

# Functional characterization of neuronal networks in the spinal cord

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A Periodic high-conductance state has been observed in turtle spinal cord motoneurons. Experiments in vitro have shown that excitation and inhibition are activated in phase. The co-activation of inhibition and excitation was associated with irregular firing. During high-conductance states, the voltage standard deviation and power increased significantly. In this project, we present two models of this system. First, a NEURON model of the underlying interneuron network was implemented. The model produced oscillations as an emergent network property, but failed to give irregular firing. Second, a conductance based integrate and fire model was implemented. This model reproduced irregular firing in response to time-varying poisson distributed inhibition and excitation in phase. The voltage power and standard deviation were in phase with the activation of synaptic activity. The simulation results describe the relationship between membrane voltage standard deviation, power, and firing rate.

[work done by Jens Kolind and Ulrik Holst-Pedersen]