

Evaluation of Focus Laterality in Temporal Lobe Epilepsy: A Quantitative Study

Comparing Double Inversion-Recovery MR Imaging at 3T with FDG-PET

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Summary

Objective: To quantitatively compare diagnostic capability of double inversion recovery (DIR) with fluorine-18 fluorodeoxyglucose positron emission tomography (FDG-PET) for detection of seizure focus laterality in temporal lobe epilepsy (TLE).

Methods: This study was approved by the institutional review board, and written informed consent was obtained. Fifteen TLE patients and 38 healthy volunteers were enrolled. All MR images were acquired using a 3T-MRI system. Voxel-based analysis (VBA) was conducted for FDG-PET images and white matter segments of DIR images (DIR-WM) focused on the whole temporal lobe (TL) and the anterior part of the temporal lobe (ATL). Distribution of hypometabolic areas on FDG-PET and increased signal intensity areas on DIR-WM was evaluated, and their laterality was compared with clinically-determined seizure focus laterality. Correct diagnostic rates of laterality were evaluated, and agreement between DIR-WM and FDG-PET was assessed using κ statistics.

Results: Increased signal intensity areas on DIR-WM were located at the vicinity of the hypometabolic areas on FDG-PET, especially in the ATL. Correct diagnostic rates of seizure focus laterality for DIR-WM (0.80 and 0.67 for the TL and the ATL, respectively) were slightly higher than those for FDG-PET (0.67 and 0.60 for the TL and the ATL, respectively). Agreement of laterality between DIR-WM and FDG-PET was substantial for the TL and almost perfect for the ATL ($\kappa = 0.67$ and 0.86 , respectively).

Significance: High agreement in localization between DIR-WM and FDG-PET and nearly equivalent detectability of them show us an additional role of MRI in temporal lobe epilepsy.