SEIZURE FREQUENCY MODULATION USING NON-INVASIVE TRANSCUTANEOUS ELECTRICAL STIMULATION

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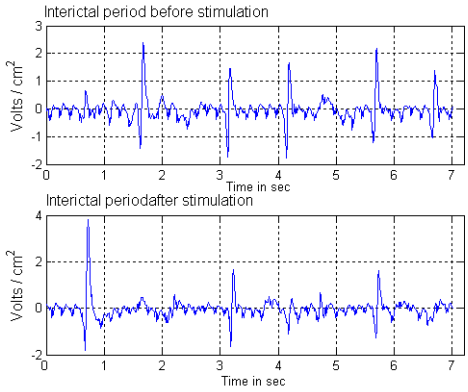
Epilepsy and seizures affect 2.5 million Americans and 1% of world population is estimated to be affected. Thirty percent of these cases are not treatable by the present day therapies. Current therapies are not suitable for emergency cases such as status epilepticus. Our research focuses on the development of a non-invasive system, capable of detecting and terminating seizures before the onset. A concentric ring electrode system for detecting seizure electrical activity and applying localized transcutaneous electrical stimulation (TES) was developed. Seizures were induced in rats, using an intracisternal rat penicillin model was used, developed for this research. The model was fast acting and long lasting, on average 14 minutes to seizure activity and one hour to cessation. Three sets of tri-polar concentric ring electrodes were placed on the scalp of seizing rats. Advanced EEG was recorded with the concentric ring electrodes and localized TES was applied through the same electrodes.



It was observed that the TES via concentric ring electrodes led to a decrease in frequency of the interictal spikes. TES didn't cause strong convulsions as was seen with earbar electrode stimulation. Further testing is necessary. These experiments give credence that these novel concentric ring electrodes can be used for non-invasive deep-brain stimulation to alter seizure activity.