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Clues to how 'super-agers' retain young memories

Researchers' images reveal robust brain networks

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Photo courtesy of Jesse Orrico

New research reveals how some older adults appear to be “super-agers” with unusually resilient memories.

MGH Communications

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Some loss of memory is usually considered an inevitable part of aging, but new research reveals how some people appear to escape that fate. A study by investigators at Harvard-affiliated Massachusetts General Hospital examined a group of older adults with extraordinary memory performance and found that certain key areas of their brains resembled those of young people.

The study, published in the *Journal of Neuroscience*, is the first step in a research program aimed at understanding how some older adults retain youthful thinking abilities and the brain circuits that support those abilities. The program is led by two senior authors of the new study — Bradford Dickerson, a Harvard Medical School associate professor of neurology and director of the Frontotemporal Disorders Unit in the MGH Department of Neurology, and Lisa Feldman Barrett of the hospital’s Department of Psychiatry.

While most older adults experience a gradual decline in memory ability, some researchers have described “super-agers” with unusually resilient memories. For the new study, the investigators enrolled 40 adults ages 60 to 80 — 17 of whom performed as well as adults four to five decades younger on memory tests, and 23 with normal results for their age group — and 41 adults ages 18 to 35.

“Previous research on super-aging has compared people over age 85 to those who are middle-aged,” said Alexandra Touroutoglou of MGH Neurology and HMS, who co-authored the research with Dickerson and Barrett. “Our study is exciting because we focused on people around or just after typical retirement age — mostly in their 60s and 70s — and investigated those who could remember as well as people in their 20s.”

Imaging studies revealed that super-agers had brains with youthful characteristics. While the cortex — the outermost sheet of brain cells that is critical for many thinking abilities — and other parts of the brain typically shrink with aging, in the brains of super-agers a number of those regions were comparable in size to those of young adults.

“We looked at a set of brain areas known as the default mode network, which has been associated with the ability to learn and remember new information, and found that those areas, particularly the hippocampus and medial prefrontal cortex, were thicker in super-agers than in other older adults,” Touroutoglou said. “In some cases, there was no difference in thickness between super-agers and young adults.”

Barrett, who is also University Distinguished Professor at Northeastern University, added: “We also examined a group of regions known as the salience network, which is involved in identifying information that is important and needs attention for specific situations, and found preserved thickness among super-agers in several regions, including the anterior insula and orbitofrontal cortex.”

Critically, the researchers showed not only that super-agers had no shrinkage in these brain networks but also that the size of these regions was correlated with memory ability. One of the strongest correlations between brain size and memory was found in an area at the intersection of the salience and default mode networks. Previous research has shown that this region — the para-midcingulate cortex — is an important hub that allows different brain networks to communicate efficiently.

“We believe that effective communication between these networks is very important for healthy cognitive aging,” said Touroutoglou.

Understanding which factors protect against memory decline could lead to important advances in treating age-related memory loss and possibly even various forms of dementia, said Dickerson.

“We desperately need to understand how some older adults are able to function very well into their seventh, eight, and ninth decades. This could provide important clues about how to prevent the decline in memory and thinking that accompanies aging in most of us.”

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