

Mother's flu during pregnancy may increase baby's risk of schizophrenia

March 11 2010

Rhesus monkey babies born to mothers who had the flu while pregnant had smaller brains and showed other brain changes similar to those observed in human patients with schizophrenia, a study at the University of Wisconsin-Madison in collaboration with the University of North Carolina at Chapel Hill has found.

The study, published online by the journal *Biological Psychiatry*, is the first study done with monkeys that examines the effects of flu during pregnancy. Results from this study support findings from rodent studies suggesting this type of infection may increase the risk of [schizophrenia](#) in the offspring, said lead author Sarah J. Short, Ph.D.

Short worked on the study while earning her doctorate at Wisconsin and now is a post-doctoral fellow at UNC working with John H. Gilmore, M.D., professor of psychiatry in the UNC School of Medicine.

"This was a relatively mild flu infection, but it had a significant effect on the brains of the babies," Short said. "While these results aren't directly applicable to humans, I do think they reinforce the idea, as recommended by the [Centers for Disease Control and Prevention](#), that pregnant women should get flu shots, before they get sick."

In the study, 12 [rhesus macaques](#) were infected with a mild [influenza A virus](#) 1 month before their baby's due date, early in the third trimester of pregnancy. For comparison, the study also included 7 pregnant monkeys who did not have the flu.

When the babies were 1 year old, [magnetic resonance imaging](#) (MRI) scans were taken of their brains. Researchers also assessed the babies' behavioral development at that time.

The babies born to flu-infected mothers showed no evidence of direct viral exposure. Their birth weight, gestation length and neuromotor, behavioral and endocrine responses were all normal.

However, the MRI scans revealed significant reductions in overall brain size in the flu-exposed babies. In addition, the scans found significant reductions of "gray matter" (the portion of brain tissue that is dark in color) especially in areas of the brain called the cingulate and parietal lobe, and significant reductions of "white matter" (brain tissue that is lighter in color) in the parietal lobe.

The cingulate is located in the middle of the brain, but spans a broad distance from front to back and relays information from both halves of the brain. This structure is important for numerous cognitive function related to emotions, learning, memory, and executive control of these processes to aid in decision-making and anticipation of rewards. In addition this structure also plays a role in regulating autonomic processes, such as blood pressure and respiratory control. The parietal lobe comprises a large section on both sides of the brain between the frontal lobes and the occipital lobes, in the back of the brain. This part of the brain integrates information from all the senses and is especially important for combining visual and spatial information.

"The [brain](#) changes that we found in the monkey babies are similar to what we typically see in MRI scans of humans with schizophrenia," said Gilmore. "This suggests that human babies whose mothers had the flu while pregnant may have a greater risk of developing schizophrenia later in life than babies whose mothers did not have the flu. Normally that risk affects about 1 of every 100 births. Studies in humans suggest that for

flu-exposed babies, the risk is 2 or 3 per 100 births."

Provided by University of North Carolina School of Medicine

Citation: Mother's flu during pregnancy may increase baby's risk of schizophrenia (2010, March 11) retrieved 24 April 2024 from <https://medicalxpress.com/news/2010-03-mother-flu-pregnancy-baby-schizophrenia.html>

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