They are often asked to identify as white non-Hispanics, despite emerging evidence indicating they cannot be classified by traditional immigrant health patterns. The lack of a proper identifier to address Arab American individuals, which ignores the unique risks and factors regarding their health as a population, needs to be rectified.

Dr. Kindratt has said she hopes her work and that of fellow researchers will help Arab Americans be placed in their own category in the 2030 Census.

As Director of the Health Services Research Laboratory, one of Dr. Kindratt’s current projects includes research into the “Prevalence of Diagnosed and Undiagnosed Alzheimer’s Disease and Related Dementias among Arab Americans,” sponsored by the NIH and funded by the National Institute of Aging.

The COVID-19 crisis wears on amid other, decades-old health care challenges, and CONHI is continuing to break down barriers to help all members of future generations be treated with respect in health care settings. The breadth and variety of research being conducted at CONHI lives up to the spirit of the college’s vision statement of providing “innovative, exceptional education, research, and practice opportunities to those committed to advancing health and the human condition.”

“I’m very proud of our faculty,” Dr. Merwin said, “that they have chosen to focus on areas of health care that are so important to the quality of health care and reducing health disparities for vulnerable communities.” ■





## RESEARCH SPOTLIGHT

# REENVISIONING HEALTH EQUITY

BY AVERY GREGURICH

**T**hree faculty members in the College of Nursing and Health Innovation are pursuing new nursing research.

Dr. Kristin Hittle Gigli, Assistant Professor in Graduate Nursing, joined CONHI in the fall of 2020. Her work as a pediatric nurse practitioner influences her research, which examines pediatric hospital care, including the utilization of nurse practitioners in hospital-based care and the influence of health policy on the outcomes of hospitalized children.

Over the summer, Dr. Gigli plans to interview school principals, guidance counselors, and school nurses in Dallas and Tarrant County schools to learn about current practices related to screening for opioid use disorder, their processes for referral to treatment for opioid use disorder, and barriers and facilitators to these practices.

“All across the country, kids are having relatively similar experiences. In Texas, one in five kids uses opioids at some point, and if misuse doesn’t become addressed, it becomes addiction,” Dr. Gigli said. “This will be an opportunity to see how those policies might impact students in Texas. I hope this work will inform a larger study to better understand the barrier to adolescent opioid use disorder treatment.”

Dr. Jessica G. Smith, Assistant Professor in Undergraduate Nursing, has devoted significant effort to studying rural hospitals. Her re-

search works towards understanding the needs of the acute rural nursing workforce to deliver safer patient care and how work environment and processes influence nurse well-being. She is keenly interested in the effect of rural hospital closures on nurse job outcomes and the communities that they serve, and she is currently composing a quantitative survey for nurses across several hospital settings in the state.

“First my question is: What happens to nurses after their hospital closes? What percentage retire versus what percentage decide to leave the profession? Maybe they want to find a job in the area, or they are committed to nursing to the extent that they move and find a job in a similar area,” Dr. Smith said. “Then my question will be: What happens for the community outcomes? If they lose their nurses, if they don’t have local care, then what happens in these communities?”

Dr. Jaquetta Reeves, Assistant Professor in Graduate Nursing, joined CONHI in the spring of 2021. She has worked as a family nurse practitioner for nearly a decade, and her research addresses sexual health inequities and health disparities among minority populations who are understudied and underserved in sexual and reproductive health care.

