Master's degree in Biology – Chemistry-Biology Department

Master 2 internship project
Year 2020-2021

Laboratory/Institute: Centre de Physiopathologie de Toulouse-Purpan - INSERM UMR 1043, CNRS UMR 5282
Director: Pr. Roland LIBLAU
Team: Inflammatory diseases of the central nervous system: mechanisms and therapies
Head of the team: Pr. Roland LIBLAU /Dr. Abdelhadi SAOUDI

Name and status of the scientist in charge of the project:
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Program of the Master's degree in Biology:
☑ Immunology, Microbiology, Infectious Diseases ☐ Integrative Structural Biology
☑ Physiology, Epigenetics, Differentiation, Cancer ☑ Neurosciences and Neurobiology
☐ Planta International

Title of the project: Roles of Foxo3 in neuronal degeneration and neuroinflammation in secondary progressive Multiple Sclerosis (SP-MS)

Objectives (up to 3 lines):
- deciphering the implication of Foxo3 in mouse models of MS
- deciphering the roles of Foxo3 oligodendrocyte/axons interaction during SP-MS

Abstract (up to 10 lines):
While it is clearly established that relapse-remitting stages of multiple sclerosis (RR-MS) is mainly triggered by pathogenic T cell infiltrated within brain parenchyma, the progressive MS (P-MS) harbors several characteristics of a classical neurodegenerative disease. Indeed, oligodendrocyte degeneration, which is responsible for myelin loss, is accompanied with a profound axonal then somatic neuronal damage combined with astro- and microgliosis. A few years ago, we demonstrated that mice deficient for the transcription factor Foxo3 develop far less severe disease in a mouse model of RR-MS. Interestingly, Foxo3 is expressed in many cell types including astrocytes, microglia, oligodendrocytes (OL) and neurons, and a growing literature suggests its importance in the management of oxidative stress in central nervous system pathologies. In our present project, we aim at deciphering the susceptibility of Foxo3 deficient mice to P-MS. Then, using primary co-cultures of neurons and OL progenitors from Foxo3 KO mice, we will develop a culture system to study the interactions between OL and axons, and assess the implication of Foxo3 in these 2-cell units.

Methods (up to 3 lines):
- mouse models of MS (food modification and/or myelin-specific T-cell transfert)
- establishment of co-cultures of primary neurons and inflammatory cells to analyze their interactions
- analysis of mitochondria and metabolism in primary cell cultures
Up to 3 relevant publications of the team:


Requested domains of expertise (up to 5 keywords):

mouse models, primary cell cultures, mitochondria function and cell metabolism