عنوان مقاله:

Does Deficits in Place Field Formation Cause Spatial Navigation Impairment in Alzheimer's Disease?

محل انتشار:

بیستمین کنفرانس مهندسی پزشکی ایران (سال: 1392)

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خلاصه مقاله:

In this work we propose a biophysical neural network model to investigate some of the impacts of the Alzheimer's disease (AD) on spatial navigation in a simulated rodent. The model is a hybrid model developed based on physiological and functional description of neuronal networks in the hippocampus engaged in place field formation. The model of hippocampal network takes into account both anatomical and physiological properties, including recurrent structure of CA3, neuron-astrocyte interactions and spike timing–dependent plasticity of synapses. The place field based spatial navigation model applies SARSA, an algorithm used in reinforcement learning, to describe spatial learning process. We modeled the impact of AD at the cellular scale and investigated its effect on the behavioral level to study spatial navigation impairments. Our results show that the simulated animal with AD is less successful in finding its path to a goal, where its location was learned before, than a healthy one. Therefore, deficits in place field formation may consider as a possible cause of spatial navigation impairments in AD subjects.

کلمات کلیدی:

Spatial navigation , modeling hippocampus , place field , CA3 , recurrent structure , astrocytes , Spike Timing Dependent Plasticity (STDP) , SARSA , Alzheimer's disease (AD)

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