Diagnosing autism with MRI is one step closer

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University of Utah (U of U) medical researchers have made an important step in diagnosing autism through using MRI, an advance that eventually could help health care providers indentify the problem much earlier in children and lead to improved treatment and outcomes for those with the disorder.

In a study published on October 15, 2010 in Cerebral Cortex online, researchers led by neuroradiologist Jeffery S. Anderson, M.D., Ph.D., U of U assistant professor of radiology, used MRI to identify areas where the left and right hemispheres of the brains of people with autism do not properly communicate with one another. Those areas are in "hot spots" associated with functions such as motor skills, attention, facial recognition, and social functioning— behaviors that are abnormal in autism. MRI's of people without the disorder did not show the same deficits.

"We know the two hemispheres must work together for many brain functions," says Anderson. "We used MRI to look at the strength of these connections from one side to the other in autism patients."

Other than increased brain size in young children with autism, there are no major structural differences between the brains of people with autism and those who do not have the disorder that can be used to diagnose autism on a routine brain MRI. It has been long believed that more profound differences could be discovered by studying how regions in the brain communicate with each other. The study, and other work U of U

researchers are doing using diffusion tensor imaging (measures microstructure of white matter that connects brain regions), reveals important information about autism. The advances highlight MRI as a potential diagnostic tool, so patients could be screened objectively, quickly, and early on when interventions are most successful. The advances also show the power of MRI to help scientists better understand and potentially better treat autism at all ages.

"We still don't know precisely what's going on in the brain in autism," says Janet Lainhart, M.D., U of U associate professor of psychiatry and pediatrics and the study's principal investigator. "This work adds an important piece of information to the autism puzzle. It adds evidence of functional impairment in brain connectivity in autism and brings us a step closer to a better understanding of this disorder. When you understand it at a biological level, you can envision how the disorder develops, what are the factors that cause it, and how can we change it. "

An increasing number of studies have shown abnormalities in connectivity in autism, but this study is one of the first of its kind to characterize functional connectivity abnormalities in the entire brain using MRI rather than in a few specific pathways. The research involved about 80 autism patients between the ages of 10-35 and took about a year and a half to complete. The results will be added to an existing autism study following 100 patients over time. "The longitudinal imaging data and associated knowledge gathered forms a unique resource that doesn't exist anywhere else in the world," says Lainhart.

In addition to someday using MRI as a diagnostic tool for autism, researchers also hope to use the data to biologically describe different subtypes of autism. "This is a complex disorder that doesn't just fall into one category," says Lainhart. "We hope the information can lead us to characterizing different types of autism that may have different symptoms or prognoses that will allow us to identify the best treatment

for each affected individual."

The collaborative autism imaging research group led by Lainhart is working together to develop methods to use brain imaging to better understand autism and improve the lives of affected individuals. It includes researchers in the departments of psychiatry, radiology, and pediatrics, the Neurosciences Program, the Scientific Computing and Imaging Institute, and The Brain Institute at the U of U, as well as collaborators at Brigham Young University, the University of Wisconsin, and Harvard University.

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