

Training Interdisciplinary Pharmacology Scientists (TIPS)

Program Director: **Carmen Dessauer**, PhD, Professor, Integrative Biology and Pharmacology,
The University of Texas Health Science Center at Houston

Program Co-Director: **Timothy Palzkill**, PhD, Professor and Chair, Pharmacology and
Chemical Biology, Baylor College of Medicine

<http://www.gulfcoastconsortia.org/home/training/pharmacological-science-tps/>

Meet the Trainees



Megan Fisher

Appointed November 1, 2024 – October 31, 2026

Cancer Biology Graduate Program, University of Texas Health Science Center at Houston (UTH)

Primary Mentor: Dr. Dung-Fang Lee, Integrative Biology and Pharmacology, UTH

Secondary Mentor: Dr. Xiaoqin Wu, Integrative Biology and Pharmacology, UTH

Decoding p53(R249S)-mutated Liver Cancer: from Developmental Origins to Targeted Therapies

Liver cancer is the sixth most prevalent cancer worldwide and the third leading cause of cancer-related mortality. Conventional treatments for early-stage disease have limited effectiveness, highlighting the need for more targeted and effective therapies. Recent advancements have identified the p53(R249S) mutation as a critical driver of hepatocellular carcinoma (HCC) development. However, most studies to date have been conducted in cancer cell lines harboring secondary genomic mutations, clouding our understanding of the cellular malfunctions directly triggered by mutant p53. To address this gap, our human pluripotent stem cell (hPSC) platform featuring the p53(R249S) mutation, free of secondary mutations, serves as a powerful model for investigating the oncogenic mechanisms of mutant p53 in HCC. Preliminary findings suggest a strong link between p53(R249S) and FOXM1, a transcription factor associated with poorer patient outcomes in HCC. As part of our pharmacological studies, we are evaluating thioistrepton, a selective FOXM1 inhibitor, for its therapeutic potential. Notably, our preliminary data demonstrates that thioistrepton selectively reduces cell viability in p53(R249S) mutant HCC cell lines, supporting the hypothesis that FOXM1 inhibition may serve as a promising precision therapy for p53-mutant liver cancer.



Jazmine Grant

Appointed November 1, 2025 – October 31, 2026

MD/PhD student in the Therapeutics and Pharmacology PhD Program, UTH

Primary Mentor: Dr. Xiaodong Cheng, Integrated Biology and Pharmacology (IBP), UTH

Secondary Mentor: Dr. Alex Gorfe, IBP, UTH

Discovery of Specific Pharmacological Probes for EPAC

The cAMP signaling pathway is a fundamental second messenger system that regulates many cellular and physiological processes. Exchange protein activated by cAMP (EPAC) has been recently discovered as a PKA-independent cAMP sensor that acts as a guanine exchange factor for the small GTPase family, Rap. Its distinct paralogs EPAC1 and EPAC2 have emerged as a promising therapeutic target for various diseases, including cancers, cardiovascular events, chronic pain, and infection. Despite this, few selective EPAC modulators are available, underscoring the need for novel compounds. The primary objective of my project is to identify paralog-specific small molecules that can aid in characterizing EPAC's physiological and pathological roles. Our innovative strategy of utilizing DNA-Encoded Libraries and in silico modeling will contribute to hit-to-lead development, elucidating protein-ligand interactions, conformational states, and allosteric binding pockets of selected compounds. In turn, targeting this pathway can result in beneficial therapeutic outcomes for various diseases.



Kathy Guerra

Appointed November 1, 2025 – October 31, 2026

Neuroscience Graduate Program, UTH

Primary Mentor: Dr. Alexis Bavencoff, Integrated Biology and Pharmacology (IBP), UTH

Secondary Mentor: Dr. Carmen Dessauer, IBP, UTH

Pharmacological Targeting of MIF Signaling to Alleviate Chronic Pain after Spinal Cord Injury

Chronic pain afflicts over 1 in 5 adults in the US. In addition to motor impairment, over half of patients with spinal cord injury (SCI) develop chronic pain that is resistant to existing therapies, including opioids. Despite extensive research, the mechanisms causing chronic pain after SCI remain poorly understood. Our lab focuses on understanding how inflammatory signaling shapes pain after injury, with particular emphasis on the role of Macrophage Migration Inhibitory Factor (MIF). MIF is an immune mediator that was shown to switch sensory neurons into an injury-related hyperexcitable state. This project aims to define how MIF and its receptors regulate neuronal excitability and impact pain behaviors following SCI. Using a combination of electrophysiology, behavioral testing, and pharmacological approaches, we plan to identify receptor-specific signaling pathways that can be targeted for therapeutic interventions. Importantly, we will test clinically relevant inhibitors to repurpose them and accelerate the development of new strategies.



