Official Newsletter of the ***UTSA Brain Health Consortium***

BRAIN WAVES

Winter/Spring 2025

Message From BHC Director:

Dear Friends,

Here we are, already one month into 2025! As UTSA continues to grow its research enterprise, I'm excited to reflect on the Brain Health Consortium (BHC) progress and future opportunities.

Our faculty are driving transformative discoveries, from vascularizing brain organoid models to advance traumatic brain injury research to developing innovative behavior analysis techniques that support families affected by autism. With cutting-edge core facilities and new bioinformatics courses, we are equipping researchers with state-of-the-art tools to stay at the forefront of discovery in the era of big data. The upcoming merger with UT Health San Antonio will open new doors for collaboration with clinicians and clinician-scientists, accelerating the translation of research into real-world impact.

I'm also thrilled that brain health and trauma research has been selected for a cluster hire, further strengthening our interdisciplinary efforts and expanding our capabilities.

I welcome your questions and feedback and look forward to another year of groundbreaking innovation! As always, we are grateful for your support.

With warm regards,

Jenny Hsieh
Semmes Foundation Distinguished Chair in Cell Biology
Director, UTSA Brain Health Consortium

What's Inside

EVENTS AT A GLANCE...

Neuroscience Symposium Spring 2024 - Neurodevelopment

The Spring Neuroscience Symposium focused on "Neurodevelopment and Beyond: The Role of Epigenetics," hosted by Dr. Melanie Carless (NDRB-COS). This event was another outstanding example of how we support our UTSA ‘Runners while also drawing on the expertise of external collaborators. It provided a platform for engaging with our local community and strengthening connections with our sister institution, UTHSA. The symposium featured a range of compelling topics, sparking a dynamic Q&A session filled with fresh perspectives on the evolving field of epigenetics and its applications to existing research areas.

Neuroscience Symposium Fall 2024 - Basal Ganglia

For the Fall Neuroscience Symposium, we were privileged to attend a star-studded gathering centered around the basal ganglia, featuring some of the most influential experts in the field, hosted by Dr. Charles Wilson (NDRB-COS). The theme, “Neuronal Circuits of the Basal Ganglia,” offered a unique opportunity to explore the foundational research of this area and witness its evolution through the perspectives of pioneering scientists. Connecting with colleagues, both near and far, made the experience even more memorable.

MORE EVENTS...

BHC Dream Project Workshop

The BHC Dream Project Workshop was a fantastic success! We extend our sincere thanks to all who participated. Your contributions helped bring together diverse expertise, fostering interdisciplinary collaboration to explore key research areas and identify converging points for discussion and action. We look forward to announcing our next round of seed grant funding opportunities, incorporating feedback from our Dream Project Workshop to better support innovative and collaborative projects. Stay tuned for more details!

BRITE Workshop

The BRITE (Brain Health Institute for Teachers) Workshop is a pilot program designed to explore how scientific research can be effectively translated into teaching practice—and how educators can, in turn, inform researchers on the most impactful ways to apply their findings. This initiative aims to bridge the science-practice gap between research and education. The first workshop was a great success! Drs. Bonner (ILT-COEHD) and Wicha (NDRB-COS) now look forward to analyzing participant interviews, following up on implementation plans developed by attendees, and drafting ideas for future funding to sustain and expand their efforts.

Camp Durango

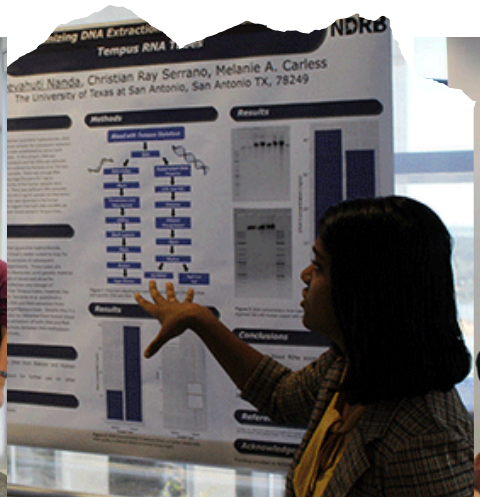
Camp Durango is an exciting, interactive research project led by faculty specializing in Applied Behavior Analysis (ABA) at the UTSA Downtown Campus. Held in the Durango Building, this six-week summer camp offers themed events and activities designed to support local families of children and young adults with diagnosed autism or those at risk. The program focuses on building communication and social skills through behavior analysis techniques, advancing our understanding of behavioral development, and exploring therapeutic approaches to support positive behavioral outcomes.

