

Electrophysiological recording of high frequency oscillations (HFO) to characterize epileptogenic brain tissue in patients

Institution: UniversitätsSpital Zürich, Klinik für Neurochirurgie

Objective:

We focus on high frequency oscillations (HFO) as diagnostic tool. We use intracranial data to establish HFO as a biomarker for the epileptogenic zone. We use HFO in scalp EEG to monitor therapy by assessing disease severity. While patients perform cognitive tasks, we test whether HFO rates are modulated by cognitive processing. In collaboration with Institute of Neuroinformatics, we develop a stand-alone device for HFO detection.

Methods:

We closely collaborate with Universitäts Kinderspital Zürich, Abteilung für Neuropedatrie and Schweizerische Epilepsie Klinik for data collection. We prospectively enroll consecutive children, adolescents and adults with drug-resistant focal, lesional epilepsy that undergo presurgical evaluation, surgical treatment and postsurgical follow-up. Each patient may undergo MRI, neuropsychology, scalp EEG, iEEG/sEEG, intraoperative ECOG, etc. According to the standard protocol of epilepsy surgery, we have

- 1) preop long-term scalp-EEG, MRI, neuropsychology,
- 2) invasive preoperative iEEG/sEEG if necessary
- 3) intraoperative ECOG if necessary
- 4) postop 3 months: scalp EEG (with sleep), MRI, neuropsychology,
- 5) postop 6 / 9 months: scalp EEG
- 6) postop 12 /24 months: scalp EEG, if necessary MRI, neuropsychology

The data is analyzed with automated HFO detection algorithms.

Both data and detection algorithms are publicly available.

State of IRB approval: approved

Current status: The research projects are funded by SNF and private foundations since 2013.

Contact: Prof. Dr. techn. Johannes Sarnthein | Klinik für Neurochirurgie

UniversitätsSpital Zürich | Frauenklinikstrasse 10 | 8091 Zürich | Schweiz | +41 44 255 5672

Johannes.sarnthein@usz.ch

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