Master's degree in Biology – Chemistry-Biology Department

Master 2 internship project
Year 2025-2026

Laboratory/Institute: Grenoble Institut Neurosciences **Director:** E. Barbier
Team: Pathophysiology of Motivation **Head of the team:** S. Carnicella

Name and status of the scientist in charge of the project: Yvan M. Vachez, Inserm Researcher

HDR: yes ☐ no ☒

Address: bâtiment Edmond J. Safra, chemin Fortuné Ferrini, 38700 La Tronche, France
Phone: 04 56 52 05 42 **e-mail:** yvan.vachez@inserm.fr

Program of the Master's degree in Biology:

☐ Microbiology, Infectious Diseases and Immunology ☐ Biochemistry & Structure
☐ Physiology, Epigenetics, Differentiation, Cancer ☒ Neurosciences and Neurobiology

Title of the project:

Behavioral and synaptic effect of ventral pallidum deep brain stimulation

Objectives (up to 3 lines):

Characterizing the effect of Ventral Pallidum Deep Brain Stimulation in a rodent model of reward processing disorders and dissecting its effect on brain circuits adaptation using patch clamp coupled with optogenetic.

Abstract (up to 10 lines):

Deep brain stimulation (DBS) has shown promise in treating neuropsychiatric disorders involving dysregulated reward processing, the optimal neural target for therapeutic intervention remains unclear. The ventral pallidum (VP), a central hub in the brain's reward circuitry, has emerged as a promising candidate. Recent findings from our laboratory demonstrated that VP-DBS can modulate motivation in healthy rats without inducing adverse effects. This internship project aims to explore the therapeutic potential of VP-DBS in a preclinical model of alcohol use disorder, a condition strongly linked to dysfunctional reward signaling. Furthermore, the study will investigate the synaptic adaptations induced by VP-DBS using optogenetics combined with patch-clamp electrophysiology. Special focus will be placed on mapping changes in connectivity between the VP and key structures such as the nucleus accumbens or the subthalamic nucleus. This research seeks to advance our understanding of the mechanisms underlying DBS and its potential for treating addiction-related disorders.

Methods (up to 3 lines):

-Behavioral characterization in rodents
-Experimental Deep brain Stimulation
-*Ex vivo* patch clamp electrophysiology with optogenetic

Up to 3 relevant publications of the team:

1) Vachez YM et al., (2021) Ventral arkypallidal neurons modulate firing to promote reward consumption. Nature Neuroscience. Mar;24(3):379-390.

2) Vachez et al., Unilateral and bilateral Subthalamic stimulation differently promote apathy: a translational approach. (2025) European Journal of Neuroscience. Feb;61:e70019

3) Fang LZ and Vachez YM. (2024) Targeting the ventral pallidum in obesity. Addiction Neuroscience (13):100179.

Requested domains of expertise (up to 5 keywords):

Circuits Neurosciences, Behavior, electrophysiology, Neuromodulation, Data processing