DANDRITE
Danish Research Institute of Translational Neuroscience
Nordic EMBL Partnership for Molecular Medicine

AARHUS UNIVERSITY

DANDRITE Topical Seminar

Wednesday 16 May 2018
11:00-12:00

Auditorium A (building 1162 – 013)
Ole Worms Allé, 8000 Aarhus C

Dr. Santiago Rompani

Integration and modulation of visual information in the thalamus

The thalamus receives sensory input from different circuits in the periphery, but how these sensory channels are integrated at the level of single thalamic cells is not well understood. We performed targeted single cell-initiated transsynaptic tracing to label the retinal ganglion cells that provide input to individual principal cells in the mouse lateral geniculate nucleus (LGN). We identified three modes of sensory integration by single LGN cells, all exhibiting convergence of different cell types onto a single LGN cell. Thus, the LGN employs at least three modes of visual input integration, each exhibiting different degrees of specialization. To further study how the LGN can modulate highly convergent input from the retina, we tested if ganglion cell axons can be modulated in the LGN via an axo-axonal synapse. To do so, we used a combination of optogenetic stimulation and GCAMP imaging to stimulate descending cortico-thalamic inputs to the LGN while recording calcium responses in ganglion cell axons in vivo. We found that cortical stimulation potentiates ganglion cell axon responses to dim light. We also found that cortico-thalamic axons synapse onto ganglion cell axons directly by using serial block-face electron microscopy, acute slice recordings, mGRASP, and transsynaptic rabies tracing. From these data we conclude that descending cortical inputs potentiate ganglion cell axons via an axo-axonal synapse. Together, these data suggest that LGN cells receive more complex inputs from the periphery than was previously appreciated as well as a novel mechanism for the thalamus to modulate sensory input.

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