

DANDRITE Topical Seminar

Wednesday 11 January 2017
at 13.00 – 14.00

Building 1170, room 347, Aarhus University

Balazs Hangya



Head of the Lendület Laboratory of Systems Neuroscience,
Institute of Experimental Medicine,
Hungarian Academy of Sciences,
Budapest, Hungary..

Seminar on “Tonic and phasic properties of central cholinergic neurons in sensory detection.”

The nucleus basalis (NB) gives rise to the central cholinergic neuromodulatory system that innervates the entire neocortex and is thought to regulate sensory processing, attention and learning. However, it is not known when cholinergic neurons are recruited during behavior and how their activity might support different aspects of cognition. We used optogenetic identification to record cholinergic neurons in behaving mice. Central cholinergic neurons were characterized as bursting and non-bursting cells. We found that both subtypes responded phasically to primary reward and punishment with remarkable speed and precision (18 ± 2 ms), unexpected for a neuromodulatory system. Responses to reward were scaled by reinforcement surprise, raising the possibility that the cholinergic system also conveys cognitive information. Tonic firing properties changed during sleep-wake states but remained similar for bursting and non-bursting neurons, contradicting the current view of bursting cells transmitting phasic information and tonic, non-bursting neurons setting ambient acetylcholine levels. These results suggest that cholinergic neurons form a rapid, reliable and temporally precise signaling route for reinforcement feedback that can mediate fast cortical activation and plasticity.

Host: Group Leader Duda Kvitsiani, DANDRITE, Dept. of Molecular Biology and Genetics, Aarhus University