Autistic Children Have More Gray Matter in Brains

This imbalance may make it tougher for them to function socially, study suggests

HealthDay

Wednesday, November 28, 2007

WEDNESDAY, Nov. 28 (HealthDay News) -- Children diagnosed with autism have more gray matter in their brains than healthy children, report researchers who used a novel imaging technique to analyze brain structure.

The excess gray matter in the parietal region may make it harder for autistic children to learn how to function socially by watching other people's behaviors, the researchers suggest. In contrast, increased gray matter among healthy children correlated with higher IQ, the researchers said.

The researchers, at the Fay J. Lindner Center for Autism, North Shore-Long Island Jewish Health System in Bethpage, N.Y., were to present their findings Nov. 28 at the Radiological Society of North America annual meeting, in Chicago.

The researchers analyzed the brain images of 13 males who had either high-functioning autism or Asperger Syndrome, a developmental disorder in the autism spectrum. The researchers compared the results with images from 12 healthy children who did not have autism. On average, the preteens were 11 years old.

The researchers used a technology called diffusion tensor imaging (DTI) to produce a visual map of each child's brain. Scientists usually use DTI to visualize the brain's white matter, as well as the brain fibers. However, the research team applied it to the assessment of gray matter by employing apparent diffusion coefficient based morphometry (ABM), a new method that highlights brain regions with potential gray matter volume changes.

They found gray matter abnormalities throughout the brain, but particularly in the parietal lobe, which adds to previous research suggesting that mirror neurons found in that region play a key role in autism.

The increase in gray matter probably affects the action of the mirror neurons, said study investigator Manzar Ashtari, who is now a senior neuroscientist at Children's Hospital of Philadelphia. Mirror neurons are those cells that activate when you perform an action and then see someone else perform the same action, or vice versa. These neurons have been dubbed the "monkey-see, monkey-do" cells.

"Mirror neurons allow us to learn without knowing we are learning and then respond appropriately in certain situations," said Ashtari. She hopes to explore the link between autism and mirror neurons in future studies, using brain imaging techniques to find out when, and if, mirror neurons are engaged at the appropriate times.

The challenge with imaging studies is getting beyond measures of volume to understand smaller and more localized changes, Ashtari said. Adding ABM to DTI gave the study researchers the ability to detect subtle regional or localized changes in the gray matter, which was not possible before, she said.

The brain structures of people with autism change over their life span, explained Ashtari, which poses a problem for researchers trying to understand the disorder. "I believe it's a very complex process the brain goes through with autism and we don't know much" about that process, she said.

Unfortunately, this new imaging technique can't be used to diagnose autism, Ashtari cautioned.

"Everyone is trying to find something that is very robust, to be able to say 'you take this test, do this screening, and then you know,'" she said.

Dr. Stewart H. Mostofsky is a pediatric neurologist at the Kennedy Krieger Institute in Baltimore. He agreed that it is too soon to use any imaging technique as a part of diagnosing autism.

"We are dealing with a disorder that is defined by symptoms," said Mostofsky, who was not involved in the study. He added that there are many different possible causes of autism, which means many different brain abnormalities. "The question beyond that is whether there is a common neuromechanism. That is not entirely clear. There is no evidence that would support imaging as a diagnostic tool."

Further, he cautioned that the new study had a very small number of high-functioning participants, so conclusions about brain abnormalities cannot be generalized to all people with autism.

Another expert lauded the new findings.

Dr. Vilayanur S. Ramachandran, professor of psychology and director of the Center for Brain and Cognition at the University of California, San Diego, called the new research "a landmark anatomical study which lends support to the increasing evidence that mirror

neurons are an underlying cause of autism." He said the finding of excess gray matter suggests that one of the issues with the autistic brain may be a matter of malfunctioning connections between neurons, rather than the neurons themselves.

Ramachandran and his colleagues published work earlier this year in the journal *Cognitive Brain Research* that suggested that autistic children have a faulty mirror neuron system.

In February, the U.S. Centers for Disease Control and Prevention released statistics indicating that one in every 150 American 8-year-olds has autism spectrum disorders. A decade ago, estimates ranged anywhere from one in 500 youngsters to one in 166.

But those new statistics -- from a 14-state survey conducted by the CDC -- failed to clear up the mystery of why autism might be striking more and more children with each passing year.

http://www.nlm.nih.gov/medlineplus/news/fullstory_58183.html