New clue why autistic people don't want hugs

February 11 2010

Why do people with fragile X syndrome, a genetic defect that is the best-known cause of autism and inherited mental retardation, recoil from hugs and physical touch - even from their parents?

New research has found in fragile X syndrome there is delayed development of the sensory cortex, the part of the brain that responds to touch, according to a study from Northwestern University Feinberg School of Medicine. This delay may trigger a domino effect and cause further problems with the correct wiring of the brain. Understanding how and when the function of the brain is affected in fragile X offers a target for a therapy to fix the incorrect development.

"There is a 'critical period' during development, when the brain is very plastic and is changing rapidly," said Anis Contractor, assistant professor of physiology at Feinberg and the lead investigator of the study. "All the elements of this rapid development have to be coordinated so that the brain becomes wired correctly and therefore functions properly."

The study will be published in the Feb. 11 issue of the journal *Neuron.*

Working with a mouse model of fragile X, Contractor found the development of synapses, the sites where neurons communicate with each other, was delayed in the sensory cortex.

"The critical period may provide a window during which therapeutic intervention can correct synaptic development and reverse some of the symptoms of the disease," Contractor said.

People with this syndrome have debilitating sensory as well as cognitive problems. "They have tactile defensiveness," Contractor explained. "They don't look in people's eyes, they won't hug their parents, and they are hypersensitive to touch and sound. All of this causes anxiety for family and friends as well as for the fragile X patients themselves. Now we have the first understanding of what goes wrong in the brain."

The sensory overload in people with fragile X results in social withdrawal, hyperarousal and anxiety. It shows up in early infancy and progressively worsens throughout childhood.

Fragile X syndrome is caused by a gene mutation in the X chromosome that interferes in the production of a protein called fragile X mental retardation protein (FMRP). That protein directs the formation of other proteins that build synapses in the brain. People with fragile X are missing FMRP. It's as if the foreman is missing on the brain's key construction site. Fragile X is so named because the X chromosome appears broken or kinked.

Boys are more severely affected by fragile X because they have only one X chromosome. Girls, who have two X chromosomes, are less affected by the defect.

Contractor and colleagues discovered the sensory cortex was late to mature by recording the electrical signals flowing through the animals' synapses. This provided a snapshot of when and how this part of the brain was developing. The ability of the brain to correctly process incoming information is based on the correct development of these synapses, he noted.

This is one of the first studies to show how synapses in this region are altered. "It starts to build a framework for how this part of the cortex actually develops," Contractor said. "Our next step is to work out what is

going wrong. How does elimination of this gene FMR1 disrupt the normal developmental processes?"

Provided by Northwestern University