



## Training in Precision Environmental Health Sciences (TPEHS)

### Program Director:

**Cheryl Walker**, PhD, Director, Center for Precision Environmental Health, Professor, Molecular & Cell Biology, and Medicine, Baylor College of Medicine

### Program Co-Directors:

**Richard Finnell**, PhD, Professor, Center for Precision Environmental Health, Baylor College of Medicine;

**Daniel Gorelick**, PhD, Associate Professor, Cellular & Molecular Biology, Baylor College of Medicine.

**Craig Hanis**, PhD, Professor, Epidemiology Human Genetics & Environmental Sciences, and Human Genetics Center, School of Public Health, UT Health Science Center at Houston; and

**Rui Chen**, PhD, Professor, Molecular and Human Genetics, Baylor College of Medicine

<http://www.gulfcoastconsortia.org/home/training/training-in-precision-environmental-health-sciences-tpehs/>

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## Meet the TPEHS Trainees

The following trainees are supported by T32ES01781, an NIEHS T32 program:



### **Joshua Marcus, PhD**

Appointed: January 1, 2022 – December 31, 2023 (Grant year 05)

Department of Molecular and Cellular Biology, Baylor College of Medicine

**Primary Mentor:** Dr. Jason Lee, MCB, BCM

**Secondary Mentor:** Dr. Daniel Gorelick, MCB, BCM

***Mechanisms of stress granule quality control by the endoplasmic reticulum in response to arsenite exposure***

Exposure to environmental contaminants disrupts normal physiological processes and negatively impacts human health. Cells respond to adverse environmental changes, such as arsenic exposure, through a program called the integrated stress response (ISR). One function of the ISR is to conserve energy by inhibiting bulk protein synthesis and sequestering mRNAs into inducible membrane-less organelles called stress granules. Membrane-less organelles are a new class of cellular compartments that allow separation of biomolecules without the need of a surrounding membrane. Stress granules form shortly after the onset of stress and disassemble after the stress has been cleared, but the quality control mechanisms that dictate the timing of these events remain unknown. Previous studies from the Lee Lab show that stress granules interact with the endoplasmic reticulum (ER). My initial experiments in the Lee Lab show that the timing of stress granule disassembly can be altered simply by changing ER morphology, suggesting that a specific domain of the ER plays a role in stress granule quality control. Understanding the mechanisms of these inducible organelles is crucial because defects in stress granule dynamics have been linked to neurodegenerative diseases such as amyotrophic lateral sclerosis, frontotemporal dementia, and Alzheimer's disease. My project will investigate inter-organelle contact sites between the ER and stress granules to elucidate the mechanisms of stress granule quality control. These studies will provide new insights into how membrane-bound organelles interact with membrane-less organelles to compartmentalize the cytoplasm in health and disease.



**Kenneth Andrew Trimmer, PhD**

Appointed: May 1, 2022 – April 30, 2024 (Grant year 05)

Program in Development Disease Models and Therapeutics, Baylor College of Medicine

**Primary Mentor:** Dr. Susan M. Rosenberg, MHG, BCM

**Secondary Mentor:** Dr. Cristian Coarfa, Molecular and Cellular Biology, BCM

***Identifying human proteins that protect the cell from DNA damage***

Cells are subject to an estimated 70000 DNA-damaging events every day, stemming from both internal and external sources. Although these events are usually repaired correctly, inefficient, or low-fidelity repair can lead to mutations. Mutation accumulation during aging causes loss of cellular function, thus increasing the risk of age-related diseases. Water

bears and stress resistant organisms possess proteins that protect them from damage. We have identified human proteins with shared biochemical and structural properties and used DNA damage markers that show them to reduce DNA damage when over-produced in human cells. The goal of this project is to determine what kinds of DNA damage are reduced and how these proteins reduce damage. Moreover, because the ultimate goal of preventing DNA damage is reducing the accumulation of mutations in cells, we will measure whether mutations are decreased by the over-production of the protein candidates to identify those that can maintain a low number of mutations. This project will provide valuable insight into disease development and open the door to new potential disease prevention strategies.

The TPEHS program is Administered by the:



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 Health Science Center*

*Houston Methodist Research Institute*