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

Study Summary

Exposure to Certain Flame-retardant Chemicals During Pregnancy May Be Linked with Decreased Cognitive Function in Young Children, ECHO Study Finds

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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?

Organophosphate esters (OPEs) are chemicals widely used as flame retardants and plastic softeners in a variety of household and industrial products, and previous studies suggest they can affect child brain development. With increasing human exposure to these chemicals, especially during sensitive periods like pregnancy, there has been concern about the potential impact on child cognitive development. Previous studies have found mixed results, highlighting the need for a large, contemporary cohort study to clarify these associations and examine possible sex differences.

What were the study results?

When pregnant women had higher urine levels of diphenyl phosphate (DPHP), a compound produced during the breakdown of certain OPEs in the human body, their children tended to have slightly lower scores on tests of mental skills at ages 4–6. This pattern was seen in boys and girls. Boys whose mothers had higher levels of certain other chemicals linked to OPE exposure during pregnancy scored higher on these tests, but this was not true for girls. This finding was unexpected, so more research may be needed to understand the biological mechanism underlying this association.

What was the study's impact?

Results from this large contemporary cohort of mother–child pairs in the U.S. suggest that OPE exposure during pregnancy may be associated with minor decreases in cognitive functioning in children. Considering that DPHP is a widely detected marker of OPE exposure in the U.S. population, the overall impact of this effect may be significant.

Who was involved?

The study included 831 mother–child pairs from three ECHO Cohort Study Sites in the United States. The study population was predominantly non-Hispanic White and highly educated, which may limit generalizability.

What happened during the study?

Pregnant participants provided urine samples for measurement of nine OPE chemicals. Researchers assessed child mental skills using standardized intelligence scales when children were between 4 and 6 years old. Researchers then used statistical analyses to examine associations between OPE exposure and childhood cognition.

Footnote: 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 happens next?

Additional studies could help researchers better understand the biological pathways underlying these associations. Additional studies could also help clarify the association between some chemical markers of OPE exposure and higher cognitive scores among boys.

Where can I learn more?

Access the full journal article, titled “Prenatal exposure to organophosphate ester flame retardants and child cognition: findings from the environmental influences on child health outcomes cohort,” in *Environmental Pollution*.