Relationship of White Matter Integrity and Cognitive Performance in Elderly Adults

ABSTRACT

It is still largely unclear how age-related changes in white matter (WM) may associate to changes in cognition. Several studies reported a decline of WM integrity in frontal regions in late adulthood affecting cognitive performance that led to a disconnection hypothesis. The present work is devoted to assess the relationships between WM integrity and cognitive performance in a group of healthy elderly adults. Participants consisted of 20 healthy volunteers between 57 and 73 years. WM integrity was assessed by diffusion tensor imaging and statistical analysis was performed by means of a voxelwise analysis of fractional anisotropy using Tract-Based Spatial Statistics and region of interest analysis. Cognitive performance was assessed by a set of standard neuropsychological tests. The results showed a positive correlation of FA values with performance of a visual scanning task in frontal WM regions. Negative correlations of FA values with flexibility, working memory and an inhibition tasks were also observed in several areas in contradiction with the hypotheses and previous literature. We conclude that there is a relationship between WM integrity measurements and very basic cognitive performance such as visual scanning and motor speed in healthy elderly adults. More research has to be done using functional imaging methods in combination with DTI, in order to analyze more precisely the structural and functional interactions during cognitive performance in healthy elderly adults.