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Study On Alzheimer's Disease Based on Neuronal Network Model and Mouse Calcium Imaging

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One of the main characteristics of Alzheimer's Disease (AD) is a significant change in the synaptic connectivity of neuronal networks. A study on the experimental neuronal network is focused on the analysis of the recordings of calcium imaging data obtained from the network for different days in vitro of cell maturation in healthy and diseased conditions. The aim is to evaluate the dynamics of the behavior and reproduce it in a simplified mathematical model of a neuronal network. To perform the study, a neuronal network computational model is developed to address the key elements of the time evolution of AD and to carry out new experiments. The information obtained from the study is related to the correlation coefficient distribution and frequency response of mean calcium signal in a range of defined parameters to determine the optimal combination suitable for reproducing healthy and diseased network behavior. The considered range of parameters refers to balancing excitatory-inhibitory strength and synaptic connections. The simulations show that the network behavior of AD is characterized by a predominance of synchronous activity and the different parameters related to the network excitation and spatial connectivity can match the behavior of healthy and diseased networks.