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Abstract

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PI Title: ASSISTANT PROFESSOR OF NEUROLOGY

Project Title: MRI OF STRUCTURE/FUNCTION IN TEMPORAL LOBE EPILEPSY

Abstract: DESCRIPTION: (Applicant's abstract) Epilepsy is among the most common neurological disorders, affecting approximately one percent of the adult population. Although anticonvulsants provide reasonable control of seizures in the majority of affected patients, up to twenty percent are refractory to medical therapy. In patients with refractory temporal lobe epilepsy (TLE), temporal lobectomy is beneficial, resulting in better seizure control, better integration into society, and a lower incidence of unexplained death, but carries a risk of producing memory or language disturbances. Assessment of memory function is a critical aspect of the preoperative evaluation for temporal lobectomy. Functional magnetic resonance imaging (fMRI) techniques allow task-specific regional brain function to be visualized noninvasively with high spatial resolution, and should be applicable to the preoperative assessment of abnormalities in memory function. Preliminary data obtained from normal volunteers and patients with TLE demonstrate that fMRI can noninvasively determine hemispheric asymmetries in the recruitment of mesial temporal lobe (mTL) structures during the performance of episodic memory tasks. In contrast to normal subjects who show symmetrical mTL activation, patients with TLE show significant asymmetries. The lateralization of the measured asymmetries are in agreement with findings by invasive testing using intracarotid amobarbital, currently the "gold-standard" for the preoperative assessment of memory and language laterality. The proposed research will use fMRI during memory tasks to delineate mTL brain regions involved in episodic memory function, and will validate a role of fMRI as a clinically useful tool in the presurgical evaluation of patients with medically intractable temporal lobe epilepsy. We will assess its clinical value by prospectively comparing the results of fMRI memory assessment with intracarotid amobarbital testing (IAT) as well as post-surgical neuropsychological outcomes in 125 patients with TLE who undergo temporal lobectomy. The results of fMRI will also be compared with volumetric assessment of mTL structures to examine the correlation between structural changes and functional deficits in mTL structures. Validation of an fMRI protocol for assessing memory function will improve the safety and quality of the preoperative assessment for temporal lobectomy, and may have important implications for neurosurgical planning and prognosis.

Thesaurus Terms:

brain interhemispheric activity, epilepsy, functional magnetic resonance imaging, memory, temporal lobe /cortex

brain mapping, cerebral dominance, neuroanatomy, neuropsychology

bioimaging /biomedical imaging, clinical research, human subject, neuropsychological test

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