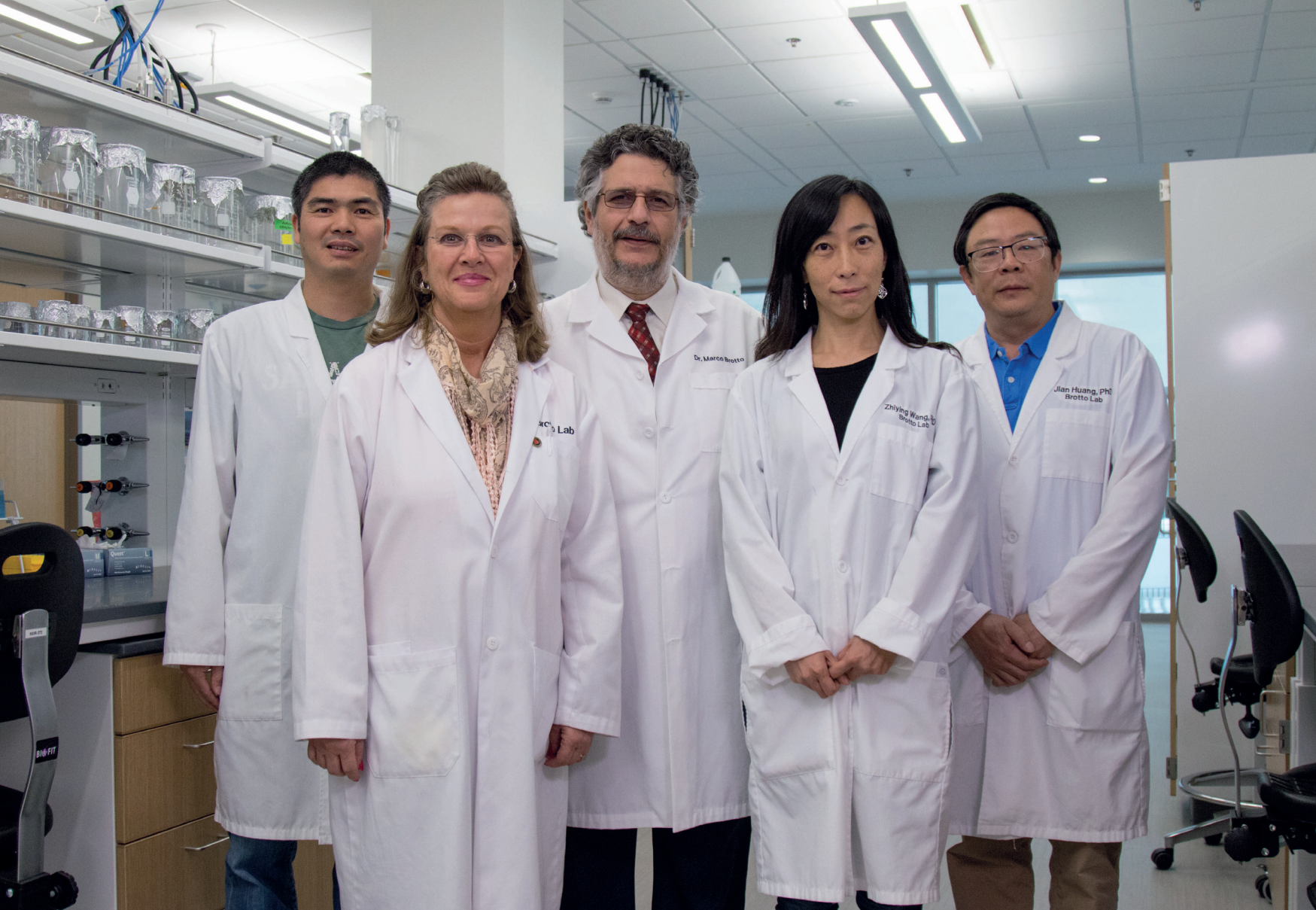
Since arriving at UTA, she has been working to form a strong community academic

partnership, both clinically and collaboratively, between the public health department and local community-based health care clinics in the area who are serving the underserved and underinsured patient population. She hopes to use these connections to strengthen her first research project, which will focus on helping identify facilitators and barriers to condom use among minority young women who have a history of having a repeated sexually transmitted infection.

“The spread of sexually transmitted infections has hit an all-time high, particularly among minority adolescents and young adults. I am targeting minority young women who have a history of recurrent sexually transmitted infections, which increases their risk for HIV infection and for infecting others.”

“(A qualitative study) tells you the story of their lived experience. It gives them an opportunity to share their life experience, which helps me to gain a better understanding of the internal and external factors that impact consistent condom use among this group of young women,” Dr. Reeves said. “Maybe it’s something we’re missing, maybe it’s something else that we need to learn from them that will help us be an even greater support and empower these young women to protect themselves from recurring STIs and risk for HIV infection.” ■





# STRENGTH IN NUMBERS

Collaboration is key to tackling the effects of aging in UTA's Bone-Muscle Research Center.

