White matter hyper intensities evoke cortical atrophy but their influence on cognitive deterioration seem to be later event

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Background: The white matter hyper intensities (WMHs) are high signal lesions seen on T2 or FLAIR MRI (Fluid-attenuated inversion recovery) images. It is known to be a normal aging process but also as a marker of small vascular disease and severe WHMs are thought to cause cerebral cortical and subcortical atrophy. But WMHs are also founded in the MRIs of normal aging population. We aim to understand the effect of WMHs in normal aged subjects as an aging process, especially on the cortical thickness and cognition.

Methodology: Total 392 elderly individuals were recruited from the community based study pool of individuals registered in a National Research Center for Dementia, Gwangju, Korea. They have no focal neurological deficits and no history of severe medical illnesses and cerebrovascular accidents and their basic or instrumental daily activities were all normal. They were assessed with a series of questionnaires and comprehensive neuropsychological (NP) assessment using the Seoul Neuropsychological Screening Battery, blood sampling and MRI imaging and last interview by well-trained doctors. They were divided into two groups [cognitively normal (CN; 223) and minimally cognitive impairment (MCI; 169)] according to neuropsychological test z score over/under – 1.5 according to the age, education and gender specific norms. White matter hyperintensities (WMHs) were assessed by visual scoring with a scale by Fazekas et al. into 4 groups (0, 1, 2, 3). Cortical thickness of various cortical areas and hippocampal and ventricular volumes were measured automatically based on 3D MP-RAGE (three-dimension magnetization prepared rapid gradient echo) images using Free surfer software.

Results: At the demographic and clinical characteristics in CN group age, sex, smoking history was statistically significant. At MCI groups age, height, K-MMSE, monthly income, hypertension, ApoE4 were the significant. At cognitive profiles, WMHs did not affect on any of cognitive domains in cognitive normal group. But in MCI groups, WMHs affects on many cognitive domains (WMHs) were assessed by visual scoring with a scale by Fazekas et al. into 4 groups (0, 1, 2, 3). Cortical thickness of various cortical areas and hippocampal and ventricular volumes were measured automatically based on 3D MP-RAGE (three-dimension magnetization prepared rapid gradient echo) images using Free surfer software.

Conclusions: The older, low-educated, smaller, hypertensive and depressive females seem to be more susceptible to WMHs. When cognitive normal, WMHs did not affect cognitive profiles but when cognition decline, WMHs seem to aggravate visuospatial memory and frontal cognitive profiles. As WMH increases, so does the brain decreases but hippocampal atrophy seems not closely related with WMHs. The particular cortical areas vulnerable to increasing WM hyperintensities are fusiform, lingual, insular cortices of frontal lobe and some areas of temporal lobe and cingulate gyrus. We suppose WMHs slow progress in aging phenomenon causes cortical atrophy and cognitive decline, but their effects were not evident until the decompensation develops.

Biography
Huwon Kim pursued his MD and PhD in Neurology from Chonnam National University. He is currently a Clinician majoring in Neurology at the Chosun University Hospital, Republic of South Korea. He is one of the principal investigators of National Dementia Research Project, GwangJu. He served as a Research Fellow at the Samsung Medical Center (2000-2001); worked in the Neurology Clinic at Ilsan Hospital, Ilsan City (2001-2002). He has published more than 15 papers and has presented his talk on several occasions in domestic and international conferences.

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