Master de Sciences et Technologies
Mention Biologie Intégrative et Physiologie
Parcours : Neurosciences
Responsable : Professeur Régis Lambert

Internship Proposal
Academic Year 2019-2020

1. Host team :

Research Unit (e.g. Department or Institute) : Center for Interdisciplinary Research in Biology, INSERM U1050, CNRS UMR7241
Research Unit Director : Marie-Helene VERLHAC
Research Team Director : Nathalie ROUACH
Team name : Neuroglial Interactions in Cerebral Physiology

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2. Internship project title: A role for astrocytes in addictive behavior?

3. Internship Description :

Astrocytes are now viewed as key elements of brain wiring and neuronal communication. They not only bridge the gap between metabolic supplies by blood vessels and neurons, but also allow fine control of neurotransmission by providing appropriate signaling molecules and insulation through a tight enwrapping of synapses. Remarkably, we recently found in the hippocampus that astrocytes tune hippocampal excitatory synaptic transmission and synaptic plasticity via insertion of their fine processes into synaptic clefts, which determines the efficacy of astroglial glutamate clearance (Pannasch et al., 2014, Nature Neuroscience). Addiction is defined by a vulnerability to relapse mainly mediated by a long-lasting drug-induced plasticity. Addictive psychostimulants such as amphetamine hijack the rewarding pathway of the brain, increasing dopamine transmission from the Ventral Tegmental Area to the cortical and striatal areas. This increased dopamine concentration can in turn modulate neurotransmission among other connected regions, such as the glutamatergic projection from the prefrontal cortex (PFC) to the nucleus accumbens (NAc). Interestingly, it has been shown that an increased synaptic glutamate concentration at this synapse mediates relapse to drug-seeking behavior.

While increased synaptic glutamate level plays an important role in relapse, it is of interest to determine whether astrocytes, by modulating coverage of synapses and excitatory synaptic transmission, could restore basal extracellular glutamate concentration following drug administration. In this project, we will address the role of astrocytes in addictive behaviors using a multidisciplinary approach combining molecular and cellular biology, imaging and behavioral studies.