'Faulty' brain connections may be responsible for social impairments in autism

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New evidence shows that the brains of adults with autism are "wired" differently from people without the disorder, and this abnormal pattern of connectivity may be responsible for the social impairments that are characteristic of autism.

Using functional magnetic resonance imaging, a team of researchers affiliated with the University of Washington's Autism Center also found that the most severely socially impaired subjects in the study exhibited the most abnormal pattern of connectivity among a network of brain regions involved in face processing.

"This study shows that these brain regions are failing to work together efficiently," said Natalia Kleinhans, a research assistant professor of radiology and lead author of the paper published in the journal Brain. "Our work seems to indicate that the brain pathways of people with autism are not completely disconnected, but they are not as strong as in people without autism."

The study is the first to look at brain connectivity and social impairment, and focused on how the brain processes information about faces. Deficits in face processing are one of the earliest characteristics to emerge in people with autism.

The research team led by Elizabeth Aylward, a UW professor of radiology, examined connectivity in the limbic system, or the network of brain regions that are involved with processing social and emotional information. Participants in the study included 19 high-functioning adults with autism who had IQs of at least 85. They ranged in age from 18 to 44 and were compared with an age- and intelligence-matched sample of 21 typically developed adults. The group with autism spectrum disorder included eight individuals diagnosed with autism, nine with Asperger's syndrome and two diagnosed with pervasive developmental disorder not otherwise specified. The level of social impairment for each autistic participant was drawn from records of clinical observations and diagnoses that confirmed that each had autism.

Each participant had his or her brain scanned while looking at pictures of faces or houses. Participants were shown four series of 12 pictures of faces and a similar number of series showing houses. Each individual picture was seen for three seconds. Occasionally the same face or house picture was repeated, and participants were told to press a button when this occurred.

There was no significant difference on the two groups' performance, because the task was so basic, said Todd Richards, a professor of radiology and co-author of the paper. "Differences might have shown up if they had been asked to do something more complicated."

However, the two groups exhibited different patterns of brain activity. The researchers focused on the fusiform face area of the brain, a region that is involved in face identification. Compared to the participants with autism, the typically developing adults showed significantly more connectivity between the fusiform face area and two other brain regions, the left amygdala and the posterior cingulate. In addition, autistic participants who had the largest social impairment showed the lowest level of connectivity between the right fusiform face area and the left amygdala and increased connectivity between the right fusiform face area and the right inferior frontal gyrus.

"This study shows that the brains of people with autism are not working as cohesively as those of people without autism when they are looking at faces and processing information about them," said Kleinhans.

Source: University of Washington

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