For more information, ways to support, and registration check out: https://www.abautsa.com/camp.html

Summer of STEM

Several BHC faculty participated in the second summer session of the Neuroscience, Developmental, and Regenerative Biology Pre-Freshman Research Experience (NPRE) program. This eight-week initiative provides high school seniors and incoming UTSA freshmen with hands-on STEM exposure, with generous support extended to several students from STEMSTART Enrichment, a local nonprofit dedicated to expanding opportunities for aspiring STEM students. Each participant is paired with a mentor and lab based on their interests, allowing them to explore topics of their choice. The program's overarching goal is to equip students with valuable insights and hands-on experience, preparing them for college-level coursework while building a strong foundation for their academic and professional careers.

To learn more, apply, or support check out: https://sciences.utsa.edu/ndrb/research/npre.html



TRANSDISCIPLINARY Research at UTSA

Stem Cells and Precision Medicine

Astrid Cardona, Molecular Microbiology and Immunology, COS

Dr. Cardona's research explores tissue damage mechanisms in Multiple Sclerosis and Diabetic Retinopathy, aiming to develop translational treatments. Her lab studies immune cell, microglia, neuron, and blood vessel interactions using mouse models, immunological assays, flow cytometry, FACS, microscopy, and molecular biology techniques to uncover disease mechanisms and potential therapies.

Website: https://sciences.utsa.edu/stceid/labs/astrid-cardona/

Neuroscience

Matthew Wanat, Neuroscience, Developmental and Regenerative Biology, COS

Dr. Wanat's lab investigates how stress and drug abuse impact motivation, learning, and decision-making. Using techniques like fast-scan cyclic voltammetry, electrophysiology, chemogenetics, optogenetics, and fiber photometry, they aim to identify and reverse neural adaptations linked to psychiatric disorders.

Website: https://www.wanatlab.org/

Neuroengineering

Gongchen Sun, Biomedical Engineering & Chemical Engineering, KCEID

Dr. Sun's group develops microdevices to study electrokinetics and transport phenomena in microscale, non-equilibrium systems. Using microfluidics, additive manufacturing, electrochemical techniques, and engineered living systems, they tackle challenges in biosensing, regenerative medicine, water treatment, and systems neuroscience.

Website: https://klesse.utsa.edu/faculty/profiles/sun-gongchen.html

Psychology and Learning

Kathy Ewoldt, Interdisciplinary Learning and Teaching, COEHD

Dr. Ewoldt researches special education interventions to enhance learning in inclusive settings. Her work focuses on teaching paragraph writing skills to students with learning disabilities and English learners, integrating technology in classrooms, and service animal policy. With seven years of secondary teaching experience, she has worked with culturally, linguistically and ability-diverse student populations in urban environments

Website: https://education.utsa.edu/faculty/profiles/ewoldt-kathy.html

Collaborative Research Efforts

TRAUMA RESEARCH AND COMBAT CASUALTY CARE COLLABORATIVE
An initiative of The University of Texas System

UT Health San Antonio
Military Health Institute

One of the ways BHC leverages the wealth of knowledge and expertise in our local community is through ongoing collaboration with UT Health San Antonio (UTHSA) and the Military Health Institute (MHI). Established in 2014, MHI aims to expand collaborations between UTHSA, the Department of Defense (DoD), and the Department of Veterans Affairs (VA). Endowed by the USAA Patty and Joe Robles, Jr. Endowment in Military Health, MHI supports faculty throughout the research process with the ultimate goal of improving services for service members, veterans, and their families. A key initiative within MHI is the newly funded Trauma Research and Combat Casualty Care Collaborative (TRC4), a UT System-wide trauma research consortium led by the UTHSA Department of Surgery. This collaborative effort focuses on advancing military health research and enhancing the readiness and care of service members. Key partners include the Army Institute of Surgical Research, 59th Medical Wing, Naval Medical Research Unit, and faculty from UTSA.

