

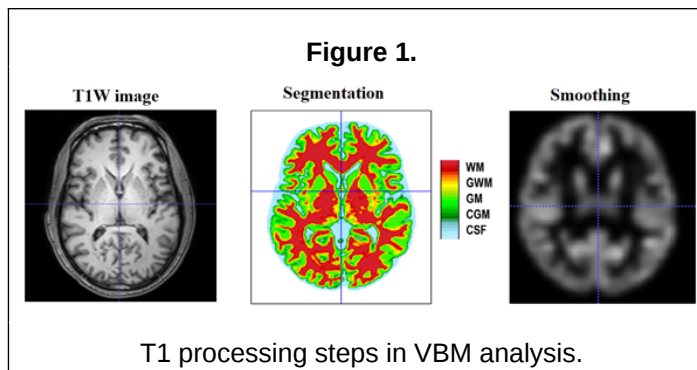
Introduction

Neurologic diseases, such as epilepsy, often cause long-term debilitation for patients leading to deficits in brain function and frequent seizures [1,2]. The purpose of this study is to determine if there are changes in gray matter concentration using voxel based morphometry (VBM) between mesial temporal lobe epilepsy (MTLE) responders and non-responders to the surgical treatments including either an anterior temporal lobectomy (ATL) or Selective Laser Amygdalohippampectomy (SLAH).

Methods

A total of 18 patients with TLE (12 males, 6 females, with mean age and std of 46.18 ± 13.8) underwent either ATL or SLAH and were scanned using T1 prior to surgery. 12 patients were responded to surgical treatments and 6 patients were still experienced seizure after surgery within 6 months follow up. All patients had a diagnosis of TLE according to standard clinical criteria.

VBM was performed on T1 images using CAT12 and SPM12 toolboxes. Initially T1 images were normalized to a template space and segmented to the gray matter (GM), white matter (WM) and cerebrospinal fluid (CSF). Before estimating statistical model, data was smoothed using median filter to minimize the effects of noise and WM/GM interface (figure 1).



Statistics

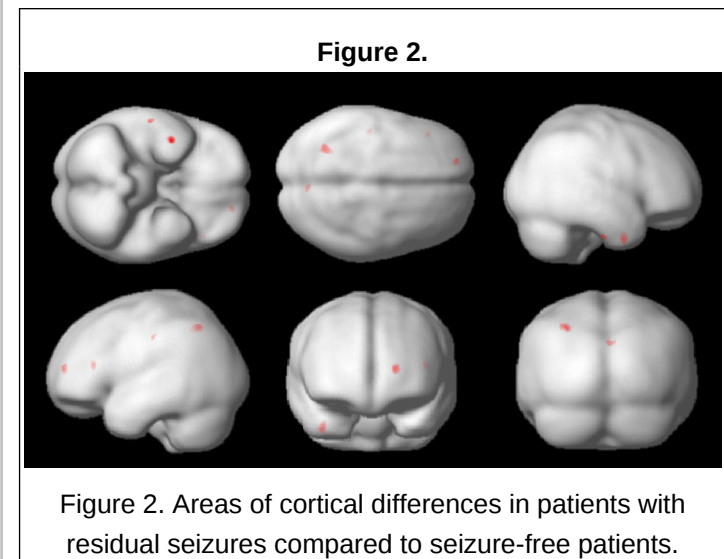
First level statistical module was designed based on paired t-test. In the statistical model, total intracranial volume (TIV) was used as a confound variable to correct for different brain sizes.

Results

Significant differences in GM concentration have been shown between responders and non-responders in 5 different regions. These regions are included contralateral middle temporal gyrus (111.38mm^3), contralateral caudate (23.63mm^3), ipsilateral dorsolateral prefrontal cortex (60.75mm^3), ipsilateral supramarginal gyrus (81mm^3) and ipsilateral postcentral gyrus (54mm^3).

Conclusions

This type of analysis provides new insights for why some patients with TLE continue to experience postoperative seizures if pathological/clinical correlates are further confirmed.



These preliminary results are very encouraging and warrant further studies with a larger population. The results show significant changes in regions outside the temporal lobe, in the areas that are connected to the limbic system specifically hippocampus and parahippocampal regions suggesting different configurations of epileptogenic networks in these 2 groups.

Learning Objectives

To characterize the cortical differences or GM atrophy in patients with residual seizures relative to the seizure free epileptic patients

References

- [1] French, J. A., et al. "Characteristics of Medial Temporal Lobe Epilepsy: I. Results of History and Physical Examination." *Annals of Neurology*, vol. 34, no. 6, 1993, pp. 774–780.
- [2] Pohlen, Michael S., et al. "Pharmacoresistance with Newer Anti-Epileptic Drugs in Mesial Temporal Lobe Epilepsy with Hippocampal Sclerosis." *Epilepsy Research*, vol. 137, 2017, pp. 56–60.