Title: Clinical implications of temporal variability in automatically detected HFO rates

Authors: Gliske S.V., Worrell G.A., and Stacey W.C.

Rationale: Prospective clinical use of HFOs for identifying epileptogenic regions requires understanding of many confounding factors. One such factor is temporal variability of HFO rates. Previous studies have investigated variations of the rate of human-identified HFOs during slow wave sleep, as well as variations in rate due to sleep stage. Our work extends these studies by considering the clinical impact of temporal variations in the rate of automatically detected HFOs, including variation both within and between various states of vigilance.

Methods: Continuous multi-day intracranial human EEG recordings, acquired at multiple centers, were analyzed, with the qHFO algorithm used to detect HFOs and redact artifacts. Changes in HFO rates were quantified using a geodesic distance, which assesses whether the same channels have high HFO rates across two different time epochs.

Results: While HFO rate is consistent in many patients, there are several in which the location of highest HFO rate is quite variable over hours or days.

Discussion: The results provide guidance for clinical translation of HFOs, including information regarding which time regions to utilize and how much total recording time is needed for robust determination of the epileptogenic zone.