Two of our own faculty members, Dr. Jenny Hsieh (NDRB-COS) and Dr. Chia “George” Hsu (Kinesiology-HCAP), have received funding to contribute to TRC4’s mission:

Jenny Hsieh
NDRB, COS

The Hsieh lab will focus on traumatic brain injury (TBI) research. Since brain cell damage can continue for days or even weeks following a TBI, understanding how the brain responds during this critical period is essential. Her team aims to study these complex processes and test a novel therapeutic approach for TBI patients.

George Hsu
Kinesiology, HCAP

The Hsu team will explore ways to enhance muscle strength and reduce inflammation after an injury—common challenges affecting millions due to peripheral nerve damage. Their research will investigate the relationship between strength training and PDE10A inhibition, using a novel drug that targets PDE10A, an enzyme involved in exercise adaptation. Recent genetic studies have highlighted PDE10A’s crucial role in recovery, offering promising insights for future clinical trials.

These collaborations underscore our commitment to innovative research that directly impacts military and civilian health.

Postdoctoral Researcher

Q&A

Lorena Roa De La Cruz, Ph.D.

Dr. Lorena Roa De La Cruz (NDRB-COS), who recently completed her Ph.D. in Cell and Molecular Biology, is now working as a Postdoctoral Fellow in the lab of Dr. Lacy Barton (NDRB-COS), studying the the mechanisms of primordial germ cell migration to the somatic gonad in Drosophila melanogaster. The focus of her research is on mechanisms of spermatogonial stem cell development and the processes that maintain them. Her results show that spermatogonial stem cells arise from a predetermined subpopulation of dividing prospermatogonia during a narrow window in embryonic development.

Publications can be found in NIH's PubMed database under "Roa-De La Cruz L" with entries such as "The Mammalian Spermatogenesis Single-Cell Transcriptome, from Spermatogonial Stem Cells to Spermatids"

Tell us how you got involved in developmental and regenerative research?

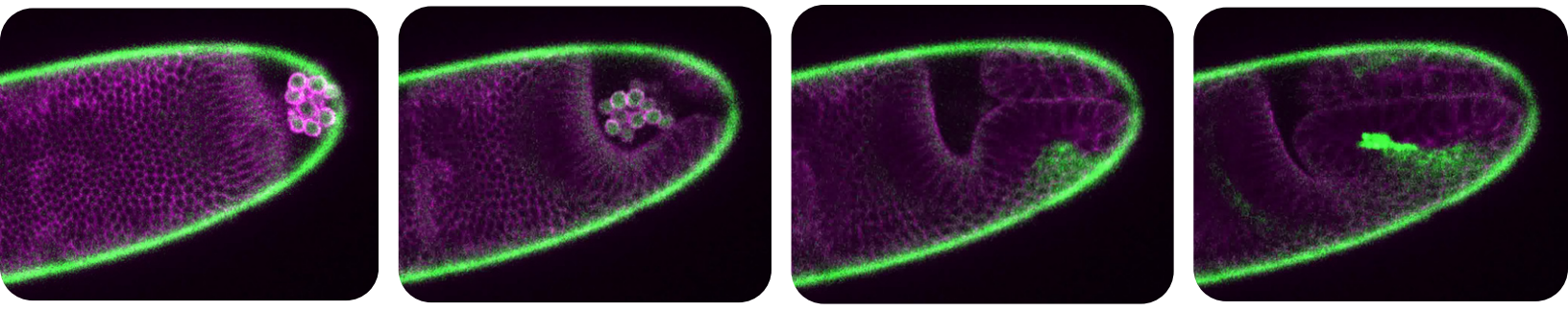
During my undergrad and master's studies, I focused on cancer research. Reading papers by my future PhD mentor, Dr. Brian Hermann, revealed the complexity and potential of Spermatogonial Stem Cells in regenerative treatments. I joined his lab for my PhD, then continued in reproductive biology after completing my degree. In January 2022, I expanded my expertise by working with Drosophila melanogaster in Dr. Lacy Barton's lab.

What advice would you give a PhD student in their final years?

Staying focused, seeking mentorship, building a support system, and prioritizing self-care. In my last year, I learned that time management is crucial for the final push in research. My current mentor, Dr. Lacy Barton, taught me the value of a strategic plan each semester—setting targets, tracking weekly progress, and staying focused on the big picture while taking concrete steps to meet goals.

What advice would you give to other new Postdocs?

