GLOBAL AND CEREBELLAR INTENSITY NORMALIZATION IN THE DETECTION OF REDUCED CEREBRAL GLUCOSE METABOLISM IN PATIENTS WITH MCI AND ALZHEIMER’S DISEASE USING [18F]FLUORODEOXYGLUCOSE PET

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Introduction: [18F]fluorodeoxyglucose positron emission tomography (FDG PET) may support the early and differential diagnosis of mild cognitive impairment (MCI) and Alzheimer’s disease (AD). However, there is still debate which reference area should be preferred for the intensity normalization. The present study compared the discrimination power of two intensity normalization methods (global and cerebellar normalization) between patients with MCI or AD, and healthy controls.

Methods: 15 patients with AD (69.3±8.4 years) and 28 patients with MCI (66.9±9.2 years) as well as 10 healthy controls (58.4±6.0 years) underwent FDG PET under resting conditions. Two intensity normalization methods were applied: Global normalization to the whole brain mean intensity and cerebellar normalization to the cerebellar cortex intensity. Between-group differences in relative regional glucose metabolism were assessed by voxel-wise t-tests with gender, age and education as covariates using SPM8. Cluster extent and peak voxel height were compared between both methods.

Results: Compared with healthy controls, cerebellar normalization as compared with global normalization

(a) found 1.9 and 6.0 times greater cluster of reduced glucose metabolism in AD and MCI, respectively, and

(b) rejected any regional hypermetabolism in patients.

By contrast, global normalization revealed greater cluster extents for both contrasts MCI greater than AD and AD greater than MCI as compared with cerebellar normalization.

Conclusion: Cerebellar normalization clearly outperformed global normalization in detecting more regional hypometabolism and rejecting hypermetabolism in patients. By contrast, global normalization might be more sensitive for differential diagnosis between MCI and AD by detecting regions with impaired and preserved metabolism.