ECHO
Environmental influences on Child Health Outcomes
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Study Summary

Prenatal Exposure to Phthalates, But Not Phthalate Replacements, Linked to Children's Behavior, 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?

Phthalates are widely used chemicals that make plastics more flexible. During pregnancy, these chemicals can cross the placenta and may affect brain development. Although exposure to some phthalates has decreased over the past two decades, these chemicals and their replacements—such as DINCH and DEHTP—are still common, and little is known about their effects on children's brain development. In this study, researchers examined many chemicals that form when the body breaks down phthalates and other plasticizers to see if exposure to these chemicals during pregnancy might be associated with behavioral problems in young children, including emotional reactivity, anxiety, depression, aggression, and attention problems.

What were the study results?

Researchers found that higher levels of two phthalate metabolites, mono-benzyl phthalate (MBzP) and mono-hexyl phthalate (MHxP), during pregnancy were associated with small to modest increases in externalizing behaviors (aggression and attention problems) in children aged 1.5–5 years. They did not find strong links between phthalate exposure and internalizing behaviors (emotional reactivity, anxiety, and depression), or between prenatal exposure to the phthalate replacement DINCH and any behavioral outcomes. The impact of these chemicals varied between boys and girls and depended on the neighborhood where the children lived. Some chemicals had stronger associations in kids from neighborhoods with more resources, while others were more impactful in areas with fewer resources.

What was the study's impact?

The study suggests that prenatal exposure to certain phthalates, but not to the alternative chemical DINCH, may be associated with increased externalizing behaviors in young children.

Who was involved?

Participants included 2,617 mother–child pairs from 13 ECHO Cohort study sites. Children's behaviors were assessed at ages 1.5–5 years, and maternal urine samples were collected mostly during mid- to late-pregnancy.

What happened during the study?

During the study, prenatal maternal urine samples were analyzed for 27 chemical markers of phthalate exposure and six markers of exposure to non-phthalate replacements. Later, the children's behaviors were assessed using the Child Behavior Checklist for Ages 1½–5 (CBCL/1½–5). The researchers then used statistical methods to explore how levels of specific chemicals in the pregnant women's body were linked to behaviors like emotional reactivity, anxiety, depression, aggression, and attention problems, and whether these links differed by child sex and neighborhood opportunity.

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?

Future studies could show how much pregnant women are exposed to di-n-hexyl phthalate (the parent compound of MHxP) and its effects on children's brain development across different populations. Researchers may also study how different newer plasticizers affect brain development by looking at more recent participants and testing samples taken from mothers at several stages during pregnancy.

Where can I learn more?

Access the full journal article, titled "Prenatal exposure to phthalates and alternative plasticizers and emotional and behavioral outcomes in early childhood in the Environmental influences on Child Health Outcomes (ECHO) Cohort," in *Environment International*.