

DANDRITE Topical Seminar

Tuesday 16 April 2019
11.00 – 12.00

Auditorium 6, building 1170, 3rd floor, room 347
Ole Worms Allé, 8000 Aarhus C



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Cellular and circuit mechanisms for somatosensory perception

The role of perception is to detect relevant sensory stimuli in a given behavioral context to guide behaviors. There is yet no consensus concerning the neural basis of perception and how it operates at the cellular and circuit level. Recently, we showed that the threshold for perceptual detection of whisker deflection is correlated with active calcium currents in the apical dendrites of an unidentified subset of layer 5 (L5) pyramidal neurons in the primary somatosensory cortex (S1) in mice (Takahashi et al., 2016). In the current study we genetically targeted L5 neuron subclasses in S1 based on their projection type, and found that the activation of apical dendrites was highly selective in neurons that project to subcerebral regions when the mice detected whisker deflections, but not in intratelencephalic-projecting neurons (Takahashi et al., unpublished). The apical calcium currents were strongly modulated by behavioral context. Subclass-specific manipulation of dendritic activity proved the causal relationship between apical calcium currents in subcerebral-projecting neurons and the perceptual threshold of the animal. Our results suggest that an active dendritic mechanism plays a key role in facilitating the transmission of sensory information to subcerebral regions in a context-dependent manner, instructing subcerebral processes to guide behaviors. I will further discuss my long-term goal to develop a mechanistic understanding of how internal brain states, such as attention and expectation, modulate sensory processing to control perceptual behaviors.

Host: DANDRITE Group Leader Keisuke Yonehara, DANDRITE, Dept. Biomedicine, Aarhus University