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Healthy older brains not significantly smaller than younger brains, new imaging study shows

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The belief that healthy older brains are substantially smaller than younger brains may stem from studies that did not screen out people whose undetected, slowly developing brain disease was killing off cells in key areas, according to new research. As a result, previous findings may have overestimated atrophy and underestimated normal size for the older brain.

The new study tested participants in Holland's long-term Maastricht Aging Study who were free of neurological problems such as dementia, Parkinson's disease or stroke. Once participants were deemed otherwise healthy, they took neuropsychological tests, including a screening test for dementia, at baseline and every three years afterward for nine years.

According to the report in the September *Neuropsychology,* published by the American Psychological Association, participants were also given MRI scans at Year 3 to measure seven different parts of the brain, including the memory-laden hippocampus, the areas around it, and the frontal and cingulate areas of the cognitively critical cortex.

After examining behavioral data collected from 1994 to 2005 (with scans taken between 1997 and 1999 depending on when people entered the study), the researchers divided participants into two groups: one group with 35 cognitively healthy people who stayed free of dementia (average starting age 69.1 years), and the other group with 30 people

who showed substantial cognitive decline but were still dementia-free (average starting age 69.2 years).

That cognitive decline was measured by drops of at least 30 percent on two or more of six core tests of verbal learning and fluency, recall, processing speed, and complex information processing, and/or drops of 3 or more points, or scores of 24 or lower (raising suspicion for cognitive impairment), on the Mini-Mental State Examination screening tool for dementia.

In contrast to the 35 people who stayed healthy, the 30 people who declined cognitively over nine years showed a significant effect for age in the hippocampus and parahippocampal areas, and in the frontal and cingulate cortices. In short, among the people whose cognition got worse, older participants had smaller brain areas than younger participants.

Thus, the seeming age-related atrophy in gray matter more likely reflected pathological changes in the brain that underlie significant cognitive decline than aging itself, the authors wrote. As long as people stay cognitively healthy, the researchers believe that the gray matter of areas supporting cognition might not shrink much at all. "If future longitudinal studies find similar results, our conception of 'normal' brain aging may become more optimistic," said lead author Saartje Burgmans, who is due to receive her PhD later this year.

The findings should caution scientists about drawing conclusions from brain studies that don't screen participants over time, using precise and objective definitions, the authors added.

More information: "The Prevalence of Cortical Gray Matter Atrophy May Be Overestimated In the Healthy Aging Brain," Saartje Burgmans, PhD student, Martin P. J. van Boxtel, PhD, MD, Eric F. P. M. Vuurman, PhD, Floortje Smeets, PhD student, and Ed H. B. M. Gronenschild,

PhD, Maastricht University; Harry B. M. Uylings, PhD, Maastricht University and VU University Medical Center Amsterdam; and Jelle Jolles, PhD, Maastricht University; *Neuropsychology*, Vol. 23, No. 5.

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