

Poster ME-4

Cerebrocortical Regions Associated with Implicit and Explicit Memory Retrieval Under the Conceptual Processing: BOLD Functional MR Imaging

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Purpose : This study is to compare the distinct brain activation between implicit and explicit memory retrieval tasks using a non-invasive blood-oxygenation-level-dependent (BOLD) functional magnetic resonance imaging(fMRI).

Materials & Methods : We studied seven right-handed, healthy volunteers aged 21-25 years(mean; 22 years) were scanned under a 1.5T Signa Horizon Echospeed MR imager(GE Medical Systems, Milwaukee, U.S.A.). During the implicit and explicit memory retrieval tasks of previously learned words under the conceptual processing, we acquired fMRI data using gradient-echo EPI with 50ms TE, 3000ms TR, 26cm×26cm field-of-view, 128×128 matrix, and ten slices(6mm slice thickness, 1mm gap) parallel to the AC-PC(anterior commissure and posterior commissure) line. By using the program of statistical parametric mapping(SPM99), functional activation maps were reconstructed and quantified.

Results : In the conceptual processing, activation of SFG/MFG-10 and PoCeG-1·2·3 was associated with implicit retrieval only; while the brain area of STG-22 was activated during the explicit retrieval task only. Compared with implicit retrieval, explicit tasks were somewhat dominant with respect to the brain activation, providing a greater activity by 12.7%. The most distinct brain activity in explicit retrieval was shown in the temporal and parietal lobes, 82.8% and 50.2% higher activities, respectively. On the contrary, the frontal lobe gave greater activities by 22.8% during the implicit retrieval with the conceptual processing. Overall lateralization of activation was dominant in the left hemisphere during both implicit and explicit retrieval tasks. However, the explicit retrieval gave greater lateralization index in comparison with implicit retrieval.

Conclusion : Our findings confirm that the cerebral regions associated with implicit and explicit retrieval tasks are neuro-anatomically dissociated, and that lateralizing the cerebral hemisphere related with language-memory function might be important in the preoperative evaluation of patients with brain diseases.