

Superager brains yield new clues to their remarkable memories

February 3 2015



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SuperAgers, aged 80 and above, have distinctly different looking brains than those of normal older people, according to new Northwestern Medicine research that is beginning to reveal why the memories of these cognitively elite elders don't suffer the usual ravages of time.

SuperAgers have memories that are as sharp as those of healthy persons decades younger.

Understanding their unique "brain signature" will enable scientists to decipher the genetic or molecular source and may foster the development of strategies to protect the memories of normal aging persons as well as treat dementia.

Published Jan. 28 in the *Journal of Neuroscience*, the study is the first to quantify brain differences of SuperAgers and normal older people.

Cognitive SuperAgers were first identified in 2007 by scientists at Northwestern's Cognitive Neurology and Alzheimer's Disease Center at Northwestern University Feinberg School of Medicine.

Their unusual brain signature has three common components when compared with normal persons of similar ages: a thicker region of the cortex; significantly fewer tangles (a primary marker of Alzheimer's disease) and a whopping supply of a specific neuron —von Economo—linked to higher social intelligence.

"The brains of the SuperAgers are either wired differently or have structural differences when compared to normal individuals of the same age," said Changiz Geula, study senior author and a research professor at the Cognitive Neurology and Alzheimer's Disease Center. "It may be one factor, such as expression of a specific gene, or a combination of factors that offers protection."

The Center has a new NIH grant to continue the research.

"Identifying the factors that contribute to the SuperAgers' unusual memory capacity may allow us to offer strategies to help the growing population of 'normal' elderly maintain their cognitive function and

guide future therapies to treat certain dementias," said Tamar Gefen, the first study author and a clinical neuropsychology doctoral candidate at Feinberg.

MRI imaging and an analysis of the SuperAger brains after death show the following brain signature:

1) MRI imaging showed the [anterior cingulate cortex](#) of SuperAgers (31 subjects) was not only significantly thicker than the same area in aged individuals with normal cognitive performance (21 subjects), but also larger than the same area in a group of much younger, middle-aged individuals (ages 50 to 60, 18 subjects). This region is indirectly related to memory through its influence on related functions such as cognitive control, executive function, conflict resolution, motivation and perseverance.

2) Analysis of the brains of five SuperAgers showed the anterior cingulate cortex had approximately 87 percent less tangles than age-matched controls and 92 percent less tangles than individuals with [mild cognitive impairment](#). The neurofibrillary [brain](#) tangles, twisted fibers consisting of the protein tau, strangle and eventually kill neurons.

3) The number of von Economo neurons was approximately three to five times higher in the anterior cingulate of SuperAgers compared with age-matched controls and individuals with mild cognitive impairment.

"It's thought that these von Economo neurons play a critical role in the rapid transmission of behaviorally relevant information related to social interactions," Geula said, "which is how they may relate to better memory capacity." These cells are present in such species as whales, elephants, dolphins and higher apes.

Provided by Northwestern University

Citation: Superager brains yield new clues to their remarkable memories (2015, February 3)
retrieved 25 April 2024 from

<https://medicalxpress.com/news/2015-02-superager-brains-yield-clues-remarkable.html>

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