ASHBi SEMINAR

Directing Neural Plasticity with Activity-Dependent Stimulation: Circuit and Behavioral Effects in Monkeys and Rats

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Date Monday, 24 April 2023

Time 17:00 – 18:00 [JST]

Venue Conference Room Onsite Only*

B1F, Faculty of Medicine Bldg. B

*Register via the right QR code

Abstract

Bidirectional neural interfaces can deliver electrical stimulation to the nervous system that is contingent on behavior or measured physiological signals. We conduct parallel studies in non-human primates and rodents to investigate the capacity of activity-dependent electrical stimulation to induce neural plasticity in motor systems and restore function after spinal cord and brain injury. In monkeys, we have shown that cortical or spinal stimulation triggered by the activity of cortical neurons modifies the synaptic strength of cortico-cortical and corticospinal connections, respectively. We are also interfacing artificial (i.e., computer instantiated) neural networks with the brain to substantially expand the computational capabilities of closed-loop stimulation, including driving specific patterns of brain activity. In rats, we have shown that targeted, muscle activity-dependent spinal stimulation can improve motor performance of the forelimb after cervical spinal cord injury. We are currently translating this approach to clinical practice in a first-of-its-kind clinical trial of activity-dependent, transcutaneous, spinal stimulation in human subjects with spinal cord injury.

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