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Mothers with diabetes, other metabolic conditions, more likely to also have anti-fetal brain autoantibodies

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Mothers of children with autism and were diagnosed with metabolic conditions during pregnancy, particularly gestational and type 2 diabetes, were more likely to have anti-fetal brain autoantibodies in their blood compared to healthy women of children with autism. The presence of these anti-fetal brain autoantibodies has been previously found to be specific to some mothers of children with autism and rare among mothers of children without autism, researchers with the UC Davis MIND Institute have found.

In this study, researchers found that diabetic women were three times more likely to have anti-fetal brain autoantibodies, particularly those whose children's autism fell on the severe end of the spectrum. Women with other metabolic conditions, such as high blood pressure and elevated body mass index (BMI) also had a higher prevalence of anti-fetal brain autoantibodies, the researchers found.

The research is published online today in the journal *Autism Research*.

"We found a three-fold increase in the prevalence of anti-fetal brain antibodies among the mothers of children with autism who were diagnosed with gestational diabetes or type 2 diabetes," said Paula Krakowiak, a post-doctoral fellow in the UC Davis Department of Public Health Sciences and a researcher affiliated with the MIND Institute.

Earlier MIND Institute research found that approximately 23 percent of women with a child diagnosed with autism had specific patterns of autoantibodies that target proteins highly expressed in the fetal brain. These autoantibody patterns were detected in only 1 percent of women who did not have children with autism. The finding, reported in 2013, was the first to identify a specific risk factor for a significant subset of autism cases, as well as a potential biomarker for drug development and early diagnosis.

In the current study, the researchers examined 227 mother/child pairs who are participants in the Childhood Autism Risk from Genetics and the Environment (CHARGE) Study, which examines the environmental and genetic causes of autism. The study found that autism-specific maternal autoantibodies were more prevalent among mothers diagnosed with diabetes, hypertensive disorders, or who were moderately overweight compared to healthy mothers.

Among the study participants, 145 mothers had children who exhibited symptoms of severe autism. Of these mothers, those diagnosed with type 2 or gestational diabetes were nearly three times more likely to have the autism-specific anti-fetal brain antibodies, when compared with healthy mothers.

Approximately 5 to 9 percent of women in the United States are diagnosed with gestational diabetes each year, according to the U.S. Centers for Disease Control and Prevention (CDC); the CDC estimates that between 4.5 and 9 percent of women in the prime childbearing years of 18 to 44 have gestational diabetes.

"There are several take-away messages from this study," Krakowiak said. "One is that metabolic conditions are characterized by increased inflammation and a number of studies have established links between metabolic conditions during pregnancy and neurodevelopmental

conditions in children. Therefore, it is also reasonable to presume that these conditions may alter the maternal immune tolerance to the fetus during pregnancy, Krakowiak said.

"Another is to encourage women who are planning a pregnancy to achieve a healthier pre-pregnancy weight through changes in diet and physical activity, and if a mother was diagnosed with a metabolic condition to keep a closer watch of the baby's development," she said.

"We need to look into how their health is being managed, and how we can help them to be healthier," Krakowiak said.

More information: Paula Krakowiak et al, Autism-specific maternal anti-fetal brain autoantibodies are associated with metabolic conditions, *Autism Research* (2016). DOI: 10.1002/aur.1657

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