HARVARD CATALYST

THE HARVARD CLINICAL AND TRANSLATIONAL SCIENCE CENTER

# Stress and Health Disparities: Merging Laboratory, Clinical, and Population Scientific Approaches

## Funded Projects

In this initiative, sponsored by the Harvard Catalyst Health Disparities Resarch Program, the community was invited to submit applications for pilot grants to support novel research partnerships with the potential to generate new evidence, methodologies, or tools that will contribute to translational research fostering deeper understanding of the roles of psychosocial stress response in human health and health disparity.

The specific research priority areas represented topics covered during the Stress and Health Disparities Symposium held on October 17 and 18, 2013. Sponsored by Harvard Catalyst's Health Disparities Research Program, the symposium "Stress and Health Disparities: Merging Laboratory, Clinical, and Population Scientific Approaches" brought together leading laboratory and clinical scientists from around the world to dialog with the epidemiological community about how to advance current research approaches towards improved understanding of psychological stress and health outcomes on a population level. Applications in response to this request for applications (RFA) related to the following research priority areas: (1) Stress Biology and Disease Pathways; and (2) Measuring Stressors, Stress Response, and Resiliency.

All Harvard University-appointed junior and senior faculty members were encouraged to apply for this funding opportunity.

Three pilot grants were awarded in amounts of up to $75,000 for each one-year project.

Funding decisions were announced in August 2015.

**Prenatal Stress and Resiliency: Implications for Offspring Epigenetic Programming**

Co-Principal Investigators: Michele Hacker, ScD, MSPH, Beth Israel Deaconess Medical Center
Heather Burris, MD, MPH, Beth Israel Deaconess Medical Center

Co-Investigator: Jennifer Scott, MD, MPH, MBA, Beth Israel Deaconess Medical Center

Maternal psychosocial stress during pregnancy can lead to negative health outcomes in the mother and infant, including preterm birth and lower birth weight. The mechanism by which this occurs is not well understood. One potential explanation is that fetal exposure to maternal stress causes changes to fetal gene expression that are unrelated to the fetus's genetic code, or DNA sequence. This phenomenon is called epigenetics. Essentially, infants with the same genetic code may experience different health outcomes due to epigenetic changes caused by some infants being exposed to maternal stress before birth. It also is not known whether maternal resiliency may mitigate the possible association between maternal stress and epigenetic changes in the infant. One way epigenetic changes can be quantified is by measuring the extent of DNA methylation. We will evaluate whether maternal prenatal stress and resiliency are associated with DNA methylation of the glucocorticoid receptor, which plays a critical role in an infant's ability to regulate stress responses. Better understanding the biologic mechanism will provide new insights to guide development and evaluation of interventions to improve maternal psychosocial status and, consequently, maternal and infant outcomes.

**Psychosocial and Molecular Stress and Disparities in Mental Health and Aging**

Principal Investigator: Olivia Okereke, MD, Brigham and Women's Hospital

Co-Investigator: Immaculata De Vivo, PhD, Brigham and Women's Hospital

Race and ethnic disparities represent serious challenges in mental health and aging. Evidence points toward higher burden of depression among older minorities. Furthermore, minorities experience disproportionate burden of key stressors, such as adverse socioeconomic status, which contribute to disparate health outcomes. Knowledge gaps exist regarding the biological mechanisms involved in mental health and aging disparities; molecular stress may provide such an explanatory biologic link. Therefore, we will measure a novel marker of molecular stress in blood samples from a diverse sample of older participants to address this important topic. Specifically, we will test the hypothesis that psychosocial stressors – depression and low household income – are related to greater levels of molecular stress. Furthermore, we hypothesize that older minority participants not only will have higher molecular stress overall than non-minority participants, but also will have more pronounced molecular stress in the presence of the same psychosocial stressors. Future work informed by this project would be poised to improve understanding of the biologic underpinnings of health disparities and to identify means to alter them.

**Digital Phenotyping of Stress and Disordered Eating Among Women with a History of Child Abuse**

Co-Principal Investigators: Janet Rich-Edwards MPH, ScD, Brigham and Women's Hospital
Jukka-Pekka "JP" Onnela, PhD, Harvard School of Public Health

Child abuse is widespread in the United States, especially where there is high family poverty and parental unemployment. Dr. Rich-Edwards' group (Connors Center for Women's Health and Gender Biology, Brigham and Women's Hospital) has identified that disordered eating, weight gain, and obesity are long-term sequelae of child abuse that contribute to heightened risks of lifetime hypertension, diabetes, heart disease, and stroke. The associations appear to be driven by post-traumatic stress disorder (PTSD) symptoms and disordered eating, including loss-of-control eating and food addiction. To better document and understand how the associations between emotional states, PTSD symptoms and disordered eating vary by child abuse history, we propose a first-time collaboration with Dr. Onnela (Harvard Chan School of Public Health) to develop Digital Phenotyping, a method that uses active micro-surveys and passive smartphone data collection to query psychological symptoms and behaviors prospectively, repeatedly over weeks or months, and in real-life settings, as opposed to the laboratory or clinic. Better tools and a better understanding of the mechanisms underlying the abuse–obesity link, including post-traumatic stress and disordered eating, have the potential to inform obesity treatment and prevention. Ultimately, our plan is to develop and test supportive obesity prevention programs tailored to the particular phenotype(s) of abuse survivors. Thus, this proposal seeks to understand a stress-related behavior with roots in early life disparity.