Network, collaborate, and leverage your respective postdoctoral organizations. Make sure to set some career goals at the beginning of your postdoc, work towards them, but always embrace new opportunities for growth. Attend a broad range of seminars and workshops to get a more expansive view of research and career options.



SPOTLIGHT On Student Research

Christian Cruz,

BS Bioengineering and Biomedical Engineering

Masters Student

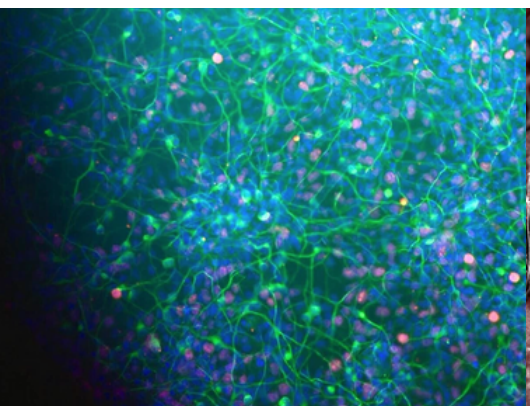
Christian Cruz, a recent Biomedical Engineering graduate, has embarked on his Master's degree to further enhance his expertise in the field. As an NSF BRAVe fellow, he conducted undergraduate research on vascularizing brain models, collaborating with his co-mentor, Dr. Eric Brey (BME - KCEID).

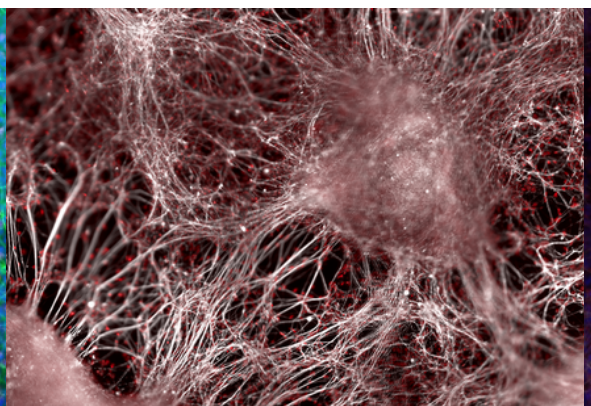
His current research is multifaceted:

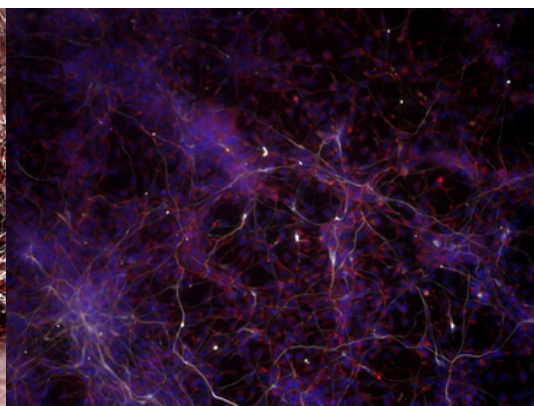
- Vascular Engineering Research: Christian is exploring the angiogenic properties of forskolin-loaded nanoparticles on Human Umbilical Endothelial Cells (HUVECs). Forskolin, a plant-derived supplement traditionally used for treating asthma, heart disease, and respiratory disorders, has shown potential for promoting new blood vessel growth. His goal is to uncover the mechanisms behind this process and explore its medical and therapeutic applications.
- Trauma Research & AI Integration: Christian is also working with Dr. Amina Qutub (BME - KCEID) as part of a trauma research team on two key projects:
  - REMEDY (Identification and Remediation of Delays to Definitive Care of Critically Injured Patients in the Texas Trauma System)
  - ACT (Advances in AI to Improve Care for Trauma)

These projects leverage AI and data visualization to identify delays in trauma treatment and optimize patient recovery across Texas.

As he advances in his career as a budding AI Engineer, Christian is expanding his expertise beyond traditional wet lab techniques. His post-graduation goal is to transition into medical imaging, applying AI and computer vision to enhance diagnostic image analysis.







Student Awards Announcements

Congratulations to outstanding students securing individual funding!