Michael Lopez

Appointed November 1, 2024 – October 31, 2026

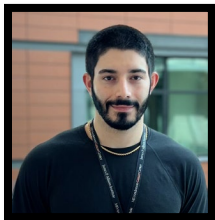
Chemical, Physical, and Structural Biology Graduate Program, Baylor College of Medicine (BCM)

Primary Mentor: Dr. Timothy Palzkill, Biochemistry and Molecular Pharmacology, BCM

Secondary Mentor: Dr. Mingxing Teng, Pathology and Immunology, BCM

Discovery of Novel Beta-Lactamase Inhibitors by Use of Covalent Warhead Libraries

Antibiotic resistance is a continually growing health crisis, responsible for increasingly severe mortality rates. My research focuses on combating this threat by developing novel inhibitors against KPC-2 and CTX-M-15, two of the most prevalent β -lactamases responsible for the deactivation of both front-line and last-resort antibiotics. By screening covalent warhead-linked compounds and conducting dose-dependence studies, I have identified 14 potential hits capable of enzymatic inhibition with increased specificity in ligand-target binding, showing minimal structural similarity to current inhibitors. Through kinetic analysis, I've been quantifying and refining hit efficacy, while also pursuing structural studies to elucidate enzyme-inhibitor interactions, both crucial steps in developing effective drugs to overcome enzyme-mediated resistance. My primary objectives are to identify safe and potent inhibitors and further optimize them using structure-activity relationship studies. The ultimate goal of this work is to contribute to the development of new therapeutic strategies to combat the rising threat of antibiotic-resistant infections caused by multidrug-resistant bacteria.



Mason Ruiz

Appointed November 1, 2025 – October 31, 2026

Therapeutics and Pharmacology Graduate Program, UTHealth Houston

Primary Mentor: Dr. Zhiqiang An, Institute of Molecular Medicine, UTHealth Houston

Secondary Mentor: Dr. Anil Sood, Gynecologic Oncology, UT MD Anderson Cancer Ctr

Targeting MSMP-Mediated Angiogenesis to Overcome Anti-VEGF Resistance in High-Grade Serous Ovarian Cancer

High-grade serous ovarian cancer (HGSC), the most lethal gynecologic malignancy, exhibits aggressive growth and frequent recurrence. HGSC tumors promote angiogenesis by upregulating vascular endothelial growth factor (VEGF) to sustain proliferation and metastasis. Although standard-of-care (SOC) therapy, including chemotherapy and anti-VEGF agents, provides initial benefit, resistance to VEGF blockade remains a major clinical challenge, with over 80% of patients relapsing. Targeting tumor-specific angiogenic drivers is therefore critical to achieving durable and effective therapies.

This project focuses on MSMP, a tumor-specific angiogenic protein implicated in VEGF-independent angiogenesis. We aim to develop anti-MSMP antibodies to be used as probes to investigate MSMP's biological function following VEGF inhibition. These antibodies will be tested *in vitro* and *in vivo* for mechanistic validation and therapeutic efficacy. This approach directly addresses VEGF resistance and seeks to advance anti-MSMP antibodies toward preclinical development to improve the durability, safety, and overall effectiveness of therapies for VEGF-refractory tumors.

The TIPS program is administered by the



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The GCC is a collaboration of:

Rice University

Baylor College of Medicine

University of Houston

University of Texas Health Science Center at Houston

University of Texas Medical Branch at Galveston

University of Texas MD Anderson Cancer Center

Institute of Biosciences & Technology at Texas A&M HSC

Houston Methodist Research Institute