Dual approach gives a more accurate picture of the autistic brain

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A new study, the first of its kind, combines two complementary analytical brain imaging techniques, to provide a more comprehensive and accurate picture of the neuroanatomy of the autistic brain. The study, published in the April issue of neuroimaging journal *Human Brain Mapping,* was conducted by researchers at The Montreal Neurological Institute and Hospital - The Neuro, McGill University and the Université de Montréal. The findings provide critical insight into autism and possible markers for the disease for use in early therapy and therapeutic strategies.

Autism is a complex spectrum disorder thought to affect 1 in 166 people. Autistic individuals have difficulties with social interaction, communication and repetitive behaviours, which can lead to isolation and emotional problems. They may also have enhanced abilities particularly in auditory and visual perception.

Although structural brain differences have been reported in autism, the reports are inconsistent. The Neuro research team's objective therefore was to investigate neuroanatomical differences using a dual-analytic approach, combining cortical thickness analysis (CT) and voxel-based morphometry (VBM) together for the first time in the same participants. The team studied a group of young adults with autism of average intelligence and similar language ability relative to closely matched typically developing controls.

"The findings are significant from a functional perspective because the

anatomical differences are found in brain regions known to play a functional role in the core features of autism such as social communication and repetitive behaviours, says Dr. Krista Hyde, research fellow with Dr. Alan Evans at The Neuro, and lead investigator in the study. "This is the first step to looking for clues or markers that would help us correlate structural differences with functional and behavioural characteristics."

The advantage in analyzing brain anatomy using CT and VBM is the complementary nature of the two methods, which in combination provide a direct measure of cortical grey matter, regions of the brain that consist primarily of nerve cell bodies. The combined method also provides a measure of subcortical grey matter as well as white matter, regions of the brain composed mainly of nerve cell fibres which have myelin sheaths, the protective covering that insulates and supports nerve cells. "The converging results found from CT and VBM analysis, allows us to make more confident interpretations about the structural brain differences found in autism," adds Dr. Hyde.

Regional differences in grey matter were found in socially-relevant and communication-related brain areas, as well as in areas implicated in repetitive behaviours and those found to play a role in empathic behavior. The study also identifies grey matter increases in autism in the visual cortex and for the first time, in the primary auditory cortex. "We believe that the visual and auditory cortical thickness increases may be related to enhanced visual and auditory perception in autism."

"These new results are extremely important because they offer a more accurate picture of the autistic brain, helping researchers improve early autism treatment strategies," says Dr. Anthony Phillips, Scientific Director of the Canadian Institutes of Health Research (CIHR) Institute of Neurosciences, Mental Health and Addiction. "Autism rates have been rising steadily in Canada, so CIHR is proud to support researchers

who devote their time to look into this neurological condition."

The study's findings provide vital insight into autism by identifying structural differences in functionally relevant areas of the brain in a group of individuals with autism using a dual analytic approach for the first time.

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