

Amyloid imaging of dementia using the radioligand ¹⁸F-AV-45 (Florbetapir F 18)

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Abstract

Purpose: To quantitatively evaluate fibrillar β -amyloid burden in patients with probable Alzheimer's disease (AD), mild cognitive impairment (MCI), and frontotemporal lobar degeneration (FTLD), as well as in healthy control (HC), using ¹⁸F-AV-45 (Florbetapir) positron emission tomography (PET).

Methods: We performed ¹⁸F-AV-45 PET on 28 patients with probable AD (16 men; mean Mini-Mental State Examination (MMSE) score, 22±5.0; mean age, 69.8±10.4 years), 14 patients with MCI (7 men; mean MMSE score, 26±3.4; mean age, 67.1±6.1 years), 11 patients with FTLD (8 men; mean MMSE score, 25.6±2.5; mean age, 65.5±11.8 years), and 8 HCs (3 men; mean age, 70.8±6.1 years). Dynamic PET was performed from 0 to 80 min after tracer injection (370 MBq), and time-activity curves were constructed. Standardized uptake value (SUV) and cortex-to-cerebellum SUV ratio (SUVR) were calculated for cortical (frontal, temporal, parietal, and occipital lobes) and non-cortical (hippocampus, caudate, putamen, thalamus, and pons) regions of interest. We made an examination of MMSE and WMS-R for all patients and HC.

Results: In the 10-min period from 50 to 60 min after tracer injection, cortex-to-cerebellum SUVR were 1.39–1.52 for patients with AD, 1.27–1.34 for patients with MCI, 1.02–1.18 for patients with FTLD, and 1.12–1.33 for HC. In HC, SUVR was higher for white matter than for gray matter. However, for patients with AD, SUVR was higher for gray matter than for white matter. In the frontal, parietal, and temporal regions, SUVR was greater in patients with AD than in patients with FTLD or HC. In the frontal and parietal regions, SUVR was greater in patients with MCI than in FTLD. No significant difference was

evident between SUVR in patients with AD and in patients with MCI. In the occipital regions, SUVR was similar in patients with all diseases and in HC. No significant difference was observed in the cortical retention of amyloid of all cortical regions for all subjects. Among patients with AD and MCI, the SUVR of all cortical regions was similar in apolipoprotein E ϵ 4 (APOE- ϵ 4) carriers and ϵ 4 non-carriers. Among patients with AD and MCI, no significant correlation was observed between SUVR and scores of MMSE and WMS Delayed Recall.

Conclusion: These results suggest that ^{18}F -AV-45 PET may be valuable for discriminating between AD dementia and non-AD dementia.