The Singapore Bioimaging Consortium (SBIC)
presents a seminar on

"Synaptic Organization of Cortical Neurons and their functional changes in disease"

Speaker: **Dr Kim Juhyun**
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Johns Hopkins
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Host : **Dr Jung Sangyong**
Date : **Monday, 17 December 2018**
Time : **2.00pm – 3.00pm**
Venue : **SBIC Seminar Room**
11 Biopolis Way
Level 2, Helios Building, Singapore 138667
(Please enter via Level 1)

Abstract

The six-layered neocortex of mammalian brain is composed of exquisite cytoarchitectural arrangement, which receives and integrates sensory information and transmits outgoing cortical signals to subcerebral structures. Among the six layers, infragranular layers (layer 5 and 6) are specifically known as the cortical output layer. Cortical projection neurons in these layers project to subcortical areas in the brain and spinal cord, as well as other cortices within the cerebral cortex. The specification of synaptic organization and maintenance of appropriate levels of spiking activity are critical for the normal brain function. The malfunction of these neurons is suggested to play a role in causing various neurological disorders. We studied how cortical projection neurons are organized in the infragranular layers by combining histological and optogenetics-based electrophysiological approaches. We investigated the synaptic organization of corticothalamic neurons which modulate sensory perception. In addition, we demonstrated the changes of L5 neurons in amyotrophic lateral sclerosis (ALS, also known as Lou Gehrig's disease), a fatal neurodegenerative disorder characterized by progressive loss of motor neurons. We investigated the intrinsic excitability, *in vivo* spiking activity, and transcriptome of the cortical neurons, and found that there are widespread and disease stage-dependent changes in the cortex in ALS.

About the Speaker

After getting B.S. in Life Science at Pohang University of Science and Technology (POSTECH) in 2004, Dr Kim joined in the Neural Stem Cell and Stroke lab in the Department of Neurology at Seoul National University Hospital as a researcher. Using rat models, Dr Kim investigated the effect of neural stem cell transplantation and neurotrophic factor injection on functional recovery following strokes or seizures. In 2005, he came back to POSTECH and joined a molecular neuroscience lab as a

graduate student. He studied synaptic plasticity involved in fear memory formation in the amygdala (Kim et al., PNAS 2008), and intrinsic, synaptic, and morphological changes of the nucleus accumbens neurons in cocaine addiction (Kim et al., Biol Psychiat 2011). After getting PhD in Neuroscience in 2011,Dr Kim joined the Solomon H. Snyder Department of Neuroscience at Johns Hopkins University School of Medicine as a postdoctoral fellow. He studied synaptic organization of excitatory and inhibitory neurons involved in sensory perception and sleep regulation in the cortex, thalamus, claustrum, and hypothalamus (Kim et al., J Neurosci, 2014, 2016; Liu and Kim et al., Nature 2017), and alterations of neuronal activities in amyotrophic lateral sclerosis (Kim et al., J Neurosci 2017; Langseth and Kim et al., Sci Rep 2017).

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