BY ROB CLINE

**W**hen it comes to addressing a complicated problem, attacking it from a single vantage point is seldom the most effective approach. That is certainly the case when it comes to treating—and perhaps preventing—declines in the body's musculoskeletal system related to aging.

The musculoskeletal (MSK) system is the largest system in the body and is made up of 208 bones, 650 muscles, around 1,300 tendons, and all of the vessels and nerves that allow the body to function. A system with that many essential components, each dependent on the other, is far too complex to study from a single point of view.

That is why the Bone-Muscle Research Center in the College of Nursing and Health Innovation is committed to a culture of collaboration. By bringing together applied, basic, translational, and clinical scientists with complementary expertise in various areas of the MSK system to work with chemists, engineers, and computational biologists, the Bone-Muscle Research Center pursues cures and innovations that can lead to longer, healthier living.

"An important notion I live by," says Dr. Marco Brotto, George & Mary Hazel Jay Endowed Professor and Director of the Bone-Muscle Research Center, "is that collaboration is better than competition. It really doesn't happen in a lot of places. A lot of places are so competitive



Dr. Chenglin Mo, Dr. Leticia Brotto, Dr. Marco Brotto, Dr. Zhiying “Carol” Wang, and Dr. Jian Huang (left to right)

that it hinders collaboration. Our spirit of true collaboration is so important.”

That said, Dr. Brotto is quick to point out that not all collaborative relationships are fruitful—especially if the members of the team are all inclined to look at problems the same way.

“You could have very homogenous people working together. People can sometimes start with the premise ‘Let’s collaborate, and let’s bring everybody that thinks like me to collaborate,’” he says with a laugh. “And then there is no real collaboration.”

According to Dr. Brotto, the center’s core team is built around a commitment to research focused on aging and related diseases and pathologies, but with a wide variety of specific expertise.

For example, among the researchers is the center’s Associate Director and Professor in Kinesiology, Dr. Jingsong Zhou, a leading expert in Amyotrophic Lateral Sclerosis (ALS) research.

“Dr. Zhou has made important discoveries related to skeletal muscle mitochondrial function in neuromuscular health and disease, particularly in ALS,” says Dr. Brotto. “Mitochondria are the powerhouses in our cells that produce energy. But the importance of her studies are far greater, because they also apply to aging research, which pulls all

of us at the BMRC closer together. Dr. Zhou and I have a joint grant from the National Institutes of Health (NIH) to study the mechanisms of ALS.”

Dr. Brotto cites the work of Dr. Zui Pan, who is an Associate Professor in Graduate Nursing and an expert in cancer biology, as another example of exciting and perhaps unexpected collaborative work.

“Someone might come to me and say, ‘What does that have to do with your research?’ But cancer is more common in aging,” explains Dr. Brotto. “And cancer cachexia (atrophy or wasting) is very similar to the muscle wasting we experience with aging. So we are untying the knot but looking from different points of view.”

