



The Singapore Bioimaging Consortium (SBIC)
presents a seminar on

“Molecular Physiology of Synaptic Sound Encoding”

Speaker: Dr Tobias Moser
**Institute for Auditory Neuroscience,
University Medical Center Göttingen
Max-Planck-Institutes for Biophysical Chemistry &
Experimental Medicine
German Primate Center
Göttingen**

Host : Dr Jung Sangyong
Date : Friday, 27 September 2019
Time : 11.00am – 12.00noon
Venue : SBIC Seminar Room
11 Biopolis Way
Level 2, Helios Building, Singapore 138667
(Please enter via Level 1)

Abstract

Sound encoding at the afferent synapses of inner hair cells (IHC) processes information at rates of hundreds per second over hours with submillisecond temporal precision. Each synapse drives a single spiral ganglion neuron to fire at high rates upon strong stimulation. Interestingly, their spontaneous and sound-evoked activity varies as the Ca^{2+} signaling at the presynaptic active zones within a given IHC. Hence, we propose IHCs vary the properties of their presynaptic Ca^{2+} channel clusters to decompose auditory information into functionally distinct neuronal channels for wide dynamic range coding. Synaptic sound encoding involves efficient use of presynaptic glutamate release for spike generation, whereby release of a single vesicle might suffice to trigger an action potential. The ribbon synapse of inner hair cells, employs an unconventional molecular composition that likely evolved to meet these high functional demands. For example, efficient vesicle replenishment to the active zone - required to sustain the high rates of sound encoding - depends on the ribbon and on otoferlin. Genetic defects affecting synaptic proteins of IHCs cause human auditory synaptopathy – a peculiar non-syndromic hearing impairment. Efforts are undertaken to replace defect genes for future viral gene therapy.

About the Speaker

Born in 1968, Dr Tobias Moser studied medicine in Leipzig and obtained his doctorate with a dissertation written in the Göttingen laboratory of Leibniz and Nobel prizewinner Erwin Neher. He remained in Neher's department at the Max Planck Institute for Biophysical Chemistry as a postdoctoral researcher and independent junior research group leader. At the same time he continued his medical studies at the University of Göttingen, where since 2001 he has led his own working group, the Inner Ear Lab, at the university hospital. After habilitating in otolaryngology in 2003, he was appointed professor in 2005 and has held his own chair since 2007. Dr Moser is currently establishing a new Institute for Auditory Neurosciences in Göttingen. He

is also the spokesperson for the Collaborative Research Centre (CRC) "Cellular Mechanisms of Sensory Processing" in Göttingen, funded since 2011. Moser's laboratory focuses on the molecular anatomy, physiology and pathophysiology of sound encoding and information processing in the auditory system as well as the restoration of hearing by gene replacement therapy and optogenetic stimulation. The lab combines various techniques to characterize synapses of hair cells and the auditory brainstem from the molecular to the systems level. This has contributed to the understanding of structure and function of auditory synapses and initiated the concept of auditory synaptopathy.

--- Admission is free and all are welcome ---