WHITE AND GREY MATTER ALTERATIONS AND CEREBRAL HYPOPERFUSION IN MILD COGNITIVE IMPAIRMENT AND ALZHEIMER DISEASE

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Introduction: Alzheimer disease (AD) develops from mild cognitive impairment (MCI). Cognitive status is reported to correlate with pathological distribution of neurofibrillary tangle (NFT) in MCI and AD. Recently, multimodal neuroimaging studies enable us to evaluate various aspects of brain simultaneously.

Aims: We aimed to elucidate the progression patterns of white and grey matter and the cerebral perfusion in MCI and AD patients.

Methods: Twenty seven patients with MCI, 36 with mild AD, 35 with moderate AD, and 25 control subjects were enrolled in this study. White and grey matter and cerebral perfusion were evaluated with diffusion tensor imaging, structural data and IMP-SPECT analyzed by using tract-based spatial statistics, voxel-based morphometry and 3-dimensional stereotactic surface projection, respectively.

Results: Fractional anisotropy (FA) values were significantly decreased in the corpus callosum in MCI and AD, and in parts (mild AD) of and broader areas (moderate AD) of the frontal, parahippocampal and parietal white matter, cingulum and uncinate fasciculus. Grey matter volume were significantly decreased in left parahippocampal gyrus in MCI, medial temporal lobes and basal frontal lobes in mild AD, and diffuse temporal lobes and parts of frontal and parietal lobes in moderate AD. There was hypoperfusion in the cingulate gyrus in MCI and AD and precuneus and posterior parietal lobes in AD.

Conclusions: The pattern of grey matter atrophy was consistent with the distribution of NFT. In contrast, decreased FA values and the cerebral hypoperfusion may reflect multiple pathogenesis such as wallerian degeneration or dying back pattern of degeneration and synaptic dysfunction.