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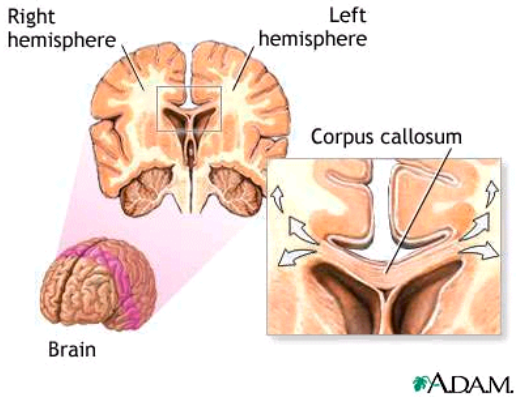
Inside the Autistic Brain

By Stacey Singer | Thursday, July 13, 2006, 12:48 PM

You've heard the phrase, "My left hand doesn't know what my right hand is doing."
In autism, that's apparently true of the brain.

New studies are revealing that specific areas of autistic brains fail to synchronize with each other as autistic people try to solve analytical problems. The difficulty seems to be unrelated to IQ.



An experiment by Marcel Just at Carnegie Mellon University in Pittsburgh, Pennsylvania, and Dr. Nancy Minshew at the University of Pittsburgh School of Medicine, and their colleagues, offered insight.

Autistic people as well as a control group underwent functional MRI while performing a pattern-recognition challenge referred to as the Tower of London. It requires moving three balls into specified arrangements.
The task demands the coordination of two parts of the brain: The prefrontal cortex, where decision making and impulse control reside, as well as the parietal cortex, which controls visual thinking and imagry.

When the "normal" study participants performed the challenge, the brain areas involved in the task lighted up at the same time — they were synchronized. In the autistic children, they were out of synch.

In the course of studying the particpants' brains, the researchers discovered an anatomical difference. An area called the corpus callosum, a section of white-matter fibers that act like cable connections between the right and left sides of the brain, was smaller in the people with autism.

Dr. Just said that the opposite was true within each hemisphere — the links between brain areas inside each half were thicker.

"At this point, we can say that autism appears to be a disorder of abnormal neurological and informational connections of the brain, but we can't yet explain the nature of that abnormality," Dr. Just told the NIH/National Institute of Child Health and Human Development, which helped pay for the research.

"These findings provide support to a new theory that views autism as a failure of brain regions to communicate with each other," said Dr. Duane Alexander, Director of NIH's National Institute of Child Health and Human Development.

A second study was equally intriguing. Researchers again used functional MRI to watch the brain work as participants took a true-false test while reading sentences, some visual, some not.

According to the NIH account: "A typical low imagery sentence consisted of constructions like "Addition, subtraction, and multiplication are all math skills." A high imagery sentence, "The number eight when rotated 90 degrees looks like a pair of eyeglasses."

The eyeglasses sentence would cause participants' left prefrontal brain areas — those involved with language — to light up. Also activated were areas dealing with vision and imagery.

The researchers found that "the visual brain areas of the normal participants were active only when evaluating sentences with imagery content. In contrast, the visual centers in the brains of participants with autism were active when evaluating both high imagery and low imagery sentences," the NIH said.

“The heavy reliance on visualization in people with autism may be an adaptation to compensate for a diminished ability to call on prefrontal regions of the brain,” Dr. Just said.

The second study also confirmed that the extent to which the two parts of the cortex could work together was correlated with the size of the corpus callosum that connected them.

About 1.5 million people in the United States have autism, according to the Autism Society of America. (www.autism-society.org/) The NIH says Dr. Just and his colleagues are conducting additional studies to ascertain the nature of the abnormality of the connections in the brains of people with autism.