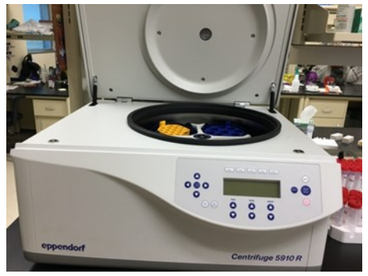
Leica Tissue Processor

Tissue-Tek TEC Embedding Center

PCR & QuantStudio qPCR System

Nano drop 8000



Eppendorf

For additional information, please contact

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Professor of Biology

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THE UNIVERSITY OF TEXAS PERMIAN BASIN

Biomedical Research Center

THE UNIVERSITY OF TEXAS PERMIAN BASIN

The Biomedical Research Center (BRC) focuses on areas of biomedical research such as cardiovascular disease, neuron-degenerative disease (Alzheimers disease, Amyotrophic Lateral Sclerosis (ALS), selective drug delivery mechanisms, CO releasing molecules as pharmaceutical drug systems, and biomedical analytics and statistics. The BRC is housed within the College of Arts and Sciences at UT Permian Basin where researchers have access to state of the art resources. The mission of the research center is to promote and support research capacity in the Permian Basin. In doing so, we can ensure the delivery of meaningful, and competitive research outcomes in the biomedical field while providing a robust atmosphere to train scientists, biomedical professionals, and a healthcare workforce for the region. In addition, the center will promote external collaborations with existing biomedical stakeholders throughout the Permian Basin.

BIOMEDICAL RESEARCH CENTER

RECENT ACOMPLISHMENTS AND RESEARCH PROJECTS

- Molecular and cellular mechanisms of heart disease, NIH funded $4,000,000
- Neurodegenerative diseases, especially Alzheimer's (AD) and Amyotrophic Lateral Sclerosis (ALS)
- Biomedical specialization in Predictive and Descriptive Analytics
- Therapeutic properties of carbon monoxide
- Drug-conjugated carboxyboranes that can release CO and potentially be used as a drug delivery system
- Xanthine oxidase inhibitors synthesis for treatment of gout disease
- Biomedical Analytics

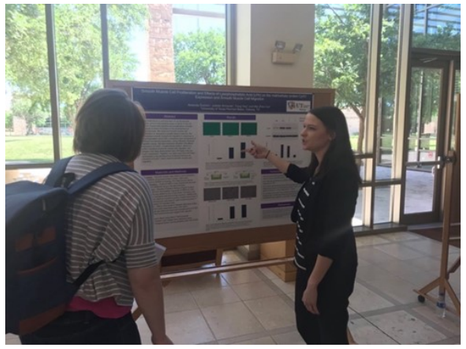
OUT- COMES

- Researchers will seek individual and collaborative external grants with the Center facilitating their research.
- Consulting services can be offered based on the expertise of the faculty and the demand.
- Organized training programs will be available for researchers and students.
- The BRC will provide education through research, training, and mentoring. Student research opportunities are available in biology & chemistry at both the undergraduate and graduate levels. The Center will help support RAs for the Masters in Biology with focus on the Biomedical Sciences.
- The UTPB Biomedical Research Center will provide support to students and faculty in performing research.
- The UTPB Biomedical Research Center will disseminate high quality research and grant deliverables.
- UTPB is the only four-year university in the Odessa/Midland area. This Center will greatly enhance the opportunity for students to engage in high-quality biomedical research and train in the field of health and research sciences.

