ECHO
Environmental influences on Child Health Outcomes
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Study Summary

How Chemical Exposures in Pregnancy Affect Gene Changes in the Placenta

Author(s): Alison Paquette, Sheela Sathyanarayana, MD, MPH, et al.

Who sponsored this study?

This research was supported by the Environmental influences on Child Health Outcomes (ECHO) program, Office of The Director, National Institutes of Health.

Footnote: The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Why was this study needed?

There is a lot we still don't know about how phthalates affect the placenta. Phthalates are a group of chemicals used in plastics. The placenta is an organ in pregnant women that provides their growing baby with oxygen and nutrients. It also helps mothers and babies share information. Exposure to phthalates during pregnancy may harm the placenta and affect how the baby develops. Looking at changes in how genes are expressed when exposed to phthalates during pregnancy can help researchers measure the effect on how the placenta works. Genes are expressed when DNA is converted into proteins, which perform a variety of important functions and play critical roles in development.

Who was involved?

The study involved pregnant women from Memphis, Tennessee who enrolled in the CANDLE study during their pregnancy. Researchers collected urine and placentas from mothers just after their babies were born. These participants were between 16-40 years old, mostly Black, and had relatively healthy pregnancies.

What happened during the study?

Researchers measured the amount of 16 phthalates in urine collected from the participants during the 2nd and 3rd trimester of pregnancy.

Researchers collected the placenta from the mother after having the baby and measured the expression of each gene in the placenta. For each gene, the researchers tried to figure out if higher phthalate concentrations were related to more or less gene expression in the placenta. This information was used to understand how phthalates may have affected how the placenta worked.

What were the study results?

Researchers found that several phthalates were associated with changes in the expression of 38 genes within the placenta. Some of these changes in gene expression were only significant in male or female

infants. This shows that phthalates may change how the placenta works in different ways for the two sexes. The team also studied which biological pathways were connected to these changes in gene expression. They found 27 specific pathways that may have been affected by phthalate exposure. These pathways involved important building blocks for the developing infant.

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.

Impact

Exposure to phthalate chemicals is related to changes in gene expression in placentas. This is important because these changes in gene expression may affect the growing baby.

What happens next?

This research team will study how changes in the placenta are related to pregnancy complications like preterm birth within this same group of pregnant women. They will also use new tools and technologies to study how phthalates may cause these changes in gene expression.

It is also important to look at the effect of phthalates on other groups of women and see how these changes in placental function impact infant and childhood health.

Where can I learn more?

Read more information about how people are exposed to phthalates and how to decrease exposures.

Access the full journal article, titled “A Comprehensive Assessment of Associations between Prenatal Phthalate Exposure and The Placental Transcriptomic Landscape” in *Environmental Health Perspectives*.