Zacharie Maloney - Biomedical Engineering Ph.D. Student

American Heart Association Pre-doctoral Fellowship - Human cortical organoids as a cellular readout for post-stroke neurogenesis and angiogenesis

The American Heart Association (AHA) Predoctoral Fellowship supports promising students in predoctoral or clinical health professional degree programs who aspire to become scientists, physician-scientists, or clinician-scientists. While AHA is often associated with cardiovascular research, its scope also includes the cerebrovascular system. As a fellowship recipient, Zach plans to utilize human cortical organoids to study neuroplastic and angiogenic responses following ischemic stroke in the motor cortex. By applying organoids in this way, he can observe brain tissue responses and uncover the body's natural healing mechanisms, offering valuable insights into stroke recovery and potential therapeutic approaches.

Yanesa Vitela - BS Health, Aging, and Society Undergraduate Student

NIH Diversity Supplement - Role of ARX Mutations in Marmoset Brain Organoids

The primary objective of Yanesa's project is to assess the neurodevelopmental impact of ARX mutations in specific cell populations involved in generating epileptic activity in the brain. She will contribute to developing models of neuron development and interneuron migration. These models have the potential for broad applications in studying age-related brain disorders, including Alzheimer's disease, stroke, and other conditions influenced by genetics, environment, and time. Her research aims to provide deeper insights into the mechanisms underlying these disorders and inform future therapeutic strategies.

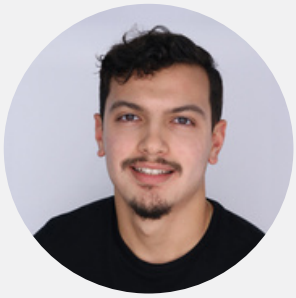
Diana Perez - BS Neuroscience Undergraduate Student

American Epilepsy Society BRIDGE Internship - Uncovering the role of TIMP3 in pro-epileptic aberrant neurogenesis

Neuron growth (neurogenesis) continues throughout our lifetime, and Diana is investigating how this process is affected by injury, seizures, and conditions like epilepsy. Building on previous findings that link specific genes to abnormal neurogenesis, she will use a combination of organoids and stem cells to study the function of TIMP3, a gene that encodes proteins involved in cellular breakdown. Her research aims to deepen our understanding of the mechanisms driving abnormal neurogenesis, potentially leading to targeted therapeutic strategies that selectively address abnormal neuron growth while preserving healthy brain function.

Brandon Garcia - Neuroscience Ph.D. Student

NSF Graduate Research Fellowship - The Role of Midbrain Astrocytes During Aversive Situations



Avoiding aversive stimuli is a fundamental survival skill across species. While previous research has shown that dopamine neurons in the ventral tegmental area (VTA) play a critical role in avoidance learning, growing evidence suggests that astrocyte-neuron interactions also contribute significantly to this process. Brandon's project aims to investigate how astrocytes in the VTA regulate dopamine transmission and active avoidance learning. By altering calcium levels, he will be able to observe changes in astrocyte-neuron interactions and their impact on cellular function, providing deeper insights into the mechanisms underlying learning and behavior.

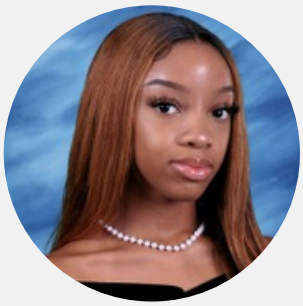
Ryan Wood - Neuroscience Ph.D. Student

NIH - F31 Grant - Investigating alterations in gustatory neuron innervation and function over the course of chemotherapy treatment

Many common chemotherapeutic treatments disrupt the sense of taste, leading to loss of appetite, nutritional imbalances, and reduced quality of life—especially when taste loss persists beyond treatment. While previous research has primarily focused on taste receptor cells (TRCs), effective taste signaling also depends on the interaction between TRCs and the gustatory nerve fibers that innervate them. Ryan aims to further investigate the impact of chemotherapy on gustatory nerve fibers and explore strategies to re-establish their connections with companion nerve cells. His research seeks to deepen our understanding of taste restoration mechanisms, ultimately improving recovery and quality of life for chemotherapy patients.

