Autism's origins: Mother's antibody production may affect fetal brain

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The mothers of some autistic children may have made antibodies against their fetuses' brain tissue during pregnancy that crossed the placenta and caused changes that led to autism, suggests research led by Johns Hopkins Children's Center investigators and published in the February issue of the *Journal of Neuroimmunology*.

The causes of autism, a disorder manifesting itself with a range of brain problems and marked by impaired social interactions, communication disorders and repetitive behaviors, remain unknown for an estimated 90 percent of children diagnosed with it. Genetic, metabolic and environmental factors have been implicated in various studies of autism, a disorder affecting 1 in 150 U.S. children, according to estimates by the Centers for Disease Control and Prevention.

"Now our research suggests that the mother's immune system may be yet another factor or a trigger in those already predisposed," says lead investigator Harvey Singer, M.D., director of pediatric neurology at Hopkins Children's.

Researchers caution that the findings needn't be cause for alarm, but should be viewed instead as a step forward in untangling the complex nature of autism.

Mostly anecdotal past evidence of immune system involvement has emerged from unusual antibody levels in some autistic children and from postmortem brain tissue studies showing immune abnormalities in areas of the brain. Antibodies are proteins the body makes in response to viruses and bacteria or sometimes mistakenly against its own tissues. Yet, the majority of children with autism have no clinical evidence of autoimmune diseases, which prompted researchers to wonder whether the antibodies transferred from mother to child during pregnancy could interfere with the fetal brain directly.

To test their hypothesis, the research team used a technique called immunoblotting (or Western blot technology), in which antibodies derived from blood samples are exposed to adult and fetal brain tissue to check whether the antibodies recognize and react against specific brain proteins.

Comparing the antibody-brain interaction in samples obtained from 100 mothers of autistic children and 100 mothers of children without autism, researchers found either stronger reactivity or more areas of reactivity between antibodies and brain proteins in about 40 percent of the samples obtained from the mothers of autistic children. Further, the presence of maternal antibodies was associated with so-called developmental regression in children, increasingly immature behaviors that are a hallmark of autism.

While the findings suggest an association between autism and the presence of fetal brain antibodies, the investigators say further studies are needed to confirm that particular antibodies do indeed cross the placenta and cause damage to the fetal brain.

"The mere fact that a pregnant woman has antibodies against the fetal brain doesn't mean she will have an autistic child," Singer says. "Autism is a complex condition and one that is likely caused by the interplay of immune, genetic and environmental factors."

Researchers are also studying the effect of maternal antibodies in pregnant mice. Preliminary results show that the offspring of mice injected with brain antibodies exhibit developmental and social behaviors consistent with autism.

Source: Johns Hopkins Medical Institutions