Could Disruption of a Single Genetic Pathway in the Brain Lead to Schizophrenia?

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Ever wonder what triggers mental illness in some people? According to new findings published in Schizophrenia Research, scientists studying the skin cells of four adults living with schizophrenia believe they may have learned how the disorder develops in utero, Science Daily reports.

Schizophrenia is a long-term mental disorder characterized by a breakdown of thought processes and emotional responses to stimuli. Symptoms of the disorder—which affects an estimated 3.5 million Americans—include hallucinations, delusions, disorganized speech and thinking and significant social and occupational dysfunction. (A lot of recent research has uncovered genetic causes of schizophrenia, with some findings showing that kids who have siblings with the disorder are up to 10 times more likely to develop the chronic illness themselves.)

For this latest study, scientists at the Jacobs School of Medicine and Biomedical Sciences at the University at Buffalo and the Icahn School of Medicine at Mount Sinai Hospital in New York took skin cells from four adults living with schizophrenia and four adults without the mental disorder. Next, researchers reprogrammed these tissues into pluripotent stem cells (cells able to replicate indefinitely and form all types of adult cells) and neuronal progenitor cells (cells capable of dividing a limited number of times into different, specific kinds of cells) to help re-create the conditions of early brain development in a fetus with a genetic predisposition to schizophrenia.

Scientists found that disrupting a single genomic pathway—called the integrative nuclear FGFR1 signaling (INFS)—led to the development of a central intersection for pathways involving more than 1,000 genes believed to trigger schizophrenia. This genetic disruption appeared to interfere with the growth of the brain as a whole, similar to the way an entire orchestra can be thrown off by a musician playing a single wrong note.

“In the last 10 years, genetic investigations into schizophrenia have been plagued by an ever-increasing number of mutations found in patients with the disease,” said Michal K. Stachowiak, PhD, a professor in the department of pathology and anatomical sciences in the Jacobs School of Medicine and Biomedical Sciences at the University at Buffalo and the study’s senior author. “We show for the first time that there is, indeed, a common, dysregulated gene pathway at work here.”

Researchers involved in the project called the study a proof of concept for hypotheses they published in 2013 on the topic. Scientists said that eventually they hoped to grow cerebral organoids (mini brains, in a sense) to further determine how this genetic disruption affects early development of schizophrenia and to test potential preventive or corrective treatments for the mental illness.

Click here to learn more about the genetic links between schizophrenia, bipolar disorder and many other mental illnesses.

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