

MRI:

MRI was performed using a 3T unit (Tim Trio, SIEMENS) with a specific protocol that included the following sequences: Coronal T2 FSE (TR 5590 ms; TE 92 ms, 3 mm slice thickness); Coronal 3D MPRAGE (TR 2000 ms; TE 2.98 ms, 0.9 mm slice thickness); Coronal 3D Inversion Recovery (TR 3000 ms; TE 384 ms; TI 380 ms, 0.9 mm slice thickness); Sagittal 3D FLAIR (TR 5000 ms; TE 396 ms and T1 1800 ms, 0.9 mm slice thickness) and axial T2 FSE (TR 4640, TE 99 ms, 3 mm slice thickness). All the coronal sequences were acquired parallel to long axis of hippocampus and all sequences covered the full brain.

SPECT:

Ictal and interictal studies were acquired within two hours after radioisotope injection with the same protocol, using a dual-head SPECT imaging system (Infinia, GE) with a low energy high-resolution parallel-hole collimator. Using a radius of rotation of 14 cm, 120 projections were acquired over 360° at 40 s/projection in a 128x128 matrix with pixel size of 3.32x3.32 mm². Images were reconstructed using a filtered backprojection algorithm with a Butterworth filter (fc=0.42; order 0.52) in the same matrix size. To assess and accurately locate the epileptogenic seizure focus before surgery we used the SISCOM procedure (Subtraction Ictal Spect Co-registered to Magnetic Resonance Imaging), which provides the coupling of brain perfusion and morphology (12). The procedure consisted of two steps: 1) Subtracted-SPECT image: Ictal and interictal reconstructed SPECT studies were realigned using a rigid body transformation with a local correlation coefficient as a cost function. They were then normalized in intensity and the interictal SPECT was subtracted from the ictal SPECT using an in-house software program written in MATLAB with some routines written in C language (13). 2) Composite-SISCOM image: The interictal SPECT was co-registered to the MRI with SPM, using the Mutual Information algorithm, applying the same transformation to the other images (Ictal Spect and Subtracted-SPECT). Subtracted-SPECT studies were then segmented to show only voxel intensities greater than 2SD above the mean (14). Finally, SPM was used to overlay the subtracted image on the 3D-MRI.