Risk genes for Alzheimer's and mental illness linked to brain changes at birth

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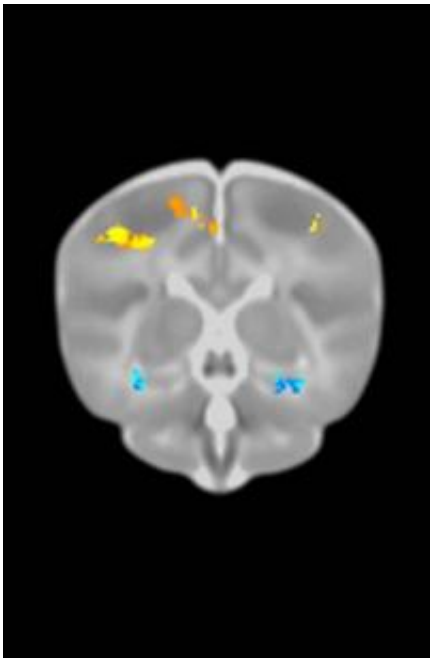

This image shows the impact of the APOE Alzheimer's risk variant on the newborn brain. Blue clusters show decreased brain volumes in newborns with the risk variant. Similar decreases in this brain area, which is involved in memory, are seen in adults with the same variant. Yellow/orange clusters show increased brain volumes in newborns with the risk variant. These changes may be unique to infants and young children and could represent beneficial effects. Credit: Image courtesy of Rebecca C. Knickmeyer, PhD

Some brain changes that are found in adults with common gene variants linked to disorders such as Alzheimer's disease, schizophrenia, and

autism can also be seen in the brain scans of newborns.

"These results suggest that prenatal brain development may be a very important influence on psychiatric risk later in life," said Rebecca C. Knickmeyer, PhD, lead author of the study and assistant professor of psychiatry in the University of North Carolina School of Medicine. The study was published by the journal Cerebral Cortex on Jan. 3, 2013.

The study included 272 infants who received MRI scans at UNC Hospitals shortly after birth. The DNA of each was tested for 10 common variations in 7 genes that have been linked to brain structure in adults. These genes have also been implicated in conditions such as schizophrenia, bipolar disorder, autism, Alzheimer's disease, anxiety disorders and depression.

For some polymorphisms – such as a variation in the APOE gene which is associated with Alzheimer's disease – the brain changes in infants looked very similar to brain changes found in adults with the same variants, Knickmeyer said. "This could stimulate an exciting new line of research focused on preventing onset of illness through very early intervention in at-risk individuals."

But this was not true for every polymorphism included in the study, said John H. Gilmore, MD, senior author of the study and Thad & Alice Eure Distinguished Professor and Vice Chair for Research and Scientific Affairs in the UNC Department of Psychiatry.

For example, the study included two variants in the DISC1 gene. For one of these variants, known as rs821616, the infant brains looked very similar to the brains of adults with this variant. But there was no such similarity between infant brains and adult brains for the other variant, rs6675281.

"This suggests that the brain changes associated with this gene variant aren't present at birth but develop later in life, perhaps during puberty," Gilmore said.

"It's fascinating that different variants in the same gene have such unique effects in terms of when they affect brain development," said Knickmeyer.

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