clevelandFEScenter APT CENTER Cleveland Clinic

Neural Prosthesis Seminar

"Biologically Inspired Strategies in Peripheral Nerve Interfacing"

Friday, December 12th, 2014 • 8:30 AM

Biomedical Research Building 105
Case Western Reserve University

Mario Romero-Ortega, PhD

Mario Romero-Ortega, PhD
Associate Professor of Bioengineering
University of Texas

Abstract

Current multi-fingered prosthetic hands can be connected to the peripheral nervous system of users for intuitive control and natural sensation. However, sensitivity and reliability of such peripheral nerve interfaces; whether extra-neural, interfascicular, penetrative or regenerative, are limited. Using molecular and developmental neurobiology principles, we have developed a Regenerative Multi-electrode interface (REMI) that guides re-growing axons through an electrode array deployed in the lumen of a nerve "Y"-shaped scaffold. We have shown that sensory-motor neural activity can be recorded chronically by REMI electrodes allowing the evaluation of firing patterns of specific axon types in freely behaving animals, and current tract-tracing data supports the feasibility for axon-type selective peripheral nerve interface.

Peripheral interfacing has also proven to be an effective tool to treat conditions such as chronic inflammation and cardiovascular diseases, with potential specific advantages over drug-enabled therapeutics. While many target relatively large nerves (ie., vagus) others require interfacing of small fascicles to achieve specificity. We will report the fabrication and testing of novel peripheral nerve electrodes specifically designed to interface small diameter somatic/autonomic nerves (50-300 μm using innovative designs and softening and conformal materials. The use of these electrodes for recording and stimulation from the vagus and peroneal nerves fascicles both in rats and mice, and the physiological responses to hypoxia and blood pressure will be demonstrated. Our work contributes towards the development of peripheral neurinterfacing tools and methods aimed at establishment of closed-loop sensory-motor bionic systems, and bioelectronics medicine applications.

For more information, please contact Cheryl Dudek
(216) 231-3257 | cdudek@FEScenter.org

Live stream video link for each lecture at www.FEScenter.org/Seminar

Veterans Health Administration Research & Development Improving Veterans' Lives www.research.va.gov

Case Western Reserve University EST. 1826

MetroHealth