

Summary of KWiSE-Neuroscience & Molecular Physiology August 15 (Thursday), 2019, 1:30-3:30pm

Tech Group F
MPS

@ Barajas

MPS-A Session: KWiSE-Neuroscience & Molecular Physiology

Co-Chairs: Hey-Kyoung Lee (Johns Hopkins University), Hee-Yong Kim (NIH)

Time	Title and Speaker
1:30	Tonic GABA Inhibition in Thalamus Eunji Cheong (Yonsei Univ.)
1:50	Role of KCNQ/Kv7 Channels in Epilepsy and Autism Hee-Jung Chung (Univ. Illinois)
2:10	Association of the Eukaryotic Translation Factor, eIF5A and its Modification Enzyme, Deoxyhypusine Synthase with a Human Neurodevelopmental Disorder Myung-Hee Park (NIH)
2:30	Daily Cycling in the Excitation/ Inhibition Balance Alfredo Kirkwood (Johns Hopkins Univ.)
2:50	Cortical Plasticity Induced by Conversion of Synaptic Eligibility Traces in Vivo Hong Su (Johns Hopkins Univ.)
3:10	Dual Sensing of Physiologic pH and Calcium by EFCAB9 Regulates CatSper Channel and Sperm Motility Jean-Ju Chung (Yale Univ.)

Key messages:

The main goal of this session was to introduce cutting-edge research in the fields of neuroscience and molecular physiology. The first speaker Dr. Eunji Cheong (Yonsei Univ.) talked about a novel cellular mechanism that mediates tonic inhibition in sensory thalamus, which plays a critical role in gating sensory information for conscious processing. Dr. Hee-Jung Chung (Univ. Illinois) presented new molecular regulatory mechanisms of neuronal potassium channels, which have known mutations in human population with epilepsy and autism. Dr. Myung-Hee Park (NIH) talked about a translational regulator, eIF5A, which is a sole substrate of deoxyhypusine synthase. Such regulation of eIF5A has implications in early embryonic development of the brain. Dr. Alfredo Kirkwood (Johns Hopkins Univ.) presented data that counters the conventional view that excitation to inhibition (E/I) balance is fixed in neurons. His research presents a novel idea that E/I balance is dynamically regulated during the day depending on the need of the brain state. Dr. Hong Su (Johns Hopkins Univ.) talked about his new findings relating to the molecular mechanisms of the memory eligibility trace, which is critical for mediating reward based learning. Dr. Jean-Ju Chung (Yale Univ.) gave a presentation on the molecular mechanisms of regulation of calcium channels in the context of regulating sperm mobility, which has clear implications to infertility problems.

Critical challenges:

Speakers in this session presented data obtained from multiple cutting-edge techniques ranging from molecular genetics, bioinformatics, cell biology, electrophysiology coupled with optogenetics, *in vivo* optical imaging to behavioral analyses. Such multidisciplinary approaches are quite powerful in generating a comprehensive view of the system, but presents challenges that require close collaboration of laboratories with specific expertise and constant exchange of ideas.

Future direction:

Molecular and cellular approaches to neuroscience and physiology is primed to produce information on fundamental mechanisms governing function. Collaborative endeavor across disciplines is likely a productive path that will yield much needed mechanistic information on normal physiology as well as during pathological disease states.