ASHBi SEMINAR

Bridging the Gap: an intelligent spinal interface to replace and restore sensorimotor function after injury

Lecturer: David A. Borton, Ph,D.

Director, Institute for Biology, Engineering and Medicine, Brown University

Date Friday, 14 March 2025

Time 17:00 – 18:00 [JST]

Venue Conference Room Onsite Only*

B1F, Faculty of Medicine Bldg. B

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Abstract

The spinal cord is a superhighway of information flowing to and from the brain and periphery. Unfortunately, in injury this bidirectional flow is disrupted, often leading to permanent impairment of sensorimotor function. Recently, epidural electrical stimulation (EES) below a lesion has been shown to support restoration of voluntary movement, improvement in autonomic function, and initiation of locomotion following chronic spinal cord injury (SCI). My laboratory is investigating the creation of an “electronic bridge” that can restore the flow of information between the periphery and the brain. To that end, we have pursued advanced neuroengineering devices and biologically-inspired machine learning in a first-in-human study demonstrating simultaneous lower extremity motor activation and somatosensory feedback enabled by perilesional EES in participants with sensory and motor complete SCI. We incorporated modern deep learning methodologies to establish stable stimulation parameters for target motor actions and sensory percepts. With an eventual goal to have such systems be utilized at home by future patients, we developed a tablet-based software program for participant-directed control of stimulation parameters. In this seminar, I will discuss the spinal interface technologies our team has been developing through the support of the Defense Advanced Research Projects Agency (DARPA) and the Department of Veterans Affairs (VA), as well as the results from early clinical studies. Further, I will argue for the use of the technology as a research platform to explore spinal health more generally. I will end with a discussion of the challenges to reaching a take-home therapeutic solution for people with SCI.

Organizer : Graduate School of Medicine
Institute for the Advanced Study of Human Biology (WPI-ASHBi), Kyoto University

Contact: Tadashi Isa
[E-mail] isa.tadashi.7u@kyoto-u.ac.jp