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Researchers at The Neuro show a brain exercise yields benefits

With implications for aging and dementia, a study finds game-like online exercises offset signs of aging in key brain systems for learning and memory – the first of any intervention shown to do so

A McGill University-led clinical trial is the first in humans to show online brain training exercises can improve brain networks affecting learning and memory.

The study found 10 weeks' use of the game-like app BrainHQ by older adults enhanced cholinergic function, a chemical system in the brain that typically declines with age and influences attention, memory and decision-making.

"The training restored cholinergic health to levels typically seen in someone 10 years younger," said senior author [Dr. Etienne de Villers-Sidani](#), an Associate Professor in McGill's Department of Neurology and Neurosurgery and neurologist at The Neuro (Montreal Neurological Institute-Hospital).

"This is the first time any intervention, drug or non-drug, has been shown to do that in humans," he said.

Alzheimer's disease involves particularly steep declines in cholinergic health. This study offers a biochemical explanation of prior findings showing these exercises reduce dementia risk and boost cognition. The researchers say this training could offer a lower-risk alternative to medication or be used alongside it.

Evidence-backed brain game

BrainHQ offers speed-based exercises that become progressively more challenging and attention-demanding, shown to be effective in hundreds of studies.

"A lot of people assume crossword puzzles or reading are enough to keep the brain sharp. But not all activities truly promote neuroplasticity," said de Villers-Sidani.

The program is already commercially available, making it an option for clinicians to discuss with patients interested in supporting brain health, he added.

Rare brain scan at The Neuro

To track brain changes, researchers used a special PET scan and tracer that makes cholinergic reserves visible on the scan, allowing them to see how active the cholinergic system was before and after training.

“We used a rare technology,” said de Villers-Sidani. “[The Neuro](#) is one of the few centres worldwide that can produce the tracer and run the scan.”

The study enrolled 92 healthy adults aged 65 and older. Participants were randomly assigned to either BrainHQ training or an active control using computer games designed for entertainment. Each group was assigned their activity on a tablet for 30 minutes per day for 10 weeks. Only the BrainHQ group showed gains in cholinergic activity.

The researchers are planning a follow-up study to test the program in people with early-stage dementia.

About the study

“Effects of Computerized Cognitive Training on Vesicular Acetylcholine Transporter Levels using Fluoroethoxybenzovesamicol Positron Emission Tomography in Healthy Older Adults: Results from the INHANCE Randomized Clinical Trial” by Mouna Attarha and Etienne de Villers-Sidani et al. is published in [JMIR Serious Games](#).

The study was conducted independently by McGill researchers in collaboration with Posit Science, which provided access to BrainHQ. All data collection and analyses were led by McGill.

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