

“Dendritic integration in cortical neurons in vivo”

by

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Date : 7 Nov 2016

Time: 10:30am to 12:00noon

**Venue: Room B6605, CSE Conference Room, 6/F Blue Zone,
Academic 1 Building, CityU (near lift no. 3)**

Abstract

Neurons in sensory regions of the cortex receive sensory modality-specific information through synapses that are located on their dendrites. The use of two-photon microscopy combined with whole-cell recordings has helped identify visually-evoked dendritic calcium signals in layer2/3 (L2/3) mouse visual cortical neurons in vivo. The calcium signals were restricted to small dendritic domains (‘hotspots’) and represented visual synaptic inputs that were highly-tuned for orientation and direction (Jia et al., Nature, 2010). An improved variant of two-photon imaging with a better sensitivity for fluorescence signaling and a reduced risk of phototoxicity, termed LOTOS (= low power temporal oversampling), allowed the detection of sensory-evoked calcium transients in dendritic spines of L2/3 neurons in the auditory cortex (Chen et al., Nature, 2011). Individual spines on the same dendrite were functionally heterogeneous. Similarly, we found in L2/3 of the vibrissal cortex that stimulation of different whiskers activated distinct spines on the same dendrite (Varga et al., PNAS, 2012). Together, our results demonstrate that in different cortices (visual, auditory, vibrissal), afferent sensory inputs to layer 2/3 neurons are widely distributed throughout the entire dendritic tree in a ‘salt-and-pepper’-like manner and that the neurons use these complex input signals to compute ‘output signals in a cell-specific manner.

About the Speaker

Arthur Konnerth’s research explores the basic processes underlying brain function. By means of electrophysiology, imaging and cell biological approaches in the intact brain in vivo, he focuses on synaptic interactions in neuronal circuits in order to achieve a better understanding of how the brain controls behaviour. A further goal is the elucidation of the neuronal defects associated with Alzheimer’s disease.

Arthur Konnerth studied medicine and obtained an MD degree in 1983 at the Ludwig-Maximilians-University (LMU) Munich and acquired his postdoctoral teaching qualification (habilitation) from Technical University of Munich in 1987. After completing postdoctoral research at universities in the USA and at MPI for Biophysical Chemistry in Goettingen/Germany, he was a full professor and director of the Institute of Physiology at the Saarland University and later held similar positions at TUM and LMU. Since 2005 he has held the Friedrich-Schiedel Professorship and been director of the Institute of Neuroscience at the TUM. He is a member of the German Academy of Sciences Leopoldina, the Academia Europaea and the Bavarian Academy of Sciences. He has been awarded the Brain Prize in 2015.

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All are welcome