Gulf Coast Center for Precision Environmental Health

2022 ANNUAL RETREAT

Day 1: Thursday, May 5, 2022		
2:00 pm - 3:00 pm	**Registration, Check-in and Coffee**	Peacock Alley
3:00 pm - 4:00 pm	**Welcome and GC-CPEH Overview** (Cheryl Walker, BCM) - Welcome & Presentation, 50 min; Q&A, 10 min	Veranda
4:00 pm - 4:30 pm	**Member Presentation** (Shelly Buffington, UTMB) - Presentation, 20 min; Q&A, 10 min	Veranda
4:30 pm - 5:00 pm	**Member Presentation** (Kristi Whitworth, BCM) - Presentation, 20 min; Q&A, 10 min	Veranda
5:00 pm – 6:00 pm	**Reception** (**Poster set-up**)	Terrace
6:00 pm - 7:00 pm	**Dinner**	Terrace
7:00 pm - 7:30 pm	**Dessert and Keynote** (Stephen Linder, UTHealth)	Veranda
7:30 pm - 7:45 pm	**Wrap up** (Cheryl Walker)	Veranda

Day 2: Friday, May 6, 2022		
8:00 am – 9:00 am	**Continental Breakfast**	Terrace
9:00 am – 9:15 am	**Welcome and Overview of the Day** (Kees Elferink, UTMB)	Veranda
9:15 am – 9:45 am	**PIPELINE Facility Core** (Chris Amos, BCM) - Presentation, 20 min; Q&A, 10 min	Veranda
9:45 am – 10:15 am	**IHSFC** (Elaine Symanski, BCM) - Presentation, 20 min; Q&A, 10 min	Veranda
10:15 am – 10:45 am	**1st Breakout Session**	
	- FC Utilization (Core Directors and Navigators)	Veranda
	- FC Subsidy Program (Heyreoun An Han, BCM)	Veranda
	- Center Citation Table to get Raffle tickets	Terrace
	- **Poster viewing**	Terrace
	- **Mobi-COACH Showing**	Parking Lot
10:45 am – 11:00 am	**Break**	
11:00 am – 11:30 am	**Community Engagement Core** (Sharon Croisant, UTMB) - Presentation, 20 min; Q&A, 10 min	Veranda

Day 2: Friday, May 6, 2022		
11:30 am – 11:45 am	**Thematic Focus Areas** (Kees Elferink, UTMB)	Veranda
11:45 am - 12:15 pm	**2nd Breakout Session** - CEC interaction with Thematic Focus Areas (Croisant, Linder and Helmer)	Veranda
	- Strengthening Thematic Focus area interactions (Walker and Elferink)	Veranda
	- Center Citation Table to get Raffle tickets	Terrace
	- **Poster viewing**	Terrace
	- **Mobi-COACH Showing**	Parking Lot
12:15 pm – 1:15 pm	**Lunch**	Terrace
1:15 pm – 1:30 pm	**Pilot Project Program** (Kees Elferink, UTMB) - Presentation,10 min; Q&A, 5 min	Veranda
1:30 pm – 1:50 pm	**Pilot Awardee Presentation #1** (Drew Helmer, BCM) - Presentation,15 min; Q&A, 5 min	Veranda
1:50 pm – 2:10 pm	**Pilot Awardee Presentation #2** (Fernanda Laezza, UTMB) - Presentation,15 min; Q&A, 5 min	Veranda
2:10 pm – 2:30 pm	**Pilot Awardee Presentation #3** (Huan Meng, BCM) - Presentation,15 min; Q&A, 5 min	Veranda
2:30- pm – 2:45 pm	**Break**	
2:45- pm – 3:00 pm	**Career Development Program** (Elaine Symanski, BCM)	Veranda
3:00 pm - 3:30 pm	**LDP Presentation** (Zheng Sun, BCM) - Presentation, 20 min; Q&A, 10 min	Veranda
3:30 pm – 4:00 pm	**3rd Breakout Session**	
	- Pilot Project Program (Elferink, Whitworth, and Wright)	Veranda
	- Career Development Program (Symanski, and Walker)	Veranda
	- Center Citation Table to get Raffle tickets	Terrace
	- **Poster viewing**	Terrace
	- **Mobi-COACH Showing**	Parking Lot
4:00 pm – 4:30 pm	**Large Group Discussion** (Cheryl Walker, BCM) - Feedback from Breakout Sessions - Ideas for Center Future and Renewal	Veranda
4:30 pm - 5:30 pm	**Closing Reception / Raffle** (Cheryl Walker, BCM)	Terrace

