Medical Xpress

Zinc found to reverse brain cell changes in autism

August 31 2016

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.

Cellular changes in the brain caused by genetic mutations that occur in autism can be reversed by zinc, according to research at the University of Auckland.

Medical scientists at the University's Department of Physiology have researched aspects of how autism mutations change brain cell function for the past five years.

This latest work - a joint collaborative effort lead by neuroscientist collaborators in Auckland, America and Germany - was published today in the high impact journal, the *Journal of Neuroscience*.

The study was funded by the Marsden Fund and the Neurological Foundation.

Lead investigator at the University of Auckland, Associate Professor Johanna Montgomery from the University's Department of Physiology and Centre for Brain Research, says "This most recent work, builds significantly from our earlier work showing that gene changes in autism decrease brain cell communication."

"We are seeking ways to reverse these cellular deficits caused by autism-associated changes in brain cells," she says."This study looks at how zinc can alter brain cell communication that is altered at the cellular level and we are now taking that forward to look at the function of zinc at the dietary and behaviour level."

"Autism is associated with genetic changes that result in behavioural changes," says Dr Montgomery. "It begins within the cells, so what happens at a behavioural level indicates something that has gone wrong at the cellular level in the brain."

International studies have found that normally there are high levels of zinc in the brain, and brain cells are regulated by zinc, but that zinc deficiency is prevalent in autistic children.

"Research using animal models has shown that when a mother is given a

low zinc diet, the offspring will be more likely to display autistic associated behaviours," she says.

"Our work is showing that even the cells that carry genetic changes associated with autism can respond to zinc.

"Our research has focussed on the protein Shank3, which is localized at synapses in the brain and is associated with neuro-developmental disorders such as autism and schizophrenia," she says.

"Human patients with genetic changes in Shank3 show profound communication and behavioural deficits. In this study, we show that Shank3 is a key component of a zinc-sensitive signalling system that regulates how brain cells communicate."

"Intriguingly, autism-associated changes in the Shank3 gene impair brain cell communication," says Dr Montgomery. "These genetic changes in Shank3 do not alter its ability to respond to zinc".

"As a result, we have shown that zinc can increase brain cell communication that was previously weakened by autism-associated changes in Shank3".

"Disruption of how zinc is regulated in the body may not only impair how synapses work in the brain, but may lead to cognitive and behavioural abnormalities seen in patients with psychiatric disorders."

"Together with our results, the data suggests that environmental/dietary factors such as changes in zinc levels could alter this protein's signalling system and reduce its ability to regulate the nerve cell function in the brain," she says.

This has applications to both autism and psychiatric disorders such as

schizophrenia.

Dr Montgomery says the next stage of their research is to investigate the impact of dietary zinc supplements to see what impact it has on autistic behaviours.

"Too much zinc can be toxic, so it is important to determine the optimum level for preventing and treating autism and also whether zinc is beneficial for all or a subset of genetic changes that occur in Autism patients."

Provided by University of Auckland

Citation: Zinc found to reverse brain cell changes in autism (2016, August 31) retrieved 19 September 2024 from
https://medicalxpress.com/news/2016-08-zinc-reverse-brain-cell-autism.html