

# Cortical electrical stimulation evoked high frequency oscillations in the human hippocampus

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## Introduction

Cortical electrical stimulation (CES) and evoked potentials (EP) used to study the neural networks. High frequency oscillations (HFO, ripples) participate in memory consolidation and epileptogenic in the hippocampal formation (HcF). We examined the effect of CES under general anesthesia in the HcF of 8 temporal lobe epilepsy patients.

## Methods

We used laminar multielectrodes to record local field potential, and spectral activation elicited by CES (0.1 ms, 5-15 mA; 0.5 Hz). Hippocampal regions were reconstructed based on histological assessment of the removed HcFs, and subregions were determined: cornu ammonis (CA), dentate gyrus (DG), subiculum (Sub). Ripples were detected by manually. Evoked spectral power and spontaneous multiple unit activity (MUA) was calculated.

## Results

Significant evHFO activity was evoked in all HcF regions. The peak time after the stimulations are the following: CA: 12±0.9 ms; DG: 27±1.7 ms; SUB: 15±1.7 ms and 40±1.36 ms. The duration time of evHFO are 22±1.9 ms derived from all cases. The maximal power frequency mean values with ERSP are 95±10.5 Hz in CA, 108±10.8 Hz in DG and 169±21.8 Hz in Sub. Overall, the amending and the modified frequencies are 11-59 Hz and 31-850 Hz. In 32% of stimulation were significantly overlapped between the HFO and MUA depth profile.

## Conclusion

EPs in the HcF contain abundant amount of HFOs. The most active region is the Sub, but DG may also contain evoked HFOs. Further investigation is needed to determine the diagnostic role of evHFO in TLE.

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