DAY 1 SPEAKERS

MEMBER PRESENTATIONS

Shelly A. Buffington, PhD, Assistant Professor, Department of Neuroscience, Cell Biology, & Anatomy, Sealy Center for Microbiome Research, The University of Texas Medical Branch at Galveston, will present ***"Therapeutic targeting of the gut microbiome to modulate host brain function and behavior".***

Traditionally, neurodevelopmental disorders and the underlying pathology were exclusively attributed to variation in the human genome; however, it is becoming increasingly evident that the microbiome can likewise contribute to host brain and behavioral dysfunction. Microbiome-directed therapies are, accordingly, emerging as an exciting new avenue for ameliorating maladaptive behaviors associated with neurodevelopmental disorders. In recent work, we found that treatment with the commensal bacteria Limosilactobacillus reuteri rescues social dysfunction and related deficits in synaptic plasticity within the mesocorticolimbic dopaminergic reward circuit in both environmental and genetic preclinical mouse models for autism spectrum disorder and began to unravel the underlying mechanisms. Here, I will discuss these and our latest findings revealing the therapeutic utility of targeting the maternal gut microbiome to prevent adverse effects of maternal high-fat diet on descendant behavioral outcomes.

Kristina Walker Whitworth, PhD, MSPH, Associate Professor, Department of Medicine | Epidemiology & Population Sciences, Center for Precision Environmental Health, Baylor College of Medicine, will present "***Exploring Susceptible Windows of Exposure to Fine Particulate Matter on Fetal Growth in a Spanish Birth Cohort***".

Though prior research suggests an association between fine particulate matter exposure and fetal growth-related outcomes, few studies have explored temporally refined susceptible windows of exposure on fetal growth. This study used distributed lag non-linear models to fill this gap, using data from a large population-based prospective cohort study in Spain. This analysis not only provides evidence of specific weekly periods during pregnancy when fine particulate matter exposure may differentially affect fetal growth but provides evidence that such windows of vulnerability may be missed by using more traditional exposure metrics, such as those that are averaged across multi-week periods during gestation (e.g., trimesters).

KEYNOTE SPEAKER

Stephen H. Linder, PhD, UTHealth School of Public Health, Co-Director, Community Engagement, GC-CPEH, will present "***Mapping to guide public health decisions through the pandemic***".

Dr. Linder's team at the Institute for Health Policy mapped weekly COVID data over two years of the pandemic to help guide public health policy decisions by the Harris County Health Department and the County Commissioners Court. The information displayed in these maps changed as the County's needs changed and showcased the power of images in conveying the neighborhood-level impacts of COVID.

DAY 2 SPEAKERS

PILOT PROJECT AWARDEE PRESENTATIONS

Drew A. Helmer, MD, MS, Deputy Director, Center for Innovations in Quality, Effectiveness, and Safety (IQuESt), Michael E. DeBakey VA Medical Center; Professor of Medicine, Health Services Research, Baylor College of Medicine, will present "***Engaging Veterans in the Gulf Coast Community to advance Understanding of Military Exposure Research and Action Priorities (U-MERAP***)".

The U-MERAP pilot project brought together researchers, clinicians, and veterans to share knowledge and perspectives and better understand how toxic exposures affect veterans. We held a military exposure Science and Communities Interact (SCI) Café community event, interviewed veterans from multiple cohorts to better understand their perspectives on genomic testing for military exposure and identified key domains of coverage through a preliminary review of military exposure surveys. We present our findings to promote awareness of military exposure concerns and advance veteran-engaged research in this area.

Fernanda Laezza, MD, PhD, Professor & Graduate Program Director Department of Pharmacology & Toxicology, University of Texas Medical Branch, will present "***Neurotoxicity of deltamethrin in the developing brain***".

Dr. Laezza will present a novel, exciting results showing how early-life exposure to the commonly used pesticide, deltamethrin leads to cellular, circuital, and behavioral changes in the developing brain that are associated with multi-omics signatures.

Huan Meng, MB, PhD, Department of Molecular & Cellular Biology, Baylor College of Medicine, will present ***"'Steatogen' and transcriptional reprogramming of lipid metabolism in NAFLD"***.

