Title: Identification of recovery-associated prognostic biomarkers and novel cell-based therapeutic strategies

Abstract: Stroke is a common and really invalidating brain pathology, making stroke survivors often functionally impaired in daily life activities. Thus, the study of neuroplasticity underlying the functional deficit and the subsequent recovery after a stroke in the motor cortex is an important aspect to improve quality of life in stroke patients. A first aspect of this project is focused on the delineation of prognostic biomarkers of the spontaneous motor recovery after an ischemic insult to the brain. For this goal, we will consider anatomical, behavioral and electrophysiological longitudinal data collected in a clinical-like mouse model of stroke induced by the Middle Cerebral Artery Occlusion (MCAO). These electrophysiological, histological and behavioral biomarkers can be important in the clinical practice to stratify patients based on the own post-stroke progress, in order to guarantee the best personalized therapy for each patient. A second aspect of this project focuses instead on the exploration and testing of novel therapies to promote brain repair and plasticity after stroke. In particular, we are currently investigating the possibility to improve motor function, exploiting a cell-based therapy, replacing lost neurons with \textit{in vitro} obtained mouse embryonic stem cells (mESC)-derived neurons or with the conversion of non-neural cells, such as astrocytes, resident in the perilesional tissue, into neurons. These two different cell-based approaches are tested alone or in combination with physical rehabilitation to evaluate their efficacy in improving motor function after a cortical stroke. In parallel, combination of electrophysiological recordings and optogenetic stimulation are currently being used to shed light on the plasticity and integration of newborn and endogenous host neurons.

References:


7. Reducing GABAA-mediated inhibition improves forelimb motor function after focal cortical stroke in mice.


8. Post-Stroke Longitudinal Alterations of Inter-Hemispheric Correlation and Hemispheric Dominance in Mouse Pre-Motor Cortex.


9. Quantitative kinematic characterization of reaching impairments in mice after a stroke.


**Keywords**: stroke, biomarkers, cell-based therapy

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