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DIFFERENTIATION OF DEMENTIA WITH LEWY BODIES FROM ALZHEIMER'S DISEASE USING FDG PET AND I-123-FLUOROPROPYL-β-CIT SPECT

Departments of Nuclear Medicine and Neurology, Seoul National University College of Medicine

Eun Kyung Park *, Sang Soo Cho, Jae Sung Lee, Jung Eun Kim, SangYun Kim, Won Woo Lee, Dong Soo Lee, June-Key Chung, Myung-Chul Lee, Sang Eun Kim

Purpose: Dementia with Lewy bodies (DLB) shares clinical and pathological features with Alzheimer's disease (AD) and Parkinson's disease. The differentiation of DLB from these disorders poses difficulties. We compared regional cerebral metabolic impairment and dopaminergic neuronal integrity between patients with DLB and AD using FDG PET and I-123-fluoropropyl-β-CIT (FP-CIT) SPECT, respectively, as measures for differential diagnosis. **Methods:** Fourteen clinically diagnosed DLB patients, 15 probable AD patients, and 12 age- and gender-matched healthy controls were studied with FDG PET and FP-CIT SPECT. A voxel-wise comparison of PET images was performed using SPM99. A dopamine transporter (DAT) parameter V3was calculated in striatal regions as (striatal VOIcerebellar VOI)/cerebellar VOI activity on SPECT images obtained 3 h after injection of 185 MBq FP-CIT. **Results:** SPM analysis of PET images of DLB revealed hypometabolism bilaterally in the occipital cortices, lateral occipitotemporal gyri, cunei, caudate, and thalami compared with controls, most pronounced in the occipital cortex compared with AD. In DLB, V3 in the caudate (1.07±0.55) and putamen (1.01±0.34) was significantly ($P < 0.001$) lower than in AD (2.73±0.75 and 3.17±0.88, respectively) and controls (3.00±0.45 and 3.11±0.31, respectively). There was no significant difference in striatal V3 between AD and controls. The ratio of putamen-to-caudate V3 was not significantly different between DLB (1.04±0.32) and controls (1.05±0.12), indicating that DATs in the caudate and putamen are evenly affected in DLB. In DLB, there was a significant correlation between striatal V3 and MMSE score (rho=0.97, $P < 0.01$). **Conclusion:** These data demonstrate different biochemical features between DLB and AD, in terms of regional brain metabolism and dopaminergic neuronal integrity. Measures of the glucose metabolism in the occipital cortex and the striatal DAT density may be informative diagnostic aids to distinguish DLB from AD.

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Characteristic pattern of cerebral perfusion in patients with the early stage of subcortical vascular dementia compared with Alzheimer's disease

Departments of Nuclear Medicine[1] & Neurology[2], Dong-A University School of Medicine

Young Jin Jeong *, Do-Young Kang[1], Kyung Won Park[2], Sang-Myung Cheon[2], Jong Kuk Kim[2], Jae Woo Kim[2]

Purpose: Brain perfusion SPECT has been commonly used to evaluate several different types of dementia. The aim of this study is to assess the specific patterns of regional cerebral blood flow (rCBF) in patients with the early stage of subcortical vascular dementia (SVD) and Alzheimer's disease (AD) using Tc-99m HMPAO SPECT, and to compare the differences between the two conditions. **Methods:** Sixteen SVD (mean age: 68.0 ±7.0 years, educational period: 6.3±5.6 years, CDR: 0.80±0.26), 46 AD (mean age: 69.9±7.4 years, educational period: 5.4±4.7 years, CDR: 0.86± 0.23) and 12 normal control subjects (mean age: 67.1±7.7 years, educational period: 6.2±4.2 years) participated in this study. We included the patients with SVD and AD according to NINCDS-ADRDA criteria for probable AD and NINDS-AIREN criteria for probable or possible VD. They were all matched for age, education and clinical dementia scale scores. **Results:** SPM analysis of the SPECT image showed significant perfusion deficits on the right temporal region and right thalamus, left insula and superior temporal gyrus, both cingulate gyri and frontal subgyral regions in patients with SVD and on the left supramarginal gyrus, superior temporal gyrus, postcentral gyrus and inferior parietal lobule, right fugiform gyrus and both cingulate gyri in patients with AD compared with control subjects (uncorrected $p<0.01$). SVD patients revealed significant hypoperfusion in the right parahippocampal gyrus, right cingulated gyrus, left insula, and both frontal subgyral regions compared with AD patients (uncorrected $p<0.01$). SVD patients revealed significant hyperperfusion in right superior frontal gyrus, left pre- and postcentral gyri, left paracentral lobule, left precuneus and both medial frontal gyri compared with AD patients (uncorrected $p<0.01$). **Conclusion:** Our study shows characteristic and different pattern of perfusion deficits in patients with SVD and AD, and these results may be helpful to discriminate the two conditions in the early stage of illness.