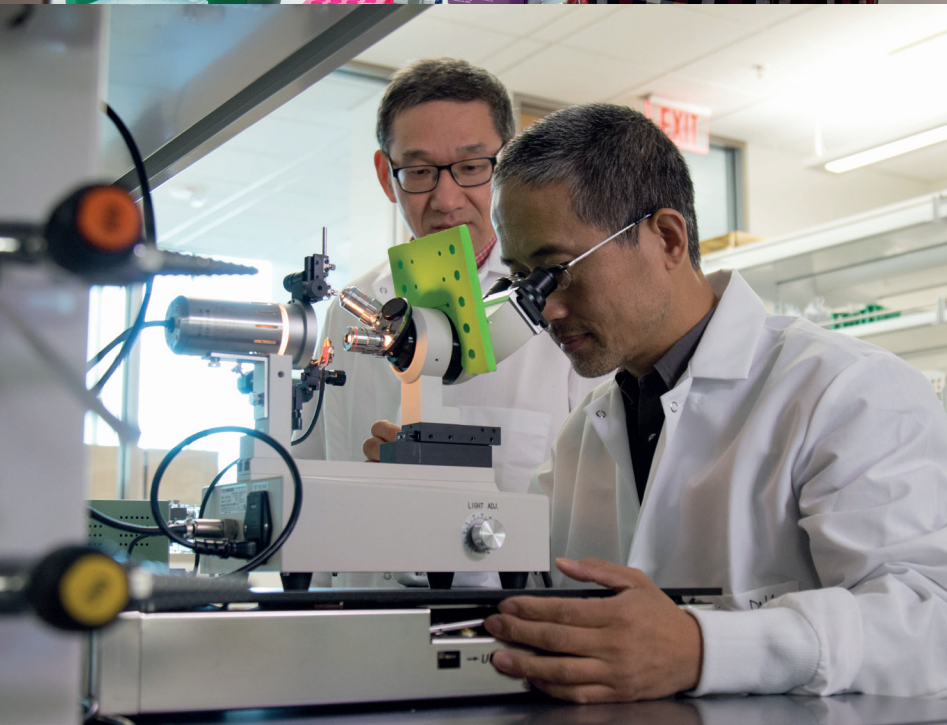
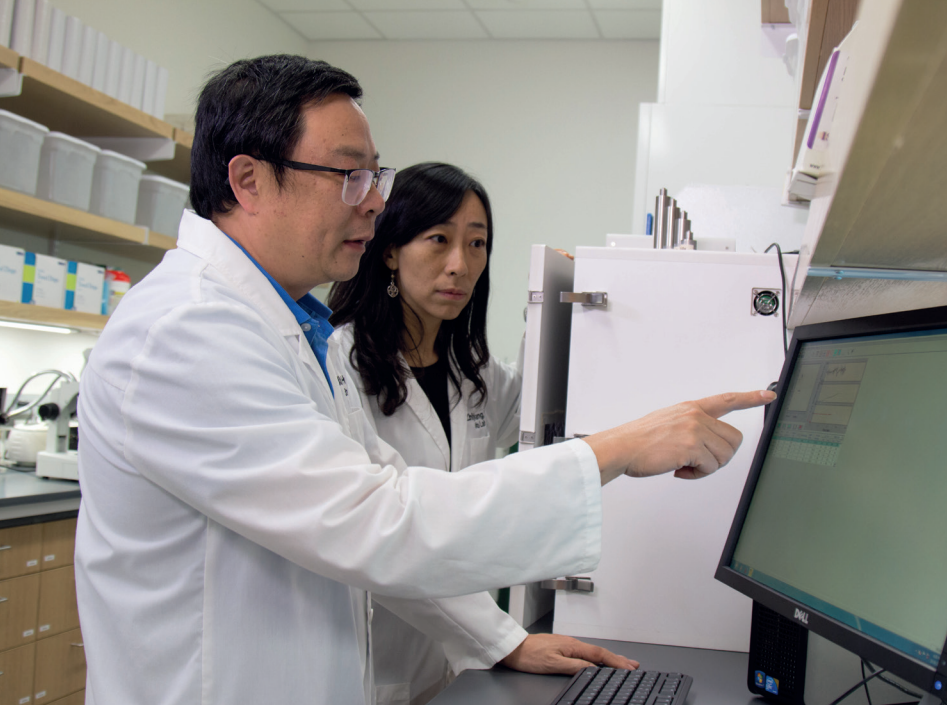
Dr. Brotto also points to the work of Dr. Rhonda Prisby, Professor in Kinesiology.

“She is looking at bone vasculature. What does that have to do with what we’re doing? Well, guess what? Bone vasculature is very important for studying osteoporosis and bone health.” He mentions her remarkable discovery of a blood particle that no one has previously described that is observed in both young and old rodents and humans. “Maybe this could be associated with calcification of arteries and vessels and maybe even cardiac diseases and bone diseases. And that maybe gets us

Sung Gi Noh, researcher in Dr. Rhonda Prisby’s lab







Top: Dr. Jian Huang and Dr. Zhiying "Carol" Wang, research scientists in the Dr. Marco Brotto Laboratory. Middle: Dr. Daniel Trott leads the Integrative Immunology Laboratory, which studies the link between aging and the immune system. Bottom: Lab manager Dr. Jianxun Yi and Dr. Xuejun Li, research scientists in the Neuromuscular Disease Laboratory led by Dr. Jingsong Zhou

to muscles as well."

