INTRAVITAL DYNAMIC IMAGING OF NEUROINFLAMMATORY CELLULAR EVENTS AFTER IMPLANTATION OF A BMI-NEUROPROSTHESIS IN THE TRAUMATIZED SPINAL CORD

KEYWORDS:

Multispectral biphoton imaging / Multicolor fluorescent mice / Spinal glass window / Dorsal hemisection / Calcium imaging / Electrostimulation & recording/ Immunomodulation

CONTEXT:

Bio-electronic microsystems hold promise for repairing the damaged central nervous system (CNS) and for developing brain mind interface (BMI). In the European consortium Neurofibres we want to achieve a breakthrough in "Neuroregenerative Bio-electronics", by developing dual-function devices that will serve as electroactive scaffolds for CNS regeneration and neural circuit activation (http://neurofibres.eu/ [1]).

Prof Collazos-Castro has engineered electroconducting microfibres (MFs) that add negligible tissue insult while promoting guided cell migration and axonal regeneration in rodents with spinal cord injury (SCI, Collazos-Castro et al 2016 Acta Biomateriala; Alves-Sampaio et al 2016 Biomaterials). An interdisciplinary consortium composed of neuroscientists, medical specialists, researchers in biomaterials, protein engineering, physics, electrical and mechanical engineering, together with a company specialised in fabrication of microcables and microconnectors, have decided to join efforts to design, develop, and test this MFs and complementary technology (microfibre functionalisation, assembling, and electronic interconnection), in order to produce a biologically safe and effective bioelectronic system for the treatment of SCI.

In this framework, the IMAPATH team at INT in Marseilles (http://www.int.univ-amu.fr/) takes advantage of its unique model of multicolor fluorescent mouse and its dedicated intravital imaging methodology (Fenrich et al 2013 J. Physiol, Dray et al 2009 PNAS) to evaluate at a cellular level the inflammatory reaction induced by MFs implantation as well as its modulation by evoked neuronal activity. Neuronal response will be assessed by GCAMP reporters as well as electrophysiological recordings.

OBJECTIVES :

1. We will record for the first time in the living mouse, the real time elongation of severed axons along guiding and stimulating graphene-microtubes.

2. We will establish the electrical stimulation paradigm producing anti-inflammatory action and promoting axonal plasticity in the traumatized spinal cord of mice.

LOOKING FOR : FROM OCT 2017

Highly motivated post-doc candidate with skills in microsurgery as well as demonstrated competences in one of the following aspects :

· fluorescence microscopy

· intravital electrophysiology

· programming automated image analysis

Principally based in France (Marseilles) episodic short term experimental works in Spain (Toledo) or in Germany (Homburg) are to be considered

SALARY : To be discussed according to experience

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[1] http://neurofibres.eu/