PROTECT: Puerto Rico Testsite for Exploring Contamination Threats

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Introduction

• The PROTECT program focuses on Puerto Rico as a testsite with dynamic exposure pathways through karstic (eroded limestone) aquifers to study Superfund and related contaminants and their contribution to preterm birth (less than 37 completed weeks of gestation).

• PROTECT is a collaboration of experts in engineering, public health, and biomedical and environmental sciences, with the dual goal of reducing exposure to environmental contamination and reducing the preterm birth rate in Puerto Rico and beyond.

• The PROTECT Program conducts targeted and nontargeted studies to evaluate the contribution of exposure to Superfund and related contaminants to preterm birth. The targeted studies focus on chlorinated solvents and phthalates because they are suspected model contaminants and because they are found in many Superfund sites.

Preterm Birth

• Preterm birth results in significant infant and maternal morbidity and mortality.

• It is also the leading cause of neonatal mortality in the US, contributing to over one-third of infant deaths and thus representing a major health and societal expenditure (~$26M/year).

• The known risk factors for preterm birth include lack of prenatal care, smoking, multiple gestation, and assisted reproductive technology (ART), and maternal complications.

• None of these factors explain the marked increase in preterm births in Puerto Rico.

• Other risk factors such as environmental exposure (such as contaminant exposure) need to be studied.

Why Puerto Rico?

Puerto Rico compared to groups in the US

% Preterm Birth

Year


PP White African American Hispanic USA

Increment in Preterm birth rates in Puerto Rico compared to groups in the US

State of the Art Knowledge

Several studies have related contaminant exposure such as those found in Puerto Rico’s groundwater (phthalates, chlorinated solvents (e.g. TCE), pesticides, and heavy metals) to adverse reproductive outcomes (reproductive damage, preterm birth, low birth weight, perinatal mortality, spontaneous abortions).

Research Projects

Objective 1: Increase the evidence that Superfund and related contaminants contribute to preterm birth.

Objective 2: Build a better understanding of the potential role and mechanisms of pollution-induced oxidative stress in preterm birth.

Objective 3: Discover and understand risk factors and their interactions for preterm birth.

Objective 4: Determine the effects of episodic transport on patterns of exposure through highly mobile karstic aquifers.

Objective 5: Improve and apply nontargeted chemical analysis.

Three-Level System

Contact information

www.neu.edu/protect