

**RESEARCH SEMINAR**

# Dissecting Molecular Networks in the Brain Using CRISPR-Cas9

Thousands of proteins are known to play roles in various cellular processes in the brain. To understand their functions, it is critical to develop a scalable method to precisely image these proteins. Recently, I have succeeded in developing a generalizable technique to image endogenous proteins with high specificity, resolution, and contrast in mammalian brain tissue. The technique, termed single-cell labelling of endogenous proteins via CRISPR-Cas9-mediated homology-directed repair (SLENDR), uses in vivo genome editing to insert a tag sequence into a gene of interest by CRISPR-Cas9-mediated homology-directed repair (Nishiyama et al., Neuron 2017; Mikuni\*, Nishiyama\*,† et al., Cell, 2016).

By delivering genome editing machinery through in utero electroporation or adeno-associated virus, SLENDR enables us to precisely edit the genome in mitotic neuronal progenitors or even mature postmitotic neurons in the in vivo brain. Importantly, genome editing only occurs in a sparse subset of cells, allowing high-contrast visualization of tagged-endogenous proteins in dense brain tissues. SLENDR provides a rapid, precise, and scalable technique to image endogenous proteins in various cell types, regions, and ages in the brain. In this seminar, I will talk about current applications and future directions of SLENDR to understand brain functions and dysfunctions at molecular and synaptic level.

## ABOUT THE SPEAKER

Dr Jun Nishiyama is a research fellow in the laboratory of Dr Ryohei Yasuda at the Max Planck Florida Institute for Neuroscience. His research goal is to elucidate the molecular/synaptic mechanisms underlying neurodevelopmental disorders. He was trained as a physician-scientist in psychiatry at the University of Tokyo, where he received his M.D. and Ph.D. degrees. For his research, he investigated the roles of autophagy in neurodegeneration in the laboratory of Dr Michisuke Yuzaki at Keio University School of Medicine. To further his research in synaptic physiology, he moved to United States and joined Dr Ryohei Yasuda's laboratory as a postdoctoral fellow.

Monday

22 January 2018

10.30 am to 11.30 am

Seminar Room, MD10

Level 2, Anatomy Museum

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