



## **Trigemino-trigeminal interactions and neuroinflammation in painful trigeminal neuropathies (TRINITY)**

*Morphological and functional alterations of the corneal nociceptive system following infra-orbital nerve chronic constriction injury in the mouse*

**Niveau de stage (Master, thèse, master + perspective de thèse) :**

Master 2 + perspective de thèse

### **Résumé et objectifs :**

Painful post-traumatic trigeminal neuropathies, responsible for severe neuropathic pain in the orofacial region following iatrogenic injury to one or more branches of the trigeminal nerve (the largest cranial nerve comprised of an ophthalmic branch [V<sub>1</sub>], a maxillary branch [V<sub>2</sub>] and a mandibular branch [V<sub>3</sub>]), are of complex diagnosis and management, resulting in poor quality of life for such patients. Underlying pathophysiological mechanisms are still poorly understood. Recent studies suggest a possible cross activation between the different trigeminal branches within the trigeminal ganglion, including neuroglial interactions between the trigeminal neurons and surrounding satellite glial cells, mediated by neuropeptides such as CGRP, substance P, PACAP and other signaling molecules (ATP, NO, cytokines, neurotrophines...).

By exploring the functional and molecular alterations within the ophthalmic branch (V<sub>1</sub>) of the trigeminal nerve in a mouse model of post-traumatic trigeminal neuropathy (chronic constriction of the infra-orbital nerve [part of the V<sub>2</sub> branch], IoN-CCI), this project, developed with Dr Annabelle REAUX-LE GOAZIGO (CRCN INSERM in the team), aims to study the trigemino-trigeminal interactions and neuroinflammatory responses implicated in the pathophysiology of painful post-traumatic trigeminal neuropathies.

The student implicated in this project will first explore the neuropathic pain phenotype developing following chronic constriction injury to the infra-orbital nerve in C57BL6J mice, at specific timepoints (D0, D7, D14, D21). The student will learn the anatomy of the trigeminal nociceptive pathway and perform molecular (PCR, Elisa...), cellular (Evans Blue and Sodium Fluorescein vascular permeability assays, immunohistochemistry) and behavioral (facial grooming, mechanical sensitivity assay with von Frey filaments...) explorations. Then, he will explore the alterations of the corneal nociceptive system (V<sub>1</sub> branch) resulting from the infra-orbital nerve injury (V<sub>2</sub> branch), using specific ophthalmological equipment (for which he will receive specific training) to monitor corneal surface alterations (slit lamp examination) and to characterize corneal inflammation and/or denervation (*in vivo* confocal microscopy).

**Profils recherchés :**

Etudiants en Master 2 Neurosciences, idéalement intéressés par la douleur, la neurologie et/ou l'ophtalmologie

**Compétences recherchées :**

- Pratique de l'expérimentation animale sur la souris
- Pratique des principales techniques de biologie moléculaire (surtout PCR)
- Adaptabilité

**Encadrants :**

- Dr Nathan MOREAU (MCU-PH, Université de Paris)
- Dr Annabelle REAUX-LE GOAZIGO (CRCN, INSERM, Sorbonne Université)

**Laboratoire :**

Institut de la Vision – UMR S 968 INSERM/Sorbonne Université/UMR 7210 CNRS  
Equipe S12 – Chimiokines et pathologies du segment antérieur de l'œil  
Directeurs : Pr Christophe BAUDOUIN (MD, PhD) et Dr Stéphane MELIK-PARSADANIAN (DR1 CNRS)

**Financement :**

Gratification du stage de M2 (sur les fonds propres du laboratoire)

**Durée et début du stage :**

Stage de 6 mois, début variable selon les doléances de la faculté

**Adresse :**

Institut de la Vision, 17 rue Moreau 75012 Paris

**Contacts :**

Dr Nathan MOREAU

[nathan.moreau@aphp.fr](mailto:nathan.moreau@aphp.fr)

[nathan.moreau@inserm.fr](mailto:nathan.moreau@inserm.fr)