

OIST Special Lecture

Speaker

Professor Angus Silver

Affiliation

University College London

Date: Friday, March 19, 2010

Venue: Seminar Room, OIST Seaside House

Time: 10:30AM-12:00PM

“Properties of an electrically coupled interneuron network in the cerebellum”

Brain oscillations reflect the synchronized activity of groups of neurons. Such network synchronization is thought to be important for encoding information, in selecting and linking specific neuronal ensembles and for ‘binding’ together spatially distributed information. Inhibitory interneurons play a central role in synchronizing the firing of principle neurons and electrical coupling between neurons enhances network synchrony. However, surprisingly little is known about how electrically coupled interneurons respond to the barrages of excitatory synaptic input that occur during sensory input. Moreover, in contrast to network synchronization, the causes of network desynchronization have received little attention. To investigate these questions we have studied a network of electrically coupled interneurons in the input layer of the cerebellar cortex. Using paired whole-cell recordings and synaptic stimulation in acute slices, we show that a sparse, temporally precise, excitatory mossy fibre input triggers both excitatory and inhibitory responses in Golgi cells. Moreover, mossy fibre input also caused transient desynchronization of firing in cell pairs. We show that these effects are mediated by interactions between excitatory chemical synapses and the inhibitory effects of Connexin 36 containing gap junctions. We also use biologically detailed computer simulations to explore the spatial properties of network dynamics. Our results suggest that several features of the sensory-evoked behaviour of Golgi cells and the rapid disappearance of oscillations in the granule cell layer observed *in vivo* could arise from sparse excitation of the electrically coupled Golgi cell network.

Contact Information

atsuko.suzuki@oist.jp
Workshop & Conference Section
Okinawa Institute of Science and Technology
7542 Onna, Onna-son, Okinawa, Japan
TEL: 098-966-8776 FAX: 098-966-8794