



ECHO

Environmental influences
on Child Health Outcomes

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Study Summary

Assessing Links between Multiple Chemical Exposures during Pregnancy and Birthweight Using Exposure Continuum Mapping

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Who sponsored this study?

The Environmental influences on Child Health Outcomes (ECHO) program, Office of The Director, National Institutes of Health.

Why was this study needed?

Pregnant women often encounter numerous chemicals that may pose a risk to them and their baby. Studies seeking to identify health effects in populations that experience such complex exposure scenarios remains difficult. With this study, we seek to improve research of multiple exposures by presenting a mixtures methodology, defined as exposure continuum mapping (ECM), that allows investigators to identify complex exposure patterns (i.e., mixtures) within their study population and evaluate complex health effects.

Who was involved?

The team involved a diverse mother-child cohort over 600 women participating in ECHO that also enrolled in the Eunice Kennedy Shriver National Institute of Child Health and Human Development's (NICHD) Fetal Growth Studies from 2009-2012

What happened during the study?

To begin, the team obtained data previously collected from the study population during their participation in the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development's (NICHD) Fetal Growth Studies. These data included concentrations of endocrine disrupting chemicals (EDCs) measured in blood samples collected from mothers 8-12 weeks into their pregnancy and their infant's weight at birth. Then, the team analyzed these data with ECM in order to identify the range of EDC exposure profiles experienced by moms during their pregnancy and to examine the relationship to the birth weight of their children.

What were the study results?

Findings from the study revealed that moms experienced a broad range of chemical exposure profiles with marked variability in exposure magnitudes across chemical classes and exposure frequencies. Evaluation of health effects found that maternal exposure profiles dominated by higher levels of flame-retardants (i.e., polybrominated diphenyl ethers, [PBDEs](#)) were associated to lower birth weights. Exposure profiles with higher levels of polychlorinated biphenyls ([PCBs](#)) and perfluoroalkyl ([PFAS](#))

substances were associated with increased birth weights. PCBs are man-made chemicals that are often found in industrial and commercial products, such as electrical and hydraulic equipment and plasticizers in paints, plastics, and rubber products. PFAS substances can often be found in food packaging, commercial household products, drinking water, and living organisms.

Impact

ECM provides a promising framework for supporting studies of other exposure mixtures as the resulting mapping benefits visualization and assessment of relationships in complex data.

What happens next?

The team will apply ECM to assist investigations of exposure mixtures and other child health outcomes, with particular interest on obesity.

Where can I learn more?

For access to software tools see: <https://github.com/johnlpearce/>

Access the [full journal article](#), titled “Exploring associations between prenatal exposure to multiple endocrine disruptors and birth weight with exposure continuum mapping.”

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Access the [associated article](#).