FACILITIES

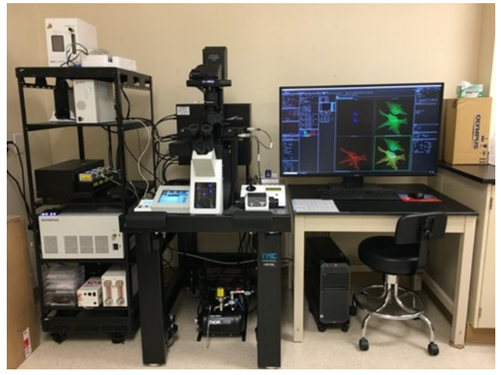
- Four newly remodeled laboratories in the Science and Technology building at UTPB
- Offices for faculty, staff, and students
- Animal facility - current facility for animals is in the ST building
- Biology common equipment room - a common room that houses or shared equipment such as ultracentrifuge, autoclave, cell sorter, Q-PCR equipment and fluorescence microscope, Confocal microscope and scanning electron microscope (SEM).
- Common equipment room in chemistry, ICP, IC, GCMS, AA, DSC, UV, IR,

Research Day, Biomedical Research Center



Research Presentation

Major Biomedical Research Equipment:



Olympus Confocal Microscope

Tissue Culture Incubator and Hood

Plate Reader

Beckman Ultracentrifuge

HM525 NX Cryostat

SUPPORT AND PROGRESS

- NIH—R01(HL153529), $1,936,792 (07/01/2020 –06/30/2024), Project Title: The Matricellular Protein Cyr61 Signaling Axis in Arterial Restenosis, Mei-Zhen Cui, PI, Xuemin Xu, Co- Investigator and John Garza, Co-Investigator.

- NIH - R01 (HL107466), $1,880,618 (07/01/2017 – 06/30/2021), (Direct cost: $1,279,332, F&A: $601,286). Project title: Novel mechanism mediating LPA-induced smooth muscle cell and vascular responses, Mei-Zhen Cui, PI, Xuemin Xu, Co-Investigator.

- Mei-Zhen Cui STARs fund ($500,000) from University of Texas System.

- R21NS095256 (From NIH) X. Xu (PI) 09/01/16–12/31/19 "Pathogenic Role of the Novel Mitochondrial Apoptotic Protein (PSAP) in ALS" The objective of this proposal is to determine the pathogenic role of a novel molecule, PSAP, in neurodegeneration in ALS.

- Xuemin Xu STARs fund ($500,000) from University of Texas System.

- T. Ayudhya rising STARs, University of Texas System (2019-2022, $300,000)

- T. Ayudhya Alaska INBRE Pilot Grant (2018-2019, $75,000)

- Innovate Award, UAA T. Ayudhya (2018, $10,000)

- Alaska INBRE Equipment Grant for NMR T. Ayudhya (2017, $180,000)

- Rising STARs Award (Univ of TX System) - Carbon Monoxide as Therapeutics: Dingra, N. $300,000 (2019-2022)
- Alaska INBRE Pilot Award (NIH) - Antineoplastic, Anti-inflammatory, and Hepatic Clearance Profiling of CORCB-1: Dingra, N. $75,000 (2018-2019)

- Dr. Cha Dong's medicinal chemistry laboratory is investigating the synthesis of Gout medicines. STARs fund $237000 from University of Texas Systems.

- K. Gandhi, P. Gutierrez, J. Garza, T. Gray-Walzo, R. Meiser, S. David, M. Carrillo, M. Narasimhan, M. Galloway, and G. Ventolini, Vaginal Lactobacillus species and inflammatory biomarkers in pregnancy. Minerva Ginecologica, (2020). DOI: 10.23736/s0026-4784.20.04566 -9 PMID: 32403915

- K. Gandhi, P. Gutierrez, J. Garza, R. Arispe, M. Galloway, and G. Ventolini. Lactobacillus species and inflammatory cytokine profile in the vaginal milieu of pre-menopausal and post- menopausal women. GREM-Gynecological and Reproductive Endocrinology & Metabolism. (2020)

- Dr. Rajalingam Dakshinamurthy, STARS Grant Biomedical, $140,000 (2020)

10 YEAR PLAN

Year 1-5

- Faculty researchers - starting up with five active researchers in the biomedical fields
- Graduate students - accommodate at least 10 researchers per year
- Undergraduate students - accommodate 15 to 20 students per year
- Postdoctoral fellows and visiting scholars - accommodate 3-5 per year by grant activity
- Speakers (external) - UTPB Biomedical Center invites speakers to disseminate advances in biomedical research
- Average $500,000 per year in grant awards
- Support degree programs (example - MS in biomedical sciences)

