



ECHO

Environmental influences
on Child Health Outcomes

A program supported by the NIH

Study Summary

The development of the placenta might be different for male and female infants

Authors: Catherine Bulka, Rebecca Fry, 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.

What were the study results?

This study found that gene activity in the placenta might differ based on the infant's sex, suggesting that the placentas of males and females develop differently. The placenta is an organ formed during pregnancy to nourish the fetus that goes through many changes during the length of the pregnancy to support the development of the infant.

Previous studies have found that a number of changes occur in the genetic make-up of the placental tissue throughout pregnancy. The current study suggests that some of these genetic changes may differ based on whether the baby is male or female. The researchers looked at gestational age (the amount time the baby spent in-utero) to compare placentas among males and female fetuses at different points in time. Among females, the researchers saw modifications in genes related to the immune system. Among males, there was modifications in genes related to the transport of molecules into the placenta.

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 was the study's impact?

This study identified differences in the location of modifications of placental DNA between male and female infants at different gestational ages. The most prominent differences were linked to genes that play significant roles in immunity, inflammation, and pregnancy complications. These differences seen between male and female infants may be important when looking at sex-specific health and developmental outcomes.

Why was this study needed?

The placenta is crucial for fetal growth and development. No previous study had considered the role of infant sex in placental development, despite accumulating evidence that females and males develop differently *in utero*.

Who was involved?

This study included 774 infants from 4 ECHO research sites. In total, the study included 355 female and 419 male infants. One of the research sites enrolled infants born at less than 28 weeks, which provided samples from the earliest viable births.

What happened during the study?

Research sites compared the placental tissue of male and female infants to determine associations between gestational age and modifications of placental DNA. Researchers then located the modifications and identified the closest genes, allowing them to analyze the biological significance of the modifications.

What happens next?

Researchers are now using this data to estimate an infant's "biological" rather than "chronological" gestational age based on the modification of placental DNA. The findings of this study suggest that it may be important to consider the infant's sex when calculating "biological" gestational age.

Where can I learn more?

Access the full journal article, titled "Sex-based differences in placental DNA methylation profiles related to gestational age: an NIH ECHO meta-analysis," in [Epigenetics](#).

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