

Abstract Submitted
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A Neuron-Based Model of Sleep-Wake Cycles¹ SVETLANA POSTNOVA, University of Marburg, ACHIM PETERS, University of Luebeck, HANS BRAUN, University of Marburg — In recent years it was discovered that a neuropeptide orexin/hypocretin plays a main role in sleep processes. This peptide is produced by the neurons in the lateral hypothalamus, which project to almost all brain areas. We present a computational model of sleep-wake cycles, which is based on the Hodgkin-Huxley type neurons and considers reciprocal glutaminergic projections between the lateral hypothalamus and the prefrontal cortex. Orexin is released as a neuromodulator and is required to keep the neurons firing, which corresponds to the wake state. When orexin is depleted the neurons are getting silent as observed in the sleep state. They can be reactivated by the circadian signal from the suprachiasmatic nucleus and/or external stimuli (alarm clock). Orexin projections to the thalamocortical neurons also can account for their transition from tonic firing activity during wakefulness to synchronized burst discharges during sleep.

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