Taquoia Green - BS Biochemistry Undergraduate Student

NIH Diversity Supplement - Spatial transcriptomics analyses of marmoset germline development



A major challenge in developing effective neurological treatments is the difficulty of translating scientific discoveries from rodent models to humans. To bridge this critical gap, Taquoia's research will utilize advanced tools, including pluripotent stem cells, CRISPR/Cas9 gene editing, male germline modifications, 3D organoid models, and marmoset tissue-derived systems. By developing a marmoset model system that more accurately represents human neurobiology, the aim is to gain deeper insights into the causes of neurological disorders (Alzheimer's, Epilepsy etc.) and explore potential treatment strategies.

By the numbers

Taking into account the contribution of our amazing student researchers, combined with the hard work our Faculty continually display, the BHC is able to grow each year.

BHC	Proposals	Awards	Expenses	Publications
FY23	80 total: $66.2M	**19 total: $4.9M**	$4.4M	**323**
FY24	104 total: $71.5M	**18 total: $4.6M**	$6.9M	**378**

BHC Faculty In the Press

Here, we highlight selected manuscripts by our members.

Communication is at the heart of scientific advancement and innovation. ***For 2024 coming into 2025, the BHC count for total unique publications stands at 378 and rising.*** *Our goal to further contribute to the understanding of the inner workings of the brain remains strong and we will continue to share discoveries and ask questions.*

Humberto Pena - Asst. Prof. of Research - Edu. Psych. - COEHD

Using Video-Based Instruction to Increase Employment-Related Social Behaviors for College Students with Intellectual and Developmental Disabilities.
By: Humberto Peña Jr, Carly Blustein Gilson, Dongjin Kwon, Luis Morissette, Zoey Du.
Journal of Inclusive Postsecondary Education Vol 5 No. 2 (2024)

https://journals.gmu.edu/index.php/jipe/article/view/3492

Lindsey Macpherson - Assoc. Prof. - NDRB - COS

Give-and-take of gustation: the interplay between gustatory neurons and taste buds.
By: Landon SM, Baker K, Macpherson LJ.
Chem Senses. 2024 Jan 1;49:bjae029. doi: 10.1093/chemse/bjae029. PMID: 39078723; PMCID: PMC11315769.

https://doi.org/10.1093/chemse/bjae029

Adel Alaeddini - Prof. - Mech. Eng. - KCEID

Evaluation and improvement of student learning experience in the post-COVID world: A lean six-sigma DMAIC study
By: Mike C Chang, Syed Hasib Akhter Faruqui, Adel Alaeddini, Hung-da Wan
International Journal of Mechanical Engineering Vol 52 Iss. 3, 315-335.

https://journals.sagepub.com/doi/full/10.1177/03064190231192853

New Academic Offerings:

The NDRB Dept. is now offering a concentration in developmental and regenerative sciences within the B.S. in Biology degree. This new concentration serves to further strengthen the foundational knowledge of students to help them become more rigorous, well-informed researchers.

Faculty and students in the areas of Developmental and Regenerative Sciences study a wide range of questions relating to stem cells, cancer and cell cycle regulation, tissue regeneration, epigenetic regulation of cell fate and function, gene expression, fertility, and "Disease-in-a-Dish" models, including “organoid” systems. State-of-the-art technologies include genomics, epigenomics, proteomics, cell sorting, and cell imaging. A wide range of lecture and laboratory courses are available to undergraduate students in Developmental and Regenerative Biology, along with opportunities for seminar classes, independent study, and directed research.

Many of our faculty and students are associated with UTSA’s Institute of Regenerative Medicine, a joint collaborative initiative between UTSA’s Klesse College of Engineering and Integrated Design and the College of Sciences, and multiple research institutions in San Antonio. Undergraduate students with interests in Developmental and Regenerative Biology are encouraged to attend a weekly Developmental and Regenerative seminar series that frequently highlights research in this area.

In addition to standard core courses and other classes of interest the concentration provides a broad approach by covering the following courses:

NDRB 3913	Molecular Biology
NDRB 4132	Developmental Biology Laboratory
NDRB 4143	Developmental Biology
Select two of the following:	
NDRB 3663	Human Embryology
NDRB 3813	Cell Biology
NDRB 3993	Principles of Cancer Biology
NDRB 4153	Frontiers in Human Pluripotent Stem Cells
NDRB 4163	Epigenetics
NDRB 4173	Genomics and Bioinformatics
NDRB 4483	Developmental Neuroscience
NDRB 4913	Independent Study (must be DRS-related topic)
NDRB 4923	Laboratory Research (must be performed in a laboratory engaged in DRS-based research)
NDRB 4953	Special Studies (must be DRS-related topic)
NDRB 4993	Directed Research (must be DRS-related research)
Total Credit Hours	

