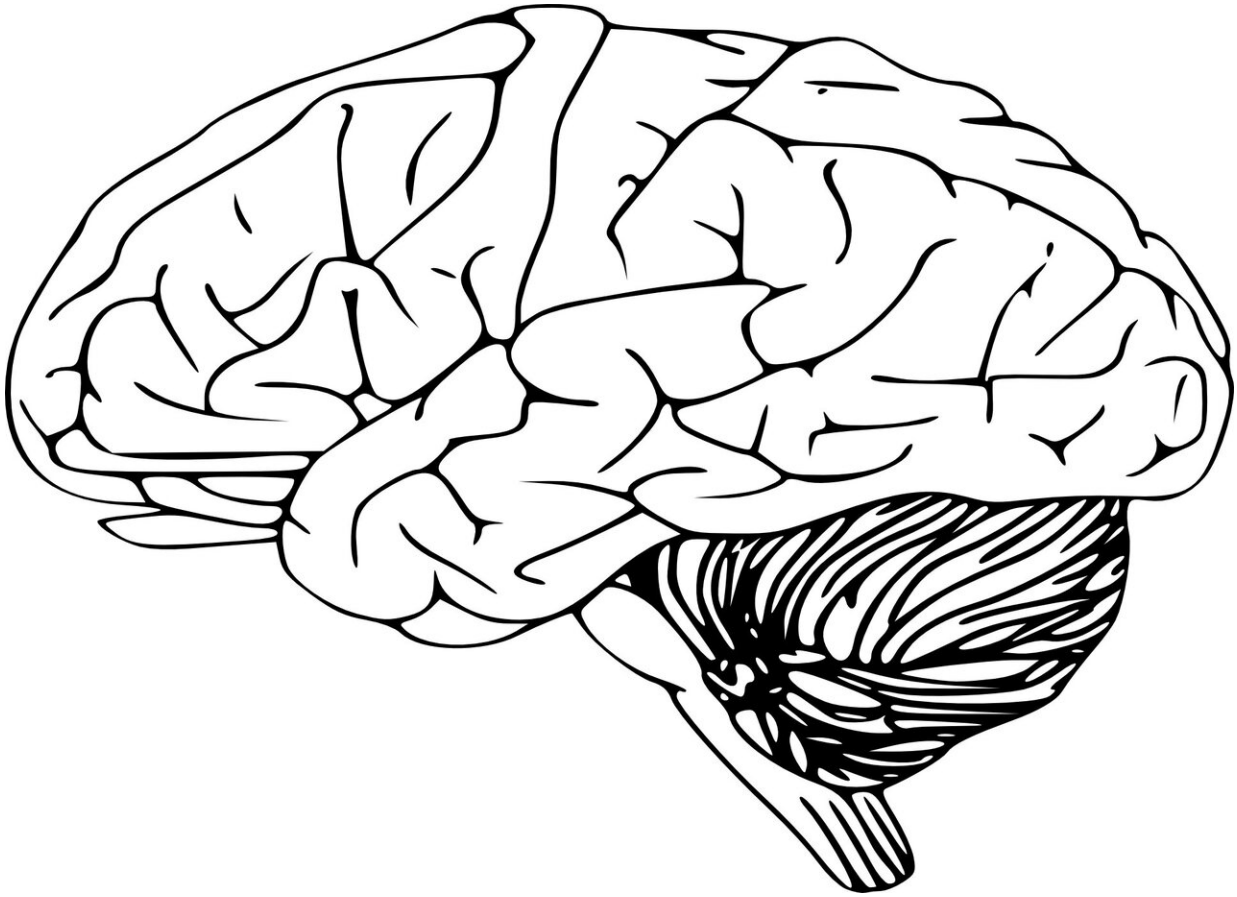
Possible 'steps' to revealing super-agers

April 17 2023



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On the quest for the proverbial fountain of youth, scientists have long looked for evidence of super-agers—people whose brain ages slower than their body. Researchers at the Del Monte Institute for Neuroscience

at the University of Rochester have found older adults whose brain performance improves when they combine a cognitive task with walking.

"Identifying super-agers will leverage what we understand about the brain and aging," said Eleni Patelaki, a Biomedical Engineering Ph.D. student at the University of Rochester Medical Center and first author of the paper out today in *NeuroImage*. "But this is difficult to do because, in this case, there was no external evidence of this ability, and people are unaware that their brain is working differently."

Walking and doing exposes brain flexibility

Researchers had the participants complete the same cognitive task while sitting and while walking. The 37 men and women, ages 62 to 79, scored similarly while sitting. When the same group repeated the test while walking, researchers found some individuals improved their cognitive performance. Researchers used Mobile Brain/Body Imaging (MoBI) to observe these changes and measure how the brain responded to the dual task. "We think this brain activity might constitute signatures of 'super-aging," said Patelaki. "We were able to find seven people, and now that we know where and how to look in the brain to find these super-agers, we can find more."

The participants whose cognition improved while walking showed that their brain was able to adapt to and improve at the task—it had flexible usage of certain frontal resources. But those same people lost their flexibility in using the rest of their neural resources, similar to their peers who did not improve at the task while walking. This suggests that the brain's ability to adapt or its flexibility in reallocating neural resources while walking might be an important factor in protecting cognition as we age.

Some young adult brains also improve

Previously, the same group of researchers in the Frederick J. and Marion A. Schindler Cognitive Neurophysiology Laboratory discovered that some young and healthy people also improve their performance on cognitive tasks while walking by changing the use of neural resources.

Like the older adults, there was no predictor of who would improve and who would not before being tested. This study was Patelaki's first clue that the dual-task experiment could find super-agers. Most previous research shows that the more tasks a person has to do concurrently, the worse they perform, especially older individuals.

Developing a map for brain health

Brain flexibility is an indicator of brain health. This research offers a potentially necessary component for tracking the health of an individual's brain—it found where to look.

"These findings have promise for being translated to clinical populations, such as patients with neurodegenerative diseases," said Ed Freedman, Ph.D., associate professor of Neuroscience and senior author of this study. "These markers could be used to assess the degree of disease progression, to evaluate treatment outcomes, and potentially to identify people, pre-clinically, at high risk for developing aging-related or disease-related cognitive decline."

Additional authors include John Foxe, Ph.D., Emma Mantel, George Kassis of the Del Monte Institute for Neuroscience at the University of Rochester. This research was supported by the Del Monte Institute for Neuroscience Pilot Program, Recordings were conducted at the University of Rochester Intellectual and Developmental Disabilities

Research Center (UR-IDDRC).

More information: Eleni Patelaki et al, Paradoxical improvement of cognitive control in older adults under dual-task walking conditions is associated with more flexible reallocation of neural resources: A Mobile Brain-Body Imaging (MoBI) study, *NeuroImage* (2023). DOI: 10.1016/j.neuroimage.2023.120098

Provided by University of Rochester Medical Center