ORIGINAL ARTICLE

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Assessment of dopamine metabolism in brain of patients with dementia by means of ^{18}F-fluorodopa and PET

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By means of positron emission tomography (PET) and ^{18}F-fluorodopa (FDOPA), a study was initiated to analyze the cerebral dopamine (DA) metabolism of 32 subjects including those with AD/SDAT and vascular dementia (VD, multi-infarct type). A semiautomated irregular ROI drawing routine to identify the striatum was developed that interactively defined the PET threshold pixels referring to the count histograms and location of the corresponding pixels. A comparative study by five examiners showed significant improvement in the area size definition and count linearity particularly for low contrast objects. The graphical plot was employed to calculate the FDOPA influx rate (Ki) for the ROI data with cerebellar radioactivity as an input function. The striatal Ki value was found to be relatively stable and did not show signs of a significant age-related change. The vascular patients had smaller Ki to the striatum than the aged control. Although the mean Ki of AD/SDAT was almost compatible with that of age-matched normals, their Ki was more scattered with higher and lower Ki cases. The multiple regression analysis revealed that the Ki could be predicted by age and the mini-mental state (MMS) performance ($r^2 = 0.590$, $p < 0.01$ for AD/SDAT, $r^2 = 0.401$, and $p < 0.05$ for VD). MMS was found to be a more dominant factor than age. We conclude that dopamine metabolism became disturbed as dementia became progressively severe.

Key words: Neurotransmission, PET, dementia, DOPA metabolism