FEATURED CORE

Kleberg Advanced Microscopy Center

The Kleberg Advanced Microscopy Center (KAMC) core is an open access facility that provides state-of-the-art technology in electron microscopy and advanced material characterization to support world-class research in nanotechnology, biology, chemistry, and materials sciences. The Center features world-class instrumentation, including Helenita – the first aberration-corrected electron microscope installed in the United States that can see and chemically identify individual atoms, a Focused Ion Beam (FIB) instrument for TEM sample preparation, and 3-D imaging & chemical mapping via serial slicing and various SEMs. KAMC also supports analytical studies and characterization of nanoscale systems via high-resolution, multi-functional X-ray diffraction Spectroscopy (Panalytical Empyrean), Raman Spectroscopy, as well as Atomic Force Microscopes.

User Support Services

Our Core Provides The Following Resources:

- Gatan Microscopy Suite software (GMS 3)
- JEMS for image and electron diffraction simulations
- ImageJ (Fiji) and ASTAR for orientation mapping
- ICDD diffraction databse
- Dragonfly for XRD analysis
- 3-D imaging & chemical mapping via serial slicing and various SEMs

Contacts:

Research Core Director

Ana Stevanovic, Ph.D.
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kamc@utsa.edu

We train researchers on our electron microscopes and other advanced equipment, with the specific goal of producing materials scientists capable of leading analytical and imaging laboratories across the country. Industry users access KAMC facilities for corporate R&D development of micro-electro-mechanical systems, nano-sensors, semiconductors, aerospace, energy, catalysis, and life sciences.

For more information on this core and others please visit us at:
https://research.utsa.edu/cores/KAMC/

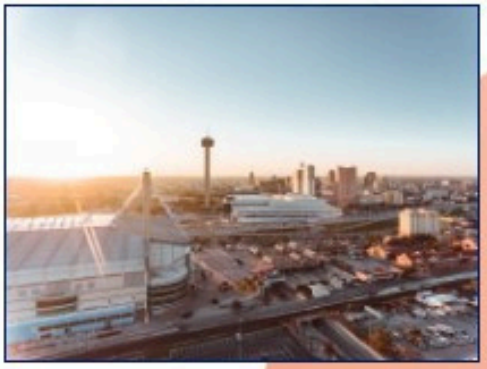
The University of Texas at San Antonio™

Cluster Hire for Associate/Full Professors in Brain Health and Trauma Research

The University of Texas at San Antonio (UTSA), a Carnegie R1, Hispanic serving institution, invites applications for Associate and/or Full Professors, to be appointed as **University of Texas System (UT System) Research Excellence Regents' Associate/Full Professor.** Five faculty hires will be made, and successful candidates will be part of a strategic cluster hiring initiative focused **on Brain Health and Trauma Research** at UTSA with an anticipated start date in the Fall of the 2025-26 academic year. Successful candidates will be hired across one or more of the following departments: Neuroscience, Developmental and Regenerative Biology, Psychology, Public Health, Biomedical and Chemical Engineering, and Educational Psychology in these key areas:

- **Neuroscientist** studying neurodevelopment, animal or human neuroscience
- **Clinical Psychologist** performing research with children or adults conducting preventative interventions, clinical trials, or longitudinal trials in trauma, PTSD, or TBI
- **Epidemiologist** or similar field within Public Health focusing on acute and long-term outcomes research in injury/trauma epidemiology or injury/trauma prevention/intervention
- **Biomedical Engineer** using approaches to promote brain health or trauma prevention/intervention
- **Behavior Analyst,** housed in Educational Psychology, who uses data science or AI methodology for assessment and treatment research focused on human or animal subjects

Candidates with expertise in brain health and trauma research beyond these areas are also encouraged to apply. **The position will remain open until filled, but for full consideration, apply by December 1, 2024, through this link: https://bit.ly/3zUK2lI** Contact Jenny Hsieh (jenny.hsieh@utsa.edu) for more information.



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The Mindfull Foundation
The Perry & Ruby Stevens Charitable Foundation
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CONTACT US!

We want to hear from you if you have general questions or awards, publications, or news to highlight

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