

## **Automated Detection of Interictal Scalp HFOs in Epileptic Children**

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### **Rationale:**

High Frequency Oscillations (HFOs) recorded with intracranial EEG have proved to be specific markers of epileptogenicity in patients with refractory epilepsy. However, the possibility of detecting HFOs non-invasively on scalp EEG could broaden their use in clinical practice.

This study aims to verify whether HFOs (80-150 Hz) can be automatically detected from the scalp EEG of epileptic patients, and also to characterize their relationship with interictal spikes and seizure onset zone (SOZ).

### **Methods:**

Scalp EEG data were analyzed from five epileptic children. We implemented an algorithm for automatic detection of HFOs from EEG recordings. The algorithm was designed in order to be able to distinguish real HFOs from the ones elicited by artifacts and other EEG activity, assuming that HFOs are brief events with isolated spectral peak at a distinct frequency.

The algorithm identifies interictal HFOs and spikes independently. Each event was classified as: a) spike, b) HFO, or c) spike-HFO (when co-occurring). We computed the rate of each class per channel, and evaluated their correlation with the SOZ.

### **Results:**

The detected HFOs were visually confirmed by two human reviewers, proving the detector validity. Results from the analysis show that HFOs are higher inside the SOZ than outside, and also that spikes co-occurring with HFOs seem to be a reliable marker of the SOZ.

### **Discussion:**

Such automatic detector can represent a useful tool for a better understanding of scalp HFOs. The possibility to detect HFOs noninvasively and automatically may foster the use of HFOs in the presurgical evaluation of epileptic patients.