

Effect of temporal lobe epilepsy on language function revealed by fMRI

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Purpose: Language functioning may be affected in patients with chronic intractable epilepsy especially in left hemisphere [4]. Functional neuro mapping corresponding to language areas may be of use in surgery planning in preoperative intractable epilepsy patients. Functional MRI was used to map the cortical language network in patients of temporal lobe epilepsy prior to and after six months of surgery.

Method: After obtaining the institute ethics approval, 13 consecutive patients with intractable epilepsy and 15 controls were recruited in the study (Table 1). Patients underwent ATLR. fMRI was performed using single-shot echo planar imaging sequence on 1.5T MR scanner (Avanto, Siemens, Germany) with 12-channel head coil. Design of the study involved four blocks with meaningful word reading task, semantic judgment task, syntax reading task, comprehension syntactic-semantic task during active phase and black screen during baseline. The stimuli were presented using MR compatible audio visual stimulus system with binocular LCD goggles (Nordic Neuro Lab, Norway), responses were recorded using 4-key button pad (Lumina LP 400, Cedrus Inc, USA) and microphone. Data analysis and group comparisons were carried out using SPM8.

Results: Preoperative data revealed less neural activity in IFG and STG in patients. Strong BOLD activation was observed post surgery in left IFG, MFG and STG during lexical reading and semantic reading task in comparison to judgment and comprehension syntactic-semantic task. Clinical language assessment (IAB) demonstrated improvement in patients after surgery.

Discussion: Disturbances in language network in intractable epilepsy patients, revealed by BOLD may be due to intractable seizure discharges and pathological abnormality. After surgery, specific language components (lexical, semantic, syntactic processing) were restored in TLE patients. However BOLD activation in MTG and STG involved in integration of semantic and syntactic information and is particularly responsive to meaningful sentences during semantic reading task [1,2]. We observed patients who were affected hippocampal sclerosis showed atypical language lateralization may suggest dominant hippocampus can be involve semantic and lexical information, and can raise questions regarding the specific roles of medial and lateral temporal cortex in targeted word retrieval [2]. Most of the patients reorganized language function after Anterior temporal lobe resection which suggest it is an effective treatment for refractory temporal lobe epilepsy[4].

Conclusion: Intractable epilepsy patients have atypical language lateralization with ipsilateral and contra lateral hemispheric lesions and pathological abnormalities. Important language components (lexical reading, semantic decision, semantic-syntactic processing) as measured by fMRI can guide surgeons for preservation of important brain areas during ATLR.

References:

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Table 1. Demographic details				
Group	Subjects	(Mean age \pm SD)	Gender	Diagnosis
LTLE	10	23.5 \pm 4.30	6M/4F	LMTS
RTLE	3	24.33 \pm 5.68	2M/1F	RMTS
Control	15	30.7 \pm 6.2	12M/3F	Normal

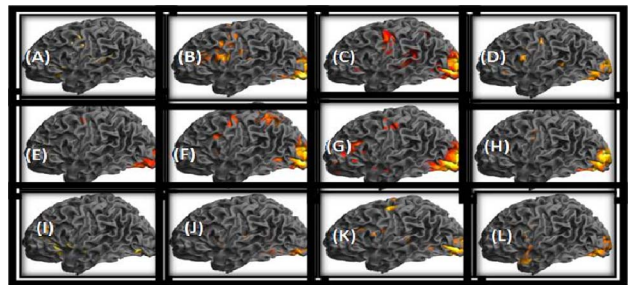


Figure 1. BOLD activation during Word reading task, Semantic judgement task, Syntax reading task and comprehension syntactic semantic task (A,B,C,D) in controls, Presurgery LTLE group (E,F,G,H) and Post surgery (I,J,K,L).