

Lipid levels during prenatal brain development impact autism

8 April 2014



Quinn, an autistic boy, and the line of toys he made before falling asleep. Repeatedly stacking or lining up objects is a behavior commonly associated with autism. Credit: Wikipedia.

In a groundbreaking York University study, researchers have found that abnormal levels of lipid molecules in the brain can affect the interaction between two key neural pathways in early prenatal brain development, which can trigger autism. And, environmental causes such as exposure to chemicals in some cosmetics and common over-the-counter medication can affect the levels of these lipids, according to the researchers.

"We have found that the abnormal level of a lipid molecule called Prostaglandin E2 in the brain can affect the function of Wnt proteins. It is important because this can change the course of [early embryonic development](#)," explains Professor Dorota Crawford in the Faculty of Health and a member of the York Autism Alliance Research Group.

This is the first time research shows evidence for cross-talk between PGE2 and Wnt signalling in neuronal stem cells, according to the peer reviewed study published at [Cell Communication and Signaling](#).

Lead researcher and York U doctoral student Christine Wong adds, "Using real-time imaging microscopy, we determined that higher levels of PGE2 can change Wnt-dependent behaviour of neural [stem cells](#) by increasing cell migration or proliferation. As a result, this could affect how the brain is organized and wired. Moreover, we found that an elevated level of PGE2 can increase expression of Wnt-regulated genes—Ctnnb1, Ptgs2, Ccnd1, and Mmp9. "Interestingly, all these genes have been previously implicated in various autism studies."

Autism is considered to be the primary disorder of brain development with symptoms ranging from mild to severe and including repetitive behaviour, deficits in social interaction, and impaired language. It is four times more prevalent in boys than in girls and the incidence continues to rise. The US Center for Disease Control and Prevention (CDC) data from 2010 estimates that 1 in 68 children now has autism.

"The statistics are alarming. It's 30 per cent higher than the previous estimate of 1 in 88 children, up from only two years earlier. Perhaps we can no longer attribute this rise in autism incidence to better diagnostic tools or awareness of autism," notes Crawford. "It's even more apparent from the recent literature that the environment might have a greater impact on vulnerable genes, particularly in pregnancy. Our study provides some molecular evidence that the environment likely disrupts certain events occurring in early [brain development](#) and contributes to autism."

According to Crawford, genes don't undergo significant changes in evolution, so even though

genetic factors are the main cause, environmental factors such as insufficient dietary supplementations of fatty acids, exposures to infections, various chemicals or drugs can change gene expression and contribute to [autism](#).

Provided by York University

APA citation: Lipid levels during prenatal brain development impact autism (2014, April 8) retrieved 5 May 2021 from <https://medicalxpress.com/news/2014-04-lipid-prenatal-brain-impact-autism.html>

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