Another example of the intersectional approach to researching issues related to aging is the work of Dr. Daniel Trott, Assistant Professor in Kinesiology, who Dr. Brotto

**"My vision is that we could evolve to become a research institute, and that some of our work leads to offshoots, companies, so that we are creating jobs and helping the economy. This is the economic branch of science. As long as you do it ethically, and as part of your mission, and to help people and the economy, I think these things are very important." —Dr. Marco Brotto**

calls a "rising star."

"His area is integrative immunology bringing together cardiac, muscle, and vascular study. What is he doing in the center? Well, immune cells are present in all of these tissues. There is a recent paper showing that if we exercise more, we have more T cells in our muscles. We don't know why, but maybe they become better sentinels or protect us from infection, for example. We know for sure that if we have more toned muscle mass, we are more resistant to certain infections. So you see how that integrates. I could never solve that part of the puzzle without Dr. Trott's work."

The work of the Bone-Muscle Research Center also includes designing and creating materials for the treatment of traumatic injuries involving tissue loss.

"For that, we needed a chemical engineer that makes biomaterials in our center," Dr. Brotto explained. "Dr. Venu Varanasi (Associate Professor in Graduate Nursing) makes new biomaterials that accelerate the healing of both bone and muscle. He's sort of a glue in between our projects, and already we have really interesting collaborations. We are testing some of these biomaterials in bone and muscle cells."

A collaboration of another kind also drives innovation in the Bone-Muscle Research Center. The center benefits from





Dr. Marco Brotto and Dr. Leticia Brotto

UTA's designation as a Shimadzu Research Institute.

"Shimadzu Corporation [is] the largest analytical chemistry company in the world, and they basically endowed UTA," Dr. Brotto said. "So everything that is created at Shimadzu, we have the same capacity at UTA. And we owe this to the incredible biochemists and the great tradition we have here. We saw in that a great opportunity to develop new analytic chemistry to create this new family of methods to look at new biomarkers for muscle diseases and for osteoporosis."

The robust collaborations cited so far are just the beginning. Dr. Brotto enthusiastically describes additional programs and researchers who contribute to the commitments to collaboration and innovation that are a hallmark of the Bone-Muscle Research Center.

"We have this highly integrated, multidisciplinary, complementary team. And then you add to that the Shimadzu Research Institute. But there's another component, too," he said. "On the first floor of our building is the Center for Translational Research, our cardiovascular center, which is all clinical human subject research. And we interact with them. And within that structure, you have the Kinesiology Program, and the wellness program, and a wellness center, and the exercise center. And then we are literally 30 minutes from UT Southwestern, where we have collaborations with some of the top cardiac researchers and exercise physiologists. They also have the Center for Translational Medicine funded by the NIH."

He sums it up: "It's more than an idea, what we've created here at UTA."

Over the course of his career, Dr. Brotto has become well known for his ability to build and sustain teams and relationships. Once he had been recruited to UTA, many of the researchers who followed were people who knew him and his reputation for creating an ethos of collaboration.

Funding from the National Institutes of Health—which in recent years has recognized the value of multiple researchers working collaboratively across research fields—also helps keep everyone involved in the collaboration working toward ambitious shared goals.

"We try to really push and motivate each other," Dr. Brotto says. "Our major goal now is to go after what are known as 'center grants.' And my vision is that we could evolve to become a research institute, and that some of our work leads to offshoots, companies, so that we are creating jobs and helping the economy. This is the economic branch of science. As long as you do it ethically, and as part of your mission, and to help people and the economy, I think these things are very important."

In the end, Dr. Brotto offers a succinct and simple reason why the work of the Bone-Muscle Research Center and all of its many collaborators is so important.

"Everybody's aging." ■



# CONHI Publications

FROM SEPT. 1, 2020 TO CURRENT

## KINESIOLOGY

### Ben Taleb, Ziyad

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Taleb, Z. B., Kalan, M. E., Bahelah, R., Boateng, G. O., Rahman, M., & Alshbool, F. Z. (2020). Vaping while high: Factors associated with vaping marijuana among youth in the United States. *Drug and Alcohol Dependence*, 217, 108290.

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Public Health faculty Dr. Ziyad Ben Taleb, Dr. Godfred Boateng, Dr. Tiffany Kindratt, and Dr. Erin Carlson (left to right) speak to crowd.

