뇌신경재활

게시일시 및 장소 : 10 월 18 일(금) 13:15-18:00 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 15:53-15:57 Room G(3F)

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Differences in White Matter Integrity and Cognition According to Genetic Polymorphism in Elderly

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Objective

It is well known that significant white matter deterioration occurs with aging and the rate of decline is varies from person to person. Environmental or genetic factors, or combination of the two would probably play an important role in explaining such individual variability in aging process. Brain-derived neurotrophic factor (BDNF) and Catechol-O-methyltransferase (COMT) are most important gene that participates in neuronal plasticity. So we investigated whether BDNF and COMT polymorphism have effect on such variability by using Diffusion Tensor Image (DTI).

Methods

34 healthy subjects (mean age 70.2±1.2) were recruited. We obtained DTI and genetic polymorphism information (BDNF, COMT gene) and Montreal Cognitive assessment (MoCA). DTI was acquired by 3-T Achieva MRI scanner (Philips Medical systems, Andover, MA, USA) and 82 region-of-interest (ROI) from whole brain were selected in standard brain, which were then transformed to native individual space using inverse transformation metrics. The diffusion metrics including fractional anisotropy (FA), mean, axial, and radial diffusivity (MD, AD, RD) were obtained from all ROIs. We performed Analysis of variance to analyze difference in each value according to gene polymorphism. Post hoc tests were performed using the Bonferroni method. Chi-square test was performed to see if specific gene is related to cognitive function. Pearson correlation analysis was done to verify the relationship between changes of diffusion metrics of ROIs and age decline. A p-value < 0.05 were considered to be statistical significant.

Results

In comparison of 3 groups (Val/Val, Val/Met, Met/Met), COMT Val/Val Polymorphism subject had larger AD value in right precuneus than COMT Met/Met type ($p = 0.021$). In case of BDNF, Met/Met subjects had larger AD of right pedunculopontine nucleus than Val/Met subjects ($p = 0.025$). There was no significant difference between groups in MoCA. However, when we divide into 2 groups (Met allele vs. Val/Val), COMT Met allele appeared to be associated with higher cognitive function (MoCA≥22)($p = 0.02$) with smaller MD, AD

and RD value at right hippocampus, right thalamus and AD of right uncinate fasciculus and left caudate. Areas that was correlated to age decline irrelevant to genetic polymorphism were middle cerebellar peduncle, corpus callosum, fornix, anterior corona radiata, right pars triangularis, left sagittal stratum inferior occipitofrontal fasciculus, fornix stria terminalis, right superior frontooccipital, tapetum, accumbens, amygdala, caudate, cingulum, lateral and medial orbitofrontal cortex, thalamus, hypothalamus, left angular gyrus (Decreased FA, Increased MD, AD, RD).

Conclusion

In this study, we found the neural correlates of the white matter integrity related to BDNF and COMT polymorphism as well as age decline in geriatric subjects. COMT Met allele seems to have protective effect on degeneration limbic system related structure and affect cognitive function.