Frontier Bioscience Seminar at Osaka University, Suita Campus

Wiring Mechanisms for Cortical Inhibitory Circuits

Hiroki Taniguchi, Ph.D.

Research Group Leader
Development and Function of Inhibitory Neural Circuits
Max Planck Florida Institute for Neuroscience

Date: May 28 (Mon), 2018
Time: 16:00-17:30
Place: 2F Seminar Room of Biosystems Building, Suita Campus

Abstract:
Cortical inhibitory interneurons (INs) play a critical role in shaping and balancing activity in neuronal networks. This indispensable task is achieved by a rich repertoire of IN subtypes, which differ in morphology, physiology, and connectivity and possess distinct functional properties. During postnatal development, cortical INs develop highly branched axonal arbors to form dense local synaptic networks and establish subtype-specific synapse specificity at cellular/subcellular levels. Despite their importance in brain function and dysfunction, wiring mechanisms for IN circuits remain largely unknown. Difficulties in dissecting IN circuit wiring are ascribed to lack of a reliable strategy to target uniform IN subtypes and follow their developmental trajectory. Chandelier cells (ChCs) powerfully control action potential generation in excitatory pyramidal neurons by specifically innervating axon initial segments. The stereotypy of axonal and synaptic organization makes ChCs an ideal experimental system to study wiring principles of IN subtypes. We have developed a genetic method that allows us to label and manipulate developing ChCs. In my talk, I will present our unpublished data demonstrating 1) that voltage-dependent calcium channels regulate axonal arborization in ChCs and 2) that cell surface molecules that are preferentially expressed in ChCs control cellular/subcellular synapse specificity. Our results provide not only deep insight into molecular mechanisms for IN circuit wiring but also novel experimental paradigms for an analysis of IN subtypes.

世話人■大阪大学大学院生命機能研究科　細胞分子神経生物学研究室
教授　山本　亘彦
Ｅ-ｍａｉｌ：nobuhiko@fbs.osaka-u.ac.jp
Ｔｅｌ：０６－６８７９－４６３６