Both environmental exposures to arsenic and consumption of high fructose sugary drinks are critical issues, and the most affected populations in Texas are located in the southern Gulf Coast area. This study aims to define how exposure to inorganic arsenic reprograms transcriptional activity and lipid metabolism to promote high fructose corn syrup (HFCS)-induced NAFLD using in vivo mouse models. We also aim to identify mechanistically how an endocrine-disrupting chemical (EDC) acts as "Steatogen" to synergistically adverse impact of sugary overnutrition on transcription and metabolism, enabling rational interventions for precision medicine.

LEADERSHIP DEVELPOMENT PROJECT PARTICIPANT (LDP) PRESENTATION

Zheng Sun, PhD, Associate Professor, Department of Medicine – Endocrinology & Department of Molecular and Cellular Biology, Baylor College of Medicine, will present ***"Circadian clock, dawn phenomenon, obesity paradox"***.

Hypothalamic circadian clock regulates the diurnal rhythm of liver glucose production and insulin sensitivity, which may underly the extended dawn phenomenon in type 2 diabetes when disrupted. Myocardial circadian clock malfunction leads to dilated cardiomyopathy and heart failure, which can be paradoxically ameliorated by obesity/systemic insulin resistance and is amenable to chronotherapy.

POSTER PRESENTATIONS: 001-003

001- Bruno Pedro Chumpitazi MD, MPH, Associate Professor, Baylor College of Medicine

Title: Microbial Fecal Multi'Omics Discriminates Fructan Sensitive from Fructan Tolerant Children with Irritable Bowel Syndrome

Dietary intolerance of fermentable carbohydrates such as fructans in children and adults with irritable bowel syndrome is common. Using microbial multi'omics (whole genome shotgun sequencing, metabolomics, lipidomics) we compared the fecal samples obtained during a randomized controlled trial of children with irritable bowel syndrome who were fructan sensitive (have increased abdominal pain when given fructans) vs. fructan tolerant. We identified over 300 features that distinguish the two groups with machine learning (Boruta Random Forest) discriminating the two groups with the area under the receiver operating curve value greater than 0.8.

002- Drew A. Helmer, MD, MS, Deputy Director, Center for Innovations in Quality, Effectiveness and Safety (IQuESt), Michael E. DeBakey VA Medical Center; Professor of Medicine, Health Services Research, Baylor College of Medicine

Title: Engaging Veterans in the Gulf Coast Community to advance Understanding of Military Exposure Research and Action Priorities (U-MERAP)

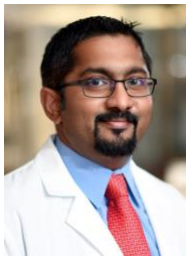
The U-MERAP pilot project brought together researchers, clinicians and veterans to share knowledge and perspectives and better understand how toxic exposures affect veterans. We held a military exposure Science and Communities Interact (SCI) Café community event, interviewed veterans from multiple cohorts to better understand their perspectives on genomic testing for military exposure, and identified key domains of coverage through a preliminary review of military exposure surveys. We present our findings here to promote awareness of military exposure concerns and advance veteran-engaged research in this area.

003- Yashoda Hosakote Madaiah, Department of Microbiology and Immunology, The University of Texas Medical Branch at Galveston

Title: HMGB1 activates tobacco smoke-suppressed innate antiviral response during respiratory syncytial virus infection

Exposure to tobacco smoke (TS), either direct or secondhand, is associated with an increase in the severity and frequency of lower respiratory tract infections, including bronchiolitis, mainly caused by respiratory syncytial virus (RSV). Although the pathogenic mechanism of TS-induced RSV severity remains largely unknown, lung immune and inflammatory responses are thought to play a major role in the outcome of the disease. Our studies showed that exposure to TS suppresses RSV-activated innate antiviral responses, resulting in an increased inflammation, and that treatment with recombinant HMGB1 significantly activated innate antiviral signaling and inhibited viral replication, and reduced TS exacerbated RSV-induced lung inflammatory responses.

