

Moderate aerobic exercise in older adults shown to modify brain hippocampus, improve memory

January 31 2011

A new study shows that one year of moderate physical exercise can increase the size of the brain's hippocampus in older adults, leading to an improvement in spatial memory.

The project—conducted by researchers at the University of Pittsburgh, University of Illinois, Rice University, and Ohio State University—is considered the first study of its kind focusing on [older adults](#) who are already experiencing atrophy of the hippocampus, the brain structure involved in all forms of [memory](#) formation. The study, funded through the National Institute on Aging, appears in the Jan. 31 *Proceedings of the National Academy of Sciences (PNAS)*.

The scientists recruited 120 sedentary older people without dementia and randomly placed them in one of two groups—those who began an exercise regimen of walking around a track for 40 minutes a day, three days a week, or those limited to stretching and toning exercises. Magnetic resonance images were collected before the intervention, after six months, and at the end of the one-year study.

The aerobic exercise group demonstrated an increase in volume of the left and right hippocampus of 2.12 percent and 1.97 percent, respectively. The same regions of the brain in those who did stretching exercises decreased in volume by 1.40 and 1.43 percent, respectively.

[Spatial memory](#) tests were conducted for all participants at the three intervals. Those in the [aerobic exercise](#) group showed improved memory function, when measured against their performance at the start of the study, an improvement associated with the increased size of the hippocampus. The authors also examined several biomarkers associated with brain health, including brain-derived neurotrophic factor (BDNF), a small molecule that is involved in learning and memory. They found that the increases in hippocampal size were associated with increased amounts of BDNF.

"We think of the atrophy of the [hippocampus](#) in later life as almost inevitable," said Kirk Erickson, professor of psychology at the University of Pittsburgh and the paper's lead author. "But we've shown that even moderate exercise for one year can increase the size of that structure. The brain at that stage remains modifiable."

"The results of our study are particularly interesting in that they suggest that even modest amounts of exercise by sedentary older adults can lead to substantial improvements in memory and [brain](#) health," said Art Kramer, director of the Beckman Institute at the University of Illinois and the senior author.

"Such improvements have important implications for the health of our citizens and the expanding population of older adults worldwide."

Provided by University of Illinois at Urbana-Champaign

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