

Automatically detected residual fast ripples in the intraoperative corticogram predict epilepsy surgery outcome.

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Rational: Fast ripple (FR) High Frequency Oscillations (HFOs) in the post-resection ECoG have recently been shown to be highly specific predictors of surgical outcome. However, FR visual marking is time consuming and depends on the expert observer. We propose here a time-frequency based automatic HFO detector .

Methods: Presurgical ECoG (N=14 patients) with visually marked HFOs were used to calibrate the detector's parameters defining baseline and threshold. Then the calibrated detector was applied on a larger post-resection ECoG dataset (N=54), and compared with visual marking and clinical outcome. The analysis was conducted separately for ripples (80-250 Hz) and FRs (250-500 Hz).

Results: Automatically detected FRs were predictive of clinical outcome with positive predictive value PPV = 100% and negative predictive value NPV = 62%. Channel-wise comparison showed a high association between automatic detection and visual marking ($p < 0.001$)

Discussion: Our automatic and fully unsupervised detection of HFO events emulated the expert observer's performance in both event selection and outcome prediction. It provides a standardized definition of clinically relevant HFOs, which may spread its use in clinical application.