

REDUCED CEREBRAL GRAY MATTER VOLUMES MAY HAVE PROGNOSTIC SIGNIFICANCE FOR MEMORY DECLINE IN HEALTHY OLDER ADULTS.

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Objective: There is considerable interest in identifying predictors of memory decline in nondemented older adults. Cerebral atrophy has been an indicator of cognitive decline in both patients with Alzheimer's disease and Mild Cognitive Impairment. We evaluated the ability of gray and white cerebral volume, as measured by three-dimensional cortical dynamic maps, to predict memory decline over 2-years in older adults both with and without the APOE-4 genetic risk for Alzheimer's disease. **Methods:** We recruited 23 nondemented adults (age range 50 – 82 years), 12 with APOE-4 and 11 without APOE-4. MRI brain scans were obtained and memory tests were administered at baseline and 2-year follow-up. Cortical pattern matching was used to evaluate brain shape and tissue distribution. Using a cortical flattening process and sulcal matching techniques, an average model of the cortex was built for subject groups. A statistical model was tested, using age, education, APOE status (APOE-4 vs nonAPOE-4), and gray and white matter volumes at baseline to predict memory test decline over 2 years, while controlling for gender and head size. **Results:** Regardless of APOE status, reduced gray matter volume in the left hemisphere at baseline predicted memory decline at 2 years ($F(5,8) = 4.65, p = 0.03$). We also categorized the subjects into "decliners" and "maintainers" depending on if the subject declined or not in memory test performance on 2 or more of 5 memory tests over a two-year period. Subjects who had memory decline over 2 years had a 6% lower left gray matter volume at baseline compared to subjects who did not decline. Other volumetric measures, including right gray matter and left and right white matter volumes, as well as APOE status, were not associated with memory decline or memory classification group. **Conclusions:** For all subjects, reduced gray matter volumes at baseline were associated with memory decline, and baseline gray matter atrophy in the left hemisphere, distinguished memory decliners from maintainers. These results expand upon previous findings using these same imaging techniques, that gray matter losses on average of 5 % per year occur in AD, and that gray matter loss is most rapid in the left compared to right hemisphere (Thompson et al., 2003). Regardless of APOE status, decreased left hemisphere gray matter volume in nondemented persons may have prognostic significance for subsequent memory decline.