

POSTER PRESENTATION

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Computational modeling of Basal Ganglia: towards a mechanism of high frequency stimulation

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Deep Brain Stimulation (DBS) with 130Hz represents an effective therapy to alleviate symptoms of some neurodegenerative diseases such as Parkinson syndrome [1]. However the mechanism underlying the observed improvement in patient's symptoms is still under dispute. Modeling of its mechanism was first done with the Albin-Delong [2] model, which assumed two discriminated feedforward projections, from the input stage Striatum to the output stage Globus pallidus internal (GPi) and Substantia Nigra pars reticulata (SNr). However, this influential contribution neither took motor control into account nor the evidence for a selective effect high frequency stimulation [3-5]. This study tries to model the underlying network with increasing realistic complexity and presents a spiking network model based on Izhikevich type neurons [6]. Our currently simulated model examines the firing patterns variability between GABAergic STN neuron projections depending on the firing rate. It shows features like synchronous, rhythmic population spike found in experimental data of pyramidal interneuronal network [7].

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