The University of Texas at Austin
CARE Clinically Applied Rehabilitation Research and Engineering

Unique pieces of a complex puzzle: premotor areas for cortical control and recovery of hand movements after stroke.

Numa Dancause, Bsc(PT), PhD – University of Montreal

The refinement of hand movements and the increased complexity of motor behaviors in primates are associated with the establishment of more direct connections of primary motor cortex (M1) neurons onto cervical motoneurons controlling the hand and the appearance of additional premotor motor areas. In contrast to rodents, who appear to have only one premotor area, the frontal cortex of primates has several distinct premotor areas interconnected with M1 and closely involved in movement production. It is not clear how these additional motor areas are interconnected with M1 and how they can participate to the production of motor outputs. After stroke, imaging studies often show atypical hemodynamic activity in premotor areas, in particular in the contralesional hemisphere, but the neurophysiological substrate underlying these changes are also poorly understood. I will first discuss recent data from our laboratory on anatomical and functional connectivity of premotor cortex. Then, I will review some neuroplastic changes we have found in premotor cortex after brain injury, such as stroke. While premotor areas in both hemispheres certainly undergo substantial reorganization, their role in recovery and the factors driving potential vicariation of function are still largely hypothetical.

Dr. Numa Dancause is an Associate Professor in the Department of Neuroscience at the University of Montreal. Dr. Dancause's research focuses on neuronal plasticity and motor recovery following stroke. His research is funded by the Canadian Institute for Health Research, Canada Foundation for Innovation, Heart and Stroke Foundation, among others.

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Refreshments will be provided.