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*Mathematical Modeling of a Network of Neurons Regarding G1D Transport Deficiency Epilepsy Seizures.*

Epilepsy is known to be traced back to spatial and temporal patterns working in sequence. Previous models such as Wilson-Cowan (1972), introduced a model showing the dynamics of a network of neurons consisting of excitatory and inhibitory neurons. Taylor et. al (2014) then adapted the Wilson-Cowan model to epileptic seizures using thalamo-cortical based theory. Fan et. al (2018) projects that thalamic reticulus nuclei control spike wave discharges specifically in absence seizures. Our current work includes studying the EEG patterns to identify the single mechanism that causes G1D epileptic behavior. The goal is to find out how an entirely connected brain network shows the neuronal functionality as a unit regarding G1D. Our coupled thalamo-cortical model goes beyond a connection in a logical unidirectional pattern shown by Fan but in a bidirectional small world pattern more analogous to realistic seizure activity. Using our model, we are able to study stability analysis, parameter values which cause synchronized or more stable activity, identify a synchronization index, and uncertainty analysis regarding parameters that directly cause specific spiking behavior. We will show explicitly how our 32-unit network model is a more accurate picture of G1D and its limitations. (Received August 27, 2019)