

TITLE: Correlation between intracranial and scalp EEG signals. Identify the correlations to better understand the secrets of brain functioning.

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FACULTY MENTOR DEPARTMENT: Neurology

RESEARCH PROJECT DESCRIPTION

Aim: Establish the intracranial signatures of the scalp EEG signals so that the scalp EEG can be interpreted in the light of better understanding of the physiological processes.

Epilepsy ranks amongst the most widespread of brain disorders in the world today. Electroencephalography (EEG) is the current standard for detecting epilepsy. The purpose of this research study is to investigate the correlation between intracranial and extra cranial EEG both for the pathological as well as physiological features in the brain activity.

We propose to analyze the EEG recorded from the scalp simultaneously with the EEG recorded intracranially using the depth or surface electrodes. The signals come from the patients who have simultaneous intracranial and extracranial recording of the brain signals, while they are being monitored in the epilepsy monitoring unit. The signals will be exported to .edf format, and thereafter to Matlab for further analysis. We will use signal processing techniques including triggered averaging, cross-correlation, cross coherence as well as Granger causality to identify correlations between intracranial EEG and extracranial EEG.

The study will provide better understanding of the neural physiological processes and thereby provide better insights into the patterns we see in the EEG. This will be beneficial specifically for epilepsy diagnosis and management and in general be very useful for the field of neuroscience where EEG is utilized as a very important tool of research