

Philadelphia Exposome And Child Health (PEACH) Pilot Study

Aimin Chen, MD, PhD

Abstract

The exposome, a concept introduced into the research arena by Christopher Wild in 2005, encompasses the totality of environmental exposures, including chemicals, nutrition, infections, lifestyle, and stressors. It serves as a counterpart to the genome in the search for causes of disease. The exposome during pregnancy is particularly important to study adverse pregnancy outcomes and suboptimal child neurobehavioral and physical development. Herein, we propose the Philadelphia Exposome And Child Health (PEACH) Pilot Study to provide preliminary data for a larger R01 research proposal to enroll 1000 pregnant women during early pregnancy from University of Pennsylvania Health System (UPHS) to examine the exposome and the relationships with adverse child physical and neurobehavioral development. The goal of the PEACH Pilot Study is to enroll 50 women at 16 ± 2 weeks of pregnancy in the UPHS, and follow them at 30 ± 2 weeks of pregnancy and delivery within a year. Biospecimens (blood, urine) will be collected at all visits. The pilot study will examine environmental chemical exposures (metals [e.g., lead, cadmium, mercury, arsenic], endocrine disrupting chemicals [EDCs, e.g., perfluoroalkyl substances, polybrominated diphenyl ethers, phenols, phthalates, organophosphate flame retardants, organophosphate pesticides]), air pollution, built environment, social stress, lifestyle, infections, nutrition, physical activity, and sociodemographic factors using the exposome concept. We will measure markers of inflammation, oxidative stress, and placental function in maternal and newborn biospecimens. We will measure the metabolome using an untargeted approach in plasma samples from pregnant women at enrollment and follow-up visits and for neonates using Ultra-High Performance Liquid Chromatography-High Resolution Mass Spectrometry (UHPLC-HRMS). We will examine the associations of exposome and biomarkers with birth outcomes (gestational age, sex- and gestational-age-specific birth weight z-score).