ECHO
Environmental influences on Child Health Outcomes
A program supported by the NIH

Study Summary

ECHO Study Finds Flame-Retardant Chemicals May Increase Risk Of Preterm Birth and Higher Birth Weight

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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 supported this research.

Why was this study needed?

Manufacturers commonly use flame-retardant chemicals known as organophosphate esters (OPEs) in products such as furniture, baby items, electronics, clothes, and building materials to prevent fires and make plastics more flexible. People can come into contact with OPEs in various ways, including swallowing or breathing indoor dust or absorbing it through the skin. Animal studies have revealed that OPEs can harm the growth and development of offspring. However, the connection between OPE exposure during pregnancy and birth outcomes has been unclear. ECHO researchers wanted to learn if there was a link between OPE levels in the urine of pregnant individuals and specific birth outcomes.

What were the study results?

Pregnant individuals exposed to specific classes of OPEs may face an increased risk of preterm birth, especially for baby girls and babies with higher birth weights. Three of these substances—diphenyl phosphate (DPHP), a combination of dibutyl phosphate and di-isobutyl phosphate (DBUP/DIBP), and bis(1,3-dichloro-2-propyl) phosphate—were associated with shorter pregnancies and higher risks of preterm birth only among female infants. Among male infants, higher concentrations of DPHP were associated with longer pregnancies.

Babies born to mothers with detectable levels of three other OPE markers—bis(1-chloro-2-propyl) phosphate, bis(2-methylphenyl) phosphate, and dipropyl phosphate—tended to have higher birth weights compared to those whose mothers had no detectable levels of these substances.

Note: Results reported here are for a single study. Other or future studies may provide new information or different results. You should not make changes to your health without first consulting your healthcare professional.

What was the study's impact?

In the past decade, OPEs have been increasingly used as flame retardants after polybrominated diphenyl ether (PBDE) flame retardants were phased out due to health risks. ECHO research examines the

potential impact of these now more widespread OPE chemicals on pregnancy outcomes such as preterm birth and birth weight. The findings can inform policies, programs, and practices to help decrease exposure.

Who was involved?

The study included 6,646 pregnant participants at 16 ECHO Cohort Study Sites across the U.S. and Puerto Rico.

What happened during the study?

Researchers measured a total of nine OPE markers in urine samples collected from 6,646 pregnant participants across 16 ECHO Cohort Study Sites—often during their third or second trimesters. The researchers then assessed birth outcomes, including the length of pregnancy and birth weight, using medical records or parent reports.

What happens next?

OPEs tend to stay in the human body for short periods, usually hours to days. To better understand how these chemicals might affect birth outcomes, researchers can use multiple measurements of urinary OPE biomarkers. This could help identify when the body might be more sensitive to these chemicals. Additionally, learning more about how people are exposed to these chemicals can help identify ways to reduce exposure, especially during pregnancy.

Where can I learn more?

Access the full journal article, titled “Associations of Organophosphate Ester Flame Retardant Exposures during Pregnancy with Gestational Duration and Fetal Growth: The Environmental influences on Child Health Outcomes (ECHO) Program,” in *Environmental Health Perspectives*.