MedicalXpress

# Children with fetal alcohol spectrum disorders have less deep-gray brain matter

May 19 2011, By Raquel Maurier

Children and youth who have fetal alcohol spectrum disorders have less deep-gray matter in their brains compared to children who don't have the condition, according to a collaborative study by a multidisciplinary team of researchers at the University of Alberta. This difference affects the way messages are relayed in the brain.

Deep-gray matter acts as the brain's "relay stations" by sending and receiving many messages between different regions in the brain. Therefore a reduction in this gray matter would result in difficulties sending messages back and forth related to memory, emotions, cognition and motor function, says Christian Beaulieu, professor of biomedical engineering in the Faculty of Medicine & Dentistry and an Alberta Innovates – Health Solutions scientist.

Those with FASD can have a host of language, learning, physical, memory and behavioural problems caused by exposure to alcohol before they are born.

"The key point of the research was to determine what brain regions are different in children and adolescents diagnosed with FASD and whether this could explain their motor, cognitive and behavioural difficulties," said Beaulieu. "Our previous studies showed that the brain white-matter wiring was affected in FASD. And now we show that the deep-gray-matter relay stations that integrate and convey information to the cortex are also different in FASD."

The research, which has been published in Early View, was conducted by Beaulieu, the senior author, in collaboration with Catherine Lebel from the Department of Biomedical Engineering, Alexa Nardelli from the School of Public Health, Carmen Rasmussen with the Department of Pediatrics, and Gail Andrew of the Glenrose Rehabilitation Hospital FASD Clinic.

The study looked at 28 children or youth with FASD who ranged in age from six to 17, and 56 similarly aged children who don't have the condition. Researchers took 3-D MRI images of the children's brains and analyzed all six deep-gray-matter structures. They noted the children and youth who had FASD had reductions in all of the deep-gray matter in their brains.

"Most studies collapse all the ages, but we show that the volume reductions are across the full age range of six to 17 years," noted Beaulieu.

Provided by University of Alberta

Citation: Children with fetal alcohol spectrum disorders have less deep-gray brain matter (2011, May 19) retrieved 20 March 2024 from https://medicalxpress.com/news/2011-05-children-fetal-alcohol-spectrum-disorders.html

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