

Ictal Occurrence of High Frequency Oscillations in Human Epilepsy

There is a wealth of data reporting high frequency oscillations (HFOs) interictally, but relatively few studies have examined ictal HFOs. Here, we describe our investigations into the classification of ictal HFOs according to seizure stage, their likely generating mechanisms, and the implications for seizure localization. The key driving event is a slowly advancing wavefront marked by steady, asynchronous firing that generally cannot be detected in ECoG recordings. Ahead of the wavefront, typically in the first few seconds of a seizure, non-localizing HFOs may occur transiently. HFOs that begin later in the seizure, after wavefront passage, are more specifically localizing for areas have been invaded by the seizure. We describe a surgical outcome study based on this finding that suggests a practical roadmap for incorporating high frequency data from ictal ECoG recordings into epilepsy surgery decision-making.