Year 5- 10

- Increase number of active researchers in the center by 50%
- Average $1,000,000 in grant dollars per year
- Increase graduate researchers to twenty per year
- Collaborate with R1 universities to host MD/PhD students for their research

CURRENT SUPPORTING PROGRAMS

- Biology B.S. and M.S. Biomedical Emphasis
- Chemistry B.S. Pre-professional Track
- Chemistry B.S. Biochemistry Track

INITIAL PERSONNEL

Theppawut Ayudhya, Ph.D.	Assistant Professor of Chemistry
Mei-Zhen Cui, Ph.D.	Professor of Biology, Co-director BRC
Nin Dingra, Ph.D.	Assistant Professor of Biochemistry
Cha Dong, Ph.D.	Assistant Professor of Chemistry
John Garza, Ph.D.	Assistant Professor of Mathematics
Xue Xu, Ph.D.	Professor of Biology, Director BRC
Scott McKay, Ph.D.	Dean of A&S, Professor of Chemistry
Milka Montes, Ph.D.	Associate Professor of Chemistry
Rajalingam Dakshinamurthy, Ph.D.	Professor of Biochemistry
Feng Hao, Ph.D.	Assistant Research Professor

COLLABORATION

UTPB Biomedical Research Center (UTPB BRC) seeks collaborations with universities, biomedical research centers, and government laboratories.

EXISTING ASSETS (estimated $10 million)

Six biomedical/medicinal faculty members
Four primary laboratories and several support laboratories
Administrative and university operational staff support
Extensive equipment

COSTS (Externally funded)

Limited operational costs recovered IDC university portion
Postdoctoral associates (grant funded)
Graduate research assistants (grant funded)
Undergraduate research assistants (grants and undergraduate resources)
Publication fees (grants funded)
Faculty release time stipends for summer (grant funded)

CURRENT RESEARCH

Dr. Mei-Zhen Cui's laboratory is focused on the molecular and cellular mechanisms of heart disease. Her laboratory integrates molecular, cellular, and genetic approaches to discover the mechanisms that control the progression of artery wall disease, which leads to heart disease and stroke. The research group was the first to reveal the possible link of oxidized low-density lipoprotein (oxLDL) and lysophospholipids to thrombosis (formation of a blood clot inside a blood vessel). Their research provided evidence that oxLDL and one type of lysophospholipids-lysophosphatidic acid (LPA) induce the expression of tissue factor, a blood clotting initiator. LPA is an active component of oxLDL. The research further uncovered LPA's influence on vascular disease with evidence that LPA induces expression of early growth response protein 1, Egr1, a key transcription factor that mediates a broad spectrum of vascular pathologies. The research team has recently discovered that the matricellular protein Cyr61(CCN1) is the key mediator for LPA-induced artery wall smooth muscle cell migration. The arterial smooth muscle cell migration from the tunica media to the intima represents one of the initial steps in development of arterial wall disease. Their work provided a new concept that the matricellular protein Cyr61 bridges the LPA signaling pathway with the integrin pathway, leading to arterial wall smooth muscle cell migration. These new discoveries, including the newly identified intracellular pathways and the related regulatory molecules, may serve as therapeutic targets for the prevention and treatment of heart disease and stroke. The recently funded studies by the National Institute of Health are based on these previous novel findings and new observations. The central goal of the proposal is to reveal the pathological role of lysolipid LPA in the development of atherosclerosis, a type of hardening of the arteries. Cardiovascular disease is the number one cause of death and disability in the United States. Understanding the basic mechanisms of atherosclerosis paves the way for new prevention and treatment approaches.

