

Irritative Zones in Focal Epilepsy: an EEG-fMRI Case Study by Fernando Gonzalez

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In the absence of seizures, epileptic patients present the so-called Interictal Epileptiform Discharges (IEDs) in their EEG recordings. IED-based fMRI analysis has been successfully used for locating brain regions responsible for epileptic seizures [1,2]. This is very important to non-invasively aid the pre-surgical planning for the extraction of the epileptic foci, especially in focal cortical dysplasia, a very aggressive type of epilepsy in children, where it is usually difficult to locate the epileptic region by means of conventional clinical tools. However, clinical protocols using this approach in the United States have been barely evaluated in the past. We present the first case of a multi-institutional pediatric protocol (WIRB 20160218) using simultaneous EEG and fMRI in Miami, FL. Moreover, we propose to include the analysis of EEG source imaging (ESI) of IEDs, so far not taken into account in these types of protocols in spite of the high temporal resolution of this method. Our fMRI activation was located near the calcarine fissure, coincidentally with the region found to exhibit delta waves in post-surgical electrocorticogram (ECoG) recordings. This localization was also reproduced by ESI. Interestingly, ESI activation also reveals an alternative putative epileptic region in the parietal cortex.