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Biological marker for Alzheimer's holds promise for earlier diagnosis and treatment

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Researchers at Robarts Research Institute at The University of Western Ontario in London, Canada have found clear evidence that increases in the size of the brain ventricles are directly associated with cognitive impairment and Alzheimer's disease.

Ventricles are fluid-filled cavities in the brain. The research, led by Robarts scientist Robert Bartha, shows the volume of the brain ventricles expands as surrounding tissue dies. The research is published online in the neurology journal *Brain*.

Currently, diagnosis for Alzheimer's relies on neuro-cognitive assessments, such as testing of memory, ability to problem solve, count, etc. Definitive diagnosis is not possible until after death when an autopsy can reveal the presence of amyloid plaques and 'tangles' in brain tissue.

Previous research has shown the link between ventricle size and Alzheimer's over longer time intervals. The research conducted at Robarts Research Institute shows that ventricle size increases with mild cognitive impairment before a diagnosis of Alzheimer's disease, and continues to increase with the onset and progression of Alzheimer's disease after only six months.

"These findings mean that, in the future, by using magnetic resonance imaging (MRI) to measure changes in brain ventricle size, we may be able to provide earlier and more definitive diagnosis," said Bartha, who is also an Associate Professor in the Schulich School of Medicine &

Dentistry in Medical Biophysics. "In addition, as new treatments for Alzheimer's are developed, the measurement of brain ventricle changes can also be used to quickly determine the effectiveness of the treatment."

The research also showed that Alzheimer's patients with a genetic marker for Alzheimer's disease exhibited faster expansion in ventricle volume.

The research was performed by utilizing MRI scans from individuals from across North America. Graduate student Sean Nestor, a coauthor, examined 500 data sets of individuals at baseline and six months later. The images were obtained from the Alzheimer's Disease Neuroimaging Initiative (ADNI), a large multi-site trial sponsored by the National Institutes of Health in the United States and the pharmaceutical industry. The project includes an online database of imaging information gathered from 800 people at more than 50 sites across the U.S. and Canada. The images are MRIs of individuals with no cognitive impairment, those with mild cognitive impairment and people with Alzheimer's disease. The database can be used by any primary researcher.

One of the ADNI sites is at London's Lawson Health Research Institute, and is led by Dr. Michael Borrie, a co-investigator on the research. Dr. Borrie is Medical Director of the Aging Brain and Memory Clinic and Geriatric Clinical Trials Group at Parkwood Hospital, St. Joseph's Health Care, London, a Lawson researcher and Chair of the Division of Geriatric Medicine at Western's Schulich School of Medicine & Dentistry.

Examination of the MRIs was made possible by using software developed by Cedara Software, the OEM division of Merge Healthcare. In the past, researchers would have to manually or semi-automatically trace the ventricles in many brain images, each showing a "slice" of the

brain. The Merge OEM software team, led by Vittorio Accomazzi, a coauthor in the research, worked closely with the researchers to refine the software to allow the processing of large volumes of data very quickly.

"This is one of the first major research studies published using data from ADNI", said Borrie, "but there will be many more neuroimaging and biomarker discoveries to arise from the ADNI project. It is a tremendous opportunity for researchers anywhere in the world to use the ADNI databases, to collaborate and share their findings in a new way that will move Alzheimer's disease research forward more quickly, objectively and effectively. Already we are building new international collaborations, arising from ADNI, that we could not have even imagined."

Source: University of Western Ontario