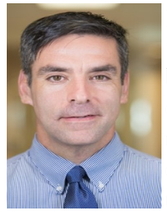
Dr. Xu's research laboratory focuses on the study of neurodegenerative diseases, especially Alzheimer's disease (AD) and amyotrophic lateral sclerosis (ALS). AD and ALS are both devastating neurodegenerative diseases for which there is currently no cure. AD and ALS are characterized by degeneration of select populations of neurons in certain regions of the brain and spinal cord, as well as the association of misfolded proteins that renders them neurotoxic and prone to aggregation.

The overall goal of our research is to understand the molecular mechanisms underlying AD, ALS, and related neurodegenerative diseases and identify novel therapeutic targets for the development of treatments and prevention of these diseases. In the course of our study, we have recently identified a novel molecule that plays a crucial role in the pathogenesis of ALS. Using our newly created mouse model, our current data demonstrated that inactivation of this particular gene greatly improved motor function and extended the lifespan of ALS model mice. Further development of this promising new line of research may lead to the identification of new therapeutic targets for the development of prevention and treatment of this devastating disease.

Dr. Nin Dingra's Research Lab is testing the therapeutic properties of carbon monoxide. Carbon monoxide has recently been found to be produced endogenously and act as a signaling molecule in the body. Studies of CO have shown anti-inflammatory, anti-apoptotic and other cytoprotective effects although the exact mechanism of CO action is not well understood. Due to its physiological importance, gaseous CO has been used as a therapeutic agent in medical applications. However, gaseous CO is not a desired long-term therapy due to the toxic effect of inhalation. Therefore, the discovery of new and diverse CO releasing molecules that are capable of releasing controlled amounts of CO in physiological conditions is highly sought after. We are interested in preparing novel molecules that release CO yet with low cellular toxicity. Our studies include determining the actions of newly discovered carbon monoxide releasing carboxyboranes (CORCBs) and their interactions with reactive oxygen species. We are also interested in elucidating how CO exerts its effect at the cellular level especially to the redox balance. We expect that the outcome of our research will contribute to the development of therapeutics for the treatment of human diseases, such as inflammation, cardiovascular disease and cancer.

Dr. Ayudhya's Research Lab aims at preparing drug-conjugated carboxyboranes that can release CO and potentially be used as a drug delivery system. Carboxyborane moiety is used to deactivate drug molecules and to target and release them at the site where they are needed which therefore will reduce unnecessary side effects. We have used drugs such as (Namenda: an Alzheimer's drug) and tamoxifen (Nolvadex: a breast cancer drug), on the carboxyborane moiety to prove this concept. We are working towards selective drug delivery to the disease sites.

Dr. Dong's research lab focuses on the design and synthesis of xanthine oxidase inhibitors for treatment of Gout disease. Approximately 8 million people in America are affected by gout., and Gout cases have been on the rise over the past two decades. The xanthine oxidase inhibitors (XOI) are small molecule drugs recommended in reducing the urate level to prevent gout attacks in adult patients. The current drugs either exhibit side effects or are very expensive. Cost-effective xanthine oxidase inhibitor design and synthesis are an important outcome from this research. The first and second generation of medicines available in North America, Asia, and Europe, are allopurinol and febuxostat respectively. The latter's price is $130/month with less side effect compared with $10/month for the former. While the third generation, FYX051(topiroxostat) is available in the Japanese medicine market and costs $150/month. It is desirable to design and synthesize inhibitors with less side-effect, less cost and higher efficacy.



Dr. John Garza's Research Lab

Dr. Garza is a mathematician supporting local medical researchers with statistics. His contributions have spanned the areas of microbiology, epidemiology, and health care analytics. His experience in abstract algebra and computer programming is helpful in applying advanced methods to medical research data sets. He is currently actively participating in many locally oriented research projects covering topics including Covid-19, Mental-Illness, Psoriasis, Multiple Sclerosis and women's health.

Specialization in Predictive and Descriptive Analytics
Permutation and Non Parametric Multivariate Analysis
Principle Coordinates Analysis
Principle Components Analysis
Linear Discriminant Analysis
Correlation Analysis
Logistics Regression