PhD Proposal

Biomedical Sciences, Université du Québec à Trois-Rivières, Québec

Discipline: Cellular and Behavioral Neuroscience, Ethology

Project Title:

Identification of the Mechanisms Involved in the Processing and Plasticity of the Trigeminal and Olfactory Systems: From Chemoreceptor Expression to Behavior

Research Project

In mammals, chemosensation relies on three interconnected systems: olfactory, gustatory, and trigeminal. Despite their essential role in the perception of flavors, danger signals, and communication cues, these systems remain less studied than the physical senses. The Covid-19 pandemic, by inducing widespread anosmia, revealed the major impact of chemosensory deficits on diet, mood, and quality of life. This situation highlights the necessity of elucidating the underlying neurobiological mechanisms and developing innovative tools for the integrated study of chemical senses. While our understanding of the trigeminal system and its bidirectional interaction with the olfactory system remains incomplete in humans, the animal model offers an unparalleled opportunity to uncover the mechanisms underlying the functioning of these chemosensory systems. In this project, we will identify the mechanisms involved in chemosensory integration at the peripheral, central, and perceptual levels by combining behavioral, imaging (functional, structural, diffusion), and immunohistochemical techniques.
More specifically:
• Axis 1 aims to characterize the trigeminal system, from behavior to molecules.
• Axis 2 aims to identify the mechanisms underlying interactions between the olfactory and trigeminal systems.
• Axis 3 aims to identify the mechanisms involved in the plasticity of the olfactory and trigeminal systems in mice and humans.

The anticipated outcomes are multiple:
1) The knowledge generated by this program will enrich fundamental research in sensory processing, multisensory integration, and neural plasticity.
2) Mathematical and computational algorithms will be optimized to improve the resolution, signal-to-noise ratio, and acquisition time of structural, functional, and diffusion imaging in mice.
3) These advances may benefit the agri-food industry as well as clinical research.

Locations:

The experiments will primarily take place at the Douglas Research Centre in Montréal and occasionally at the Université du Québec à Trois-Rivières (QC). This collaborative project involves researchers from multiple institutions (Douglas Research Centre, Université de

Sherbrooke, UQTR). Enrollment in the PhD program in Biomedical Sciences at the Université du Québec à Trois-Rivières (Québec) is required.

Required Profile:

• Master's degree in neuroscience, biology, and/or ethology.
• Desired experience: animal behavioral evaluation (ideally rodents) and immunohistochemistry (perfusion, brain sectioning, slice analysis).
• Imaging experience would be an asset.
• Strong writing and communication skills, perseverance, scientific rigor, and interest in multidisciplinary approaches.

Please send a motivation letter, a CV, and academic transcripts to:

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