

Study shows dementia-related brain changes are identifiable even before problems are noticeable

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U of T's Morgan Barense is a senior author of a study that found a potential predictor for dementia. Credit: Diana Tyszko

Researchers at the University of Toronto and Baycrest Rotman Research

Institute (RRI) have discovered a potential brain imaging predictor for dementia, which illustrates that changes to the brain's structure may occur years prior to a diagnosis, even before individuals notice their own memory problems.

The joint study, published in the *Neurobiology of Aging* journal on May 8, looked at older adults who are living in the Toronto community without assistance and who were unaware of any major [memory problems](#), but who scored below the normal benchmark on a [dementia](#) screening test.

Within these older adults, researchers also found evidence of less [brain](#) tissue in the same subregion of the brain where Alzheimer's disease originates (the anterolateral entorhinal cortex located in the brain's temporal lobe).

This U of T-Baycrest study is the first to measure this particular brain subregion in older adults who do not have a [dementia diagnosis](#) or memory problems that affect their day-to-day routine. It is also the first study to demonstrate that performance on the Montreal Cognitive Assessment (MoCA) dementia screening test is linked to the volume (size) of this subregion, along with other brain regions affected early in the course of Alzheimer's disease.

"This work is an important first step in determining a procedure to identify [older adults](#) living independently at home without memory complaints who are at risk for dementia," says Morgan Barense, associate professor in the department of psychology in the Faculty of Arts & Science at U of T and senior author on the study.

The team studied 40 adults between the ages of 59 and 81 who live independently (or with a spouse) at home. All participants were tested on the MoCA. Those scoring below 26 – a score that indicates a potential

problem in memory and [thinking skills](#) and suggests further dementia screening is needed – were compared to those scoring 26 and above.

"The early detection of these at-risk individuals has the potential to facilitate drug developments or other therapeutic interventions for Alzheimer's disease," says Rosanna Olsen, first author on the study, RRI scientist and assistant professor in U of T's department of psychology.

"This research also adds to our basic understanding of aging and the early mechanisms of Alzheimer's disease."

Scientists were able to reliably measure the volume of the anterolateral entorhinal cortex by using high-resolution brain scans that were collected for each participant.

The strongest volume differences were found in the exact regions of the brain in which Alzheimer's disease originates. The researchers are planning a follow-up study to determine whether people who demonstrated poor thinking and memory abilities and smaller brain volumes indeed go on to develop dementia.

"The MoCA is good at diagnosing mild cognitive impairment (MCI) (a condition that is likely to develop into Alzheimer's) and we are seeing that it may identify MCI in people who are not aware of a decline in their memory and thinking skills," said Barense.

Alzheimer's disease is a devastating neurodegenerative illness with widespread personal, societal and economic consequences. An estimated 564,000 Canadians live with dementia and 1.1 million Canadians are affected by the disease, according to the Alzheimer Society of Canada. There are 25,000 new cases of dementia diagnosed every year in Canada and it costs \$10.4 billion to care for those living with dementia.

"A key take-away from the study is that it highlights the utility of the MoCA test in identifying individuals who are at-risk for dementia," said Olsen.

Adults who are older than 40 and interested in testing their [memory](#) and attention prior to raising concerns with their doctor can consult Baycrest's online brain health assessment tool, Cogniciti.

More information: R.K. Olsen et al. Human anterolateral entorhinal cortex volumes are associated with cognitive decline in aging prior to clinical diagnosis, *Neurobiology of Aging* (2017). [DOI: 10.1016/j.neurobiolaging.2017.04.025](https://doi.org/10.1016/j.neurobiolaging.2017.04.025)

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