efforts to develop EEG-based objective tools for determining driving safety in patients with epilepsy.

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Poster

290. Epilepsy: Human Studies

Location: SDCC Halls B-H

Time: Monday, November 5, 2018, 8:00 AM - 12:00 PM

Program #/Poster #: 290.02/J7

Topic: B.10. Epilepsy

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Title: Characterization of cross frequency couplings produced by harmonic and non-harmonic frequency bands during seizure activity from intracerebral recordings in patients candidate to epilepsy surgery

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Abstract: Cross frequency coupling (CFC) phenomenon has been proposed to be functionally involved in neuronal communication, memory formation and learning. Besides, experimental findings have shown that phase-amplitude (PAC) and phase-phase (PPC) couplings are important variants of CFC linked to physiological and pathological brain states. In particular, PAC and PPC have been observed in local field potentials (LFP) recorded during epileptic seizures. PPC represents the phase coherence across frequency bands and/or recording sites, which in general increases between nearby areas of the neural tissue recruited to the ictal event. In PAC, the amplitude of a high frequency band is modulated by the phase of another band with a lower frequency content. Recent works have shown that nested oscillations, associated to the

scale free neural activity, and sharp waveforms both produce PAC, however, they reflect two distinct neural mechanisms that are anatomically segregated in the human brain.
In this work, we study the CFC dynamics during the seizure activity in patients with focal epilepsy who were candidates for surgery treatment. The analysis was performed on LFP obtained from 5 patients undergoing intracerebral electroencephalography (stereo EEG) and 2 patients undergoing subdural electrocorticography (ECoG). To quantify the CFC dynamics during the seizure activity we use non-parametric methods: the Phase Locking Value (PLV) and the Modulation Index based on the Kullback-Leibler distance (KLMI). In addition, we have developed specialized tools to characterize the nature of the observed CFC patterns. Specifically, the Time Locked Index (TLI) and Harmonic Index (HI) were implemented to quantify the presence of harmonics associated to the emergence of CFC. Moreover, the correlation of LFP and CFC for a given recording site across seizures was evaluated in order to quantify the seizure stereotypy.
We have found that the ictal activity gives rise to different types of CFC, which were highly stereotyped during the seizure dynamics. Importantly, two essentially different PAC patterns produced by non-sinusoidal waveforms were identified. In the first one, the PAC was elicited by highly cyclostationary (pseudo-periodic) LFP signals, which were characterized by well-defined harmonic spectral components present in their Fourier spectrum. In the second one, the PAC was produced by sharp waveforms constituted by non-harmonic high frequency components. The proposed tools allowed us to better characterize the CFC patterns emerging during the seizure dynamics, which could pave the way to unveil the underlying neural mechanisms that initiate and propagate the ictal activity.

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Poster

290. Epilepsy: Human Studies

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Topic: B.10. Epilepsy

Title: Deep brain stimulation for seizure control: A role for white matter

Authors: *F. SCHAPER[1], B. R. PLANTINGA[2], A. COLON[3], L. WAGNER[4], P. BOON[4], E. GOMMER[1], G. HOOGLAND[1], L. ACKERMANS[1], R. ROUHL[1], Y. TEMEL[2]
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Abstract: *Background*: Deep brain stimulation (DBS) of the anterior nucleus of the thalamus (ANT) can improve seizure control for patients with drug-resistant epilepsy. Yet, responder rates