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### **Fadel, Paul**

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### **Greaney, Jody L.**

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Dr. Kyrrah Brown at podium, Maternal and Child Health Equity Lab





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#### **Brotto, Marco**

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#### **Cipher, Daisha**

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#### **Daniel, Kathryn M.**

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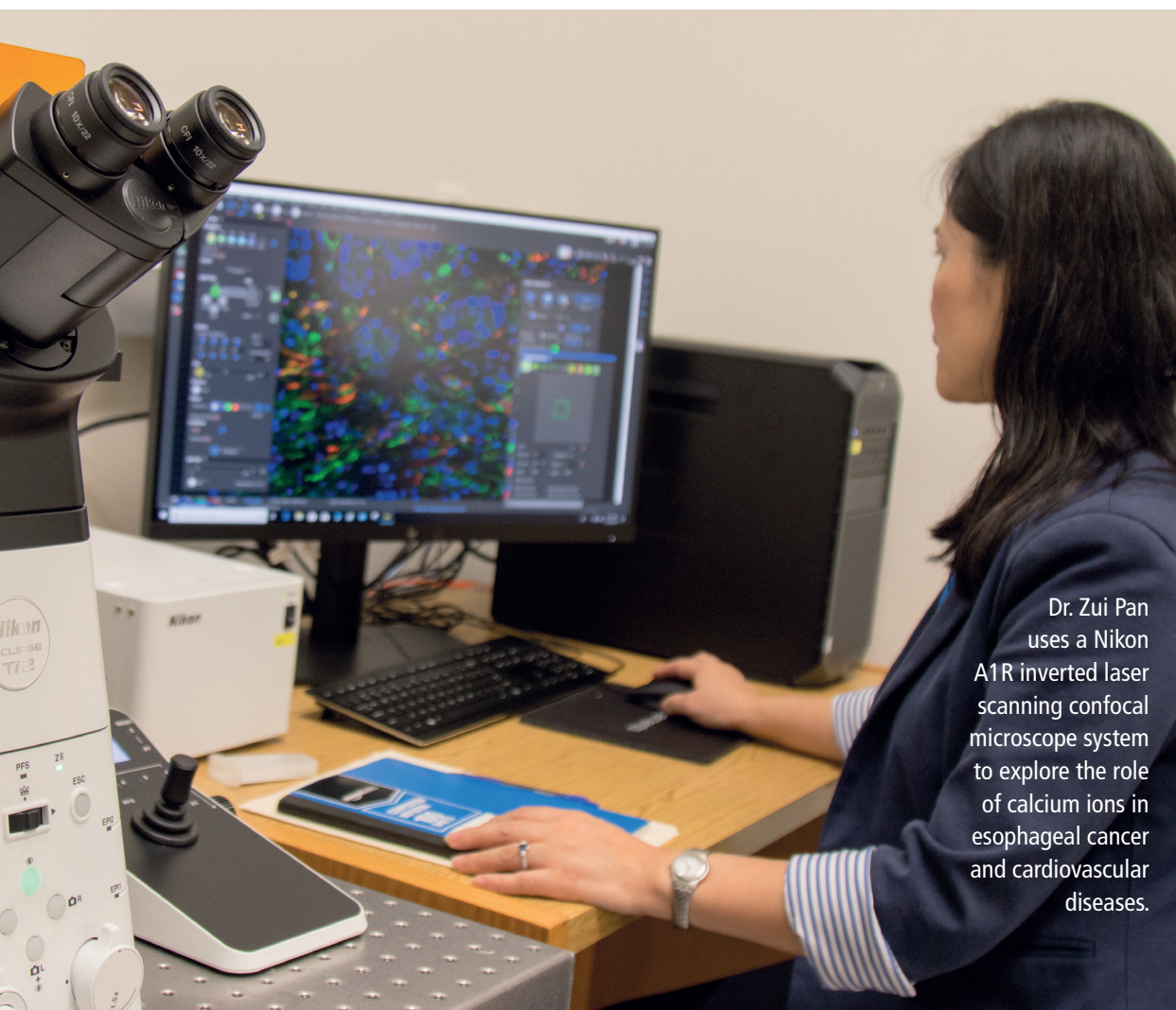
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Dr. Zui Pan uses a Nikon A1R inverted laser scanning confocal microscope system to explore the role of calcium ions in esophageal cancer and cardiovascular diseases.



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