Medical Xpress

Research may unlock mystery of autism's origin in the brain

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In the first study of its kind, researchers have discovered that in autistic individuals, connections between brain cells may be deficient within single regions, and not just between regions, as was previously believed.

Tony Wilson, Ph.D., lead researcher and assistant professor of neurology at Wake Forest University School of Medicine, said he hopes this study will eventually lead to earlier diagnosis and more targeted medications for autism.

Using magnetoencephalography (MEG) brain imaging technology to measure brain electrical activity, the researchers administered a test called the 40 hertz (cycles per second) auditory steady-state response test. The test measures electromagnetic wave cycles and indicates brain cell discharges at the 40 hertz frequency.

"This test measures the brain's capacity to mimic what it's hearing. A healthy brain's cells will fire back at 40 hertz," said Wilson. "We chose this test because it is a robust metric of how well individual circuits are functioning."

The results were reported in this month's issue of *Biological Psychiatry*.

A group of 10 children and adolescents with autism, and 10 without autism, listened to a series of clicks occurring every 25 milliseconds (ms) for a duration of 500 ms. The MEG measured the brain's responses to these clicks.

In the right hemisphere of the brain, which controls attention and spatial processing, there was no significant difference in the groups. But the results showed a considerable discrepancy between the two groups in the left hemisphere, the area of the brain that controls language and logic.

In the auditory area of the left hemisphere, the group without autism delivered a brain response to the 40 hertz stimulation 200 ms after it began. However, the group with autism failed to respond entirely at the same 40 hertz frequency.

“Our results made sense. Both anecdotal and behavioral evidence suggest children with autism have significantly disturbed brain circuits on the local-level within an individual brain area,” said Wilson. “For example, they tend to restrict their visual gaze to a part of someone’s face, like a nose or an eye, but not the person’s whole face.”

The results also support previous research that showed disconnections between two or more brain regions, known as long-range connectivity. This new study supports the idea that the network as a whole is broken, but shows the disconnection in long-range connectivity may actually start within individual brain regions, known as local connectivity.

Wilson explains the difference between local and long-range connectivity using vision as an example. “With vision, one part of your brain identifies color, another perceives motion. Within each of these areas of your brain, there is local connectivity between brain cells that allow the region to do its job. When you see a red ball flying across the room, both of these areas of your brain start communicating with each other and put together flying and red as qualities of the same ball. That’s long-range connectivity.”

Wilson conducted the autism research while at the University of Colorado, but says he hopes to continue his autism research at Wake

Forest.

“I chose Wake Forest because it has one of the most advanced MEGs in the country. Here, we can study the brain at a very precise level,” said Wilson.

Source: Wake Forest University