PROJECT 1

DoS: Bacigaluppi Marco

Title: **Understanding the role of inflammatory cells in the post-acute recovery phase after ischemic stroke**

Curriculum: Neuroscience and Experimental Neurology

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http://www.unisr.it/offerta-formativa/post-lauream/dottorati/marco-bacigaluppi/

Project description (*Number of characters*, *including spaces*: 2.000 - 3.000):
Ischemic stroke is caused by an occlusion of a cerebral artery, leading to focal brain tissue injury. The brain responds to stroke with an acute as well as prolonged tissue repair process characterized by rapid activation of resident endogenous neural stem cells, astrocytes, microglial cells, and infiltration of various types of blood borne immune cells. CNS-resident and blood-borne CNS-infiltrating inflammatory cells were considered for decades to be detrimental after stroke. However, recent evidence supports the role of these cells in the repair process. It has been in fact shown in other brain pathologies that the local immune response is important for neuroprotection, and for promoting the repair process, including axonal regeneration and cell renewal. In addition, over the last few years, it became clear that brain's resident neural stem cells (NSCs) participate in a reciprocal relationship with immune cells that is critical to the repair by endogenous cells as well as by exogenously introduced therapeutic NSCs. These progenitor cells exert an immunomodulatory function and act as source of trophic factors beyond cell replacement.

The main aim of the proposed PhD project is to study the role of inflammation in post-acute functional recovery after experimental stroke. In particular the main objectives of the project will be: i. To explore the contribution of microglia and of neutrophils to the post-acute recovery phase occurring after stroke; ii. To explore the contribution of microglia and neutrophils to drive neuronal plasticity processes after stroke; iii. To study the role of microglia in regulating long-term cell genesis from endogenous NSCs.

Skills to be acquired by the student:

Handling of transgenic mouse lines, experimental stroke inductions, confocal microscopy, immunohistochemistry and immunofluorescence staining, flow cytometry, rt-PCR, RNA-seq and bioinformatics analysis, PCR, in vivo administration of compounds and drugs (e.g. intracerebroventricular injections, intravenous injections). Knowledge of the literature in the field, construction of a hypothesis and experimental plan to unravel the response, writing of periodic scientific reports, discussion of results and of published papers (e.g. Journal Club).

References (max. 3)

- Subventricular zone neural progenitors protect striatal neurons from glutamatergic excitotoxicity. *Butti E, Bacigaluppi M, Rossi S, Cambiaghi M, Bari M, Cebrian Silla A, Brambilla E, Musella A, De Ceglia R, Teneud L, De Chiara V, D'Adamo P, Garcia-Verdugo JM, Comi G, Muzio L, Quattrini A, Leocani L, Maccarrone M, Centonze D, Martino G*. Brain. 2012 Feb;137(Pt 2):621-33.

- Neurogenesis or non-neurogenesis: that is the question. *Martino G, Butti E, Bacigaluppi M.* J Clin Invest. 2014 Mar;124(3):970-3.

- Cross-talk between neural stem cells and immune cells: the key to better brain repair? *Kokaia Z, Martino G, Schwartz M, Lindvall O.* Nat Neurosci. 2012 Jul 26;15(8):1078-87.

PROJECT 2 (optional)

DoS: ---

Title: ---

Curriculum: ---

Link to OSR/UniSR personal page:

Project description (*Number of characters*, *including spaces*: 2.000 - 3.000):

Skills to be acquired by the student:

References (max. 3)