
# Temporal Evolution and Diagnostic Utility of High Frequency Oscillations in Drug-Resistant Epilepsy

**Sabato Santaniello**
University of Connecticut

**Monday, 11/19, 9:55 am**
**Room W122, Engineering Building 2**

## LECTURE ABSTRACT

Planning a resective surgery for patients with drug-resistant epilepsy is a time-consuming, labor-intense procedure, which requires several days of continuous intracranial EEG monitoring of the patients. Clinicians spend several hours reviewing the acquired iEEG offline and labeling the seizure onset zone (SOZ), which is then used to determine the best resection strategy. In recent years, interictal high frequency oscillations (HFO) have been proposed as a promising biomarker to define the SOZ and predict the surgical outcome after the epilepsy surgery. The utility of HFO in planning the surgery, though, remains unclear. In the first part of the talk, we will present our latest results in developing a machine-learning approach to the automatic identification of the SOZ by using HFO events from as little as 30-min-long clips of intracranial EEG recordings. Tested on a cohort of twenty patients with drug-resistant epilepsy of various etiologies, the proposed approach localize the SOZ within the error margin of one electrode and is appealing because it is patient-independent, robust against neural variability due to the sleep-wake cycle, and it minimizes the duration of the clips, which make it a valuable tool for the clinical practice. In the second part of the talk, we will focus on the temporal arrangement of the HFO over multiple days of EEG recordings and we will demonstrate that, in patients with temporal lobe epilepsy – which is one of the most common forms of epilepsy – the temporal pattern of the HFOs in the SOZ has a signature rhythmicity, which emerges several hours away from the occurrence of seizure events and uniquely differentiate the SOZ from the rest of the brain. Our results demonstrate that the temporal arrangement of HFO events can reflect the pathophysiology of the epileptogenic tissue and contribute to the discrimination between channels in mesiotemporal structures.

## SPEAKER BIOSKETCH

Sabato Santaniello is an Assistant Professor in the Biomedical Engineering Department at University of Connecticut, Storrs, CT. He received undergraduate and master degree with honors in computer engineering from University of Naples (Italy), and Ph.D. degree in systems and control from University of Sannio (Italy). He was postdoctoral fellow (2009-2013) and research scientist (2013-2014) in neural engineering and computational neuroscience in the Institute for Computational Medicine at the Johns Hopkins University, Baltimore, MD. His research focuses on modeling, estimation, and control of neural systems, signal processing, neuromodulation, and brain-computer interface, with application to movement disorders and epilepsy. For info, visit the laboratory website: https://nsec.lab.uconn.edu/