

SuperAgers Show Unique Cell Signatures in the Brain

People with good memory at ages 80 or older showed evidence of more newly created neurons.

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Most of us experience some decline in our memory and learning abilities as we age. Some will have memory problems or impairment and may develop Alzheimer's disease or other dementias. Yet certain older adults can remember past events better than someone 25 to 30 years younger. Identifying unique features in the brains of these cognitive SuperAgers could lead to new approaches for supporting healthy brain aging.

Brain cells called neurons undergo a lifecycle—they're born, they age, and in conditions such as Alzheimer's disease, they may die. Scientists once thought that as people age, they no longer create new neurons in the hippocampus, a brain region responsible for learning and memory. However, recent studies in animal models show that new neurons created in the hippocampus during adulthood can help fend off memory loss. Whether this process also occurs in humans remains unclear.

An NIH-funded research team, led by Drs. Orly Lazarov and Jalees Rehman at the University of Illinois, Chicago, turned to the brains of cognitive SuperAgers for clues. SuperAgers were defined as people at least 80 years old with memory test scores as good as or better than those of people in their 50s and 60s. The team looked for molecular signatures unique to those with exceptional recall and memory.

The researchers used cutting-edge methods to analyze more than 350,000 individual hippocampal cells from donated postmortem brains. First, they identified molecular signatures of new neuron formation in young adult hippocampi. They then compared these signatures across older adults with varying cognitive abilities, including SuperAgers. The study results appeared in *Nature* on February 25, 2026.

The molecular signatures associated with new neuron development varied based on the donor's cognitive abilities. For example, SuperAgers had their own distinct signature and more newly created neurons than other groups. This distinguished SuperAgers even from other cognitively healthy groups. Also, those with Alzheimer's disease featured signatures indicating a problem in neuron creation.

The researchers also found that certain processes in specific cells were likely better maintained in SuperAgers than in other groups. These processes serve important functions such as communication between neurons and cell survival.

These findings give us a better understanding of cognitive function in the human brain as we age. “Determining why some brains age more healthily than others can help researchers make therapeutics that will boost memory in aging and prevent Alzheimer’s disease and related dementia,” Lazarov says.

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