Master's degree in Biology – Chemistry-Biology Department

Master 2 internship project
Year 2020-2021

Laboratory/Institute: Grenoble Institut Neurosciences - GIN
Team: Neuropathologies and Synaptic Dysfunction
Director: Prof. F. Saudou
Head of the team: Prof. A. Buisson

Name and status of the scientist in charge of the project: M. Albrieux, MCF UGA
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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: Functional characterization of the β-amyloid peptide effect on TRPA1 channel

Objectives (up to 3 lines): We recently identified an astrocytic calcium channel that is a potential therapeutic target in Alzheimer's disease with a neuroprotective effect. This channel, TRPA1, is activated very early in the pathology and the peptide β amyloid (Aβ) may interact directly with it. The objective of this project is to characterize how Aβ acts on this astrocytic calcium channel and what is the functional result of this activation.

Abstract (up to 10 lines): The management of Alzheimer's disease encounters a recurring failure of the current therapeutic strategies especially linked to the late detection and intervention. Early intervention, during the prodromal phase, seems essential to offer new hope to patients. It has been shown that hyperactivity of the neurons of the hippocampus is responsible for non-disabling memory deficits that are precursors of the disease. We recently showed that the astrocyte, which is a cell essential for the survival and functioning of neurons, is on the front line in the implementation of this hippocampal neuronal hyperactivity. We have identified an astrocytic molecular actor that could be responsible for this hyperactivity. We now wonder to characterize the mechanisms involved in its activation by Aβ. In parallel, we will characterize the consequences of channel activation on astrocyte function and in particular on the release of gliotransmitters potentially involved in the deleterious neuronal hyperactivity characteristic of the early phases of Alzheimer's disease. This project will allow to understand how the astrocytic TRPA1 channel is involved in the toxicity of the Aβ peptide and thus to strengthen the characterization of a novel therapeutic target and to contribute to propose an innovative and promising therapeutic strategy.

Methods (up to 3 lines): electrophysiology, calcium imaging, high resolution imaging, immunohistostainings, animal handling

Up to 3 relevant publications of the team:

Requested domains of expertise (up to 5 keywords): Alzheimer, glutamate, astrocyte, synapse, calcium signaling