Research abstract

HFOs from intracerebral sources to surface: a simultaneous MEG-SEEG study in a focal epilepsy patient

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Rational:
It is currently unclear in which condition high frequency epileptic activity can be detected on MEG signals. Our goal was to analyze MEG time-frequency maps (in beta -16_35 Hz-, gamma -36_80 Hz-, ripple -80_250 Hz- and fast ripple -250_500 Hz- frequency band) at the time of HFOs and spikes visually identified in intracerebral-EEG recorded simultaneously (Dubarry, 2014).

Methods
A focal epilepsy patient who underwent a 10 minutes simultaneous MEG-SEEG recording (2035 Hz sampling rate, 4D Neuroimaging and BrainAmps systems) was selected for HFO marking on SEEG neocortical bipolar channels. HFOs were defined as events with at least 4 consecutive oscillations that clearly stand out of the background (Jacobs, 2010). HFOs were classified as ripples, if visible on the 80 - 250 Hz band pass filter, and as fast ripples, if visible on the 250 high pass filter. HFO rates were calculated and the 3 channels with the highest rate were selected for spike marking. Spike and HFO markings were merged. We compared the time-frequency maps performed MEG signals in the two conditions: spikes with HFOs and spikes without HFOs.

Results
Ripple-band activity in the MEG time-frequency map was clearly seen at the time of SEEG spikes with HFOs, but not during SEEG spikes without HFOs. No fast ripples-band activity on MEG time-frequency map was evident in both conditions.

Discussion
Part of HFO activity marked on SEEG is visible on MEG traces. SEEG-MEG simultaneous recording is a promising tool to study HFOs and spikes propagation from deep sources to surface.

Bibliography:

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