Press Release

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Chronic inflammation in pregnancy linked to childhood neurodevelopmental delays

Large study in Biological Psychiatry *strengthens evidence and suggests a potential therapeutic target in pregnancy to give children a healthier start in life*

Philadelphia, February 25, 2020 – In pregnant women, obesity, diabetes, hypertension, depression and anxiety can increase the chances of learning delays, behavior problems and mental health issues in their children's early years. A new study reported in the journal *Biological Psychiatry*, published by Elsevier, strengthens evidence that chronic low-grade inflammation, common to these maternal conditions, may be partly to blame for the higher risk of childhood neurodevelopmental delays.

Researchers have long suspected chronic maternal inflammation may play a role in altering neurodevelopmental trajectories, leading to adverse childhood outcomes. Earlier studies, involving animals, have implicated maternal inflammation as a mechanism causing neurodevelopmental delays in offspring.

"Our findings suggest a potential therapeutic strategy to reduce prenatal exposure to inflammation and improve childhood neurodevelopment outcomes," said first author Polina Girchenko, PhD, an epidemiologist and postdoctoral researcher in the Department of Psychology and Logopedics at University of Helsinki, Finland.

To investigate further, Dr. Girchenko and her colleagues analyzed data of 418 pregnant women and their children aged between 7-to-11-years old in Southern and Eastern Finland. The women's data came from a study called PREDO, which is designed to predict and prevent preeclampsia during pregnancy, so there was a large prevalence of risk factors, including obesity, gestational diabetes, and hypertension. The team evaluated two maternal inflammatory biomarkers taken at three timepoints in the pregnancy. Maternal depression and anxiety diagnoses were extracted from Finland's national health registry.

For the children, the research team cast a wider net, using medical records and mothers' reports. Developmental delays were defined based on maternal reports and diagnoses extracted from Finland's national medical registry and included delays in cognitive, motor and social development.

Results revealed that prenatal exposure to at least one of the maternal metabolic conditions or mental health adversities was associated with a two-fold higher risk of more areas of childhood neurodevelopmental delays and was also linked to persistently high levels of antenatal inflammation. Prenatal exposure to higher levels of two maternal inflammatory biomarkers also increased a child's risk of neurodevelopmental delays. The two biomarkers combined predicted childhood neurodevelopmental delay more precisely than one alone.

"This study highlights that some potentially modifiable prenatal factors may increase the negative impact

of adverse environments upon brain and behavior during childhood," said John Krystal, MD, Editor of *Biological Psychiatry*.

Dr. Girchenko added, "For women who are at risk, we think antenatal intervention may provide targeted prevention, such as dietary supplements associated with reduced inflammation. It's an avenue for future studies to determine the most effective interventions. At this stage, we've opened the door for further discoveries in the field."

Intervention trials are needed to see how women and children respond to different interventions. The study also raises new questions about more specific maternal conditions and various childhood outcomes, Dr. Girchenko concluded. Understanding these risk factors can help researchers devise and evaluate interventions to promote a healthy start to life.

Notes for editors

The article is "Persistently High Levels of Maternal Antenatal Inflammation Are Associated With and Mediate the Effect of Prenatal Environmental Adversities on Neurodevelopmental Delay in the Offspring," by Polina Girchenko, PhD, Marius Lahti-Pulkkinen, PhD, Kati Heinonen, PhD, Rebecca M. Reynolds, MD, PhD, Hannele Laivuori, MD, PhD, Jari Lipsanen, MA, Pia M. Villa, MD, PhD, Esa Hämäläinen, MD, PhD, Eero Kajantie, MD, PhD, Jari Lahti, PhD, Katri Räikkönen, PhD (https://doi.org/10.1016/j.biopsych.2019.12.004). It appears in *Biological Psychiatry*, published by Elsevier.

Copies of this paper are available to credentialed journalists upon request; please contact Rhiannon Bugno at Biol.Psych@sobp.org or +1 254 522 9700. Journalists wishing to interview the authors may contact Polina Girchenko at polina.girchenko@helsinki.fi or +35 844 989 8459.

The authors 'affiliations and disclosures of financial and conflicts of interests are available in the article.

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