POSTER PRESENTATIONS: 004-006



004 - Vaishnav Krishnan, MD, PhD, Assistant Professor of Neurology, Neuroscience and Psychiatry and Behavioral Sciences, Baylor College of Medicine; Adjunct Assistant Professor of Electrical and Computer Engineering, Rice University

Title: On the Digital Psychopharmacology of Antiseizure Medications

The ingestion of antiseizure medications (ASMs) during pregnancy is associated with an increased risk of pervasive neurodevelopmental consequences in offspring (intellectual disability, autism spectrum, attention deficit). In this study, we conduct instrumented home-cage monitoring in C57BL6/J mice to explore how pangestational fetal ASM exposures produce drug-specific and gender-specific alterations in the structure of home-cage behavior. Our results validate an approach that could be applied more broadly to the study of environmental contributors to altered neurodevelopmental trajectories, including fertilizer compounds, heavy metals and phthalates.

005 - Thomas F. Northrup, PhD, Associate Professor & Coordinator of Behavioral Science Training, Department of Family & Community Medicine, UTHealth

Title: Associations of Thirdhand Smoke Exposure with the Gut Microbiomes of Infants Hospitalized in a Neonatal Intensive Care Unit

Thirdhand smoke (THS) exposure was associated with differences in the gut microbiome of infants hospitalized in the neonatal ICU (NICU). Specifically, greater levels of THS-related variables were associated with reduced gut MB alpha diversity and variations across 7 of 8 taxa in a sample of vulnerable NICU infants. We also found that a tobacco-specific N-nitrosamine (NNK/NNAL) can be transmitted through breastmilk of mothers who smoke tobacco.

006 - William Russell, PhD, Associate Professor of Biochemistry and Molecular Biology UTMB Health

Title: A Mass Spectrometry Facility (MSF) at UTMB for Multi-omic Analysis

The UTMB MSF has assembled state-of-the-art instrumentation (upper right panel) and highly skilled technical staff to provide experimental capabilities required to support a broad range of molecular-level 'omics' research. This includes workflows developed within the MSF to provide multi-omic (proteomics, metabolomics, and lipidomics) analysis on single samples as outlined below.

POSTER PRESENTATIONS: 007-009

007 - Zheng Sun, PhD, Associate Professor, Department of Medicine – Endocrinology & Department of Molecular and Cellular Biology, Baylor College of Medicine

Title: Cross-generational and sex-specific metabolic effects of paternal exposure to inorganic arsenic

Inorganic arsenic has sex- and generation-specific heritable effects on mammalian metabolic physiology, with implications for understanding long-term gene-environment interactions.

008 - Christopher Scott Ward, PhD, Department of Integrative Physiology | Mouse Metabolism and Phenotyping Core – Advanced Technology Cores, Baylor College of Medicine

Title: The Mouse Metabolism and Phenotyping Core – Resources to characterize your mice and develop assays

The Mouse Metabolism and Phenotyping Core provides access to equipment and expertise for characterization of whole animal and organ systems phenotypes within rodent models. This includes an array of equipment including ultrasound, Xray, and MRI imagers, as well as instruments for indirect calorimetry assessment of metabolism, assessment of metabolism associated blood parameters, monitoring of pulmonary or electro cardiac signals, and implanted telemetry; The core can also assist in animal phenotyping projects that make use of other BCM resources including assessment of neurobehavioral outcomes, or development of novel assays and analysis methods. An automated neonate autoresuscitation reflex assay to model Sudden Infant Death Syndrome is among the novel assay development pursued by the core in collaboration with the lab of Russell Ray, and this assay can be used to screen for environmental exposure risks that may contribute to Sudden Infant Death Syndrome.

009 - Casey W. Wright, PhD, Associate Professor, Department of Pharmacology and Toxicology, UTMB

Title: AhR promotes phosphorylation of ARNT isoform 1 in human T cell malignancies as a switch for optimal AhR activity

Nontoxic agonists and antagonists of the aryl hydrocarbon receptor (AhR) hold high therapeutic potential for treating autoimmune disease and cancer. However, AhR activation by different ligands can lead to opposing phenotypical outcomes in a cell- and tissue-specific manner. This study demonstrates that proportional flux in the levels of aryl hydrocarbon receptor nuclear translocator (ARNT) isoforms 1 and 3 modulates AhR signaling in terms of amplitude and expression of distinct gene programs. These results delineate a molecular mechanism of ARNT isoform–mediated AhR regulation, simplify our understanding of a complex AhR signaling pathway, and provide feasibility for ARNT-targeted therapies that could be used in conjunction with nontoxic AhR ligands for the purpose of immunomodulation.