



UNIVERSITAT DE
BARCELONA



Institut de Neurociències
UNIVERSITAT DE BARCELONA



PhD IN NEUROSCIENCES

The **Neuropharmacology and Pain Group** (<http://www.ub.edu/neuropharmpain/>) at the University of Barcelona (Bellvitge Campus) is looking for candidates to carry out their doctoral thesis. Our mission is to discover innovative pharmacological solutions for treating neurological and neuropsychiatric disorders. We explore the intricate neurobiological mechanisms underlying these conditions, delving into molecular dynamics of neurotransmitter receptors, circuit neuroadaptations, and their physiological and behavioural implications. Our multidisciplinary team employs a diverse range of therapeutic strategies, including cutting-edge approaches such as combined pharmacology, tailored oligomer drugs, and photopharmacology, among others.

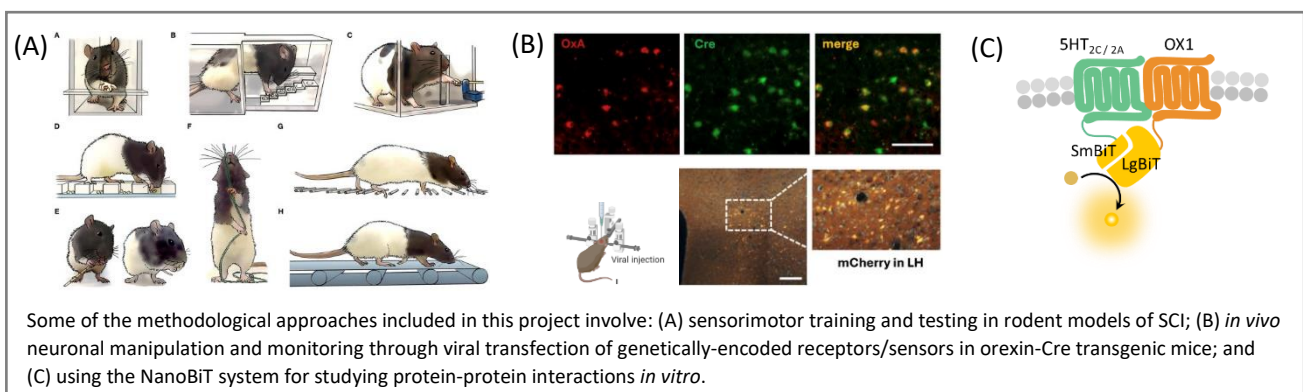
The research line

We invite enthusiastic and dedicated individuals to join our dynamic research team as part of one of our latest research initiatives. The candidate will develop his/her PhD thesis within a project focused on unraveling the critical role of the **orexinergic system in enhancing sensorimotor recovery induced by physical rehabilitation after spinal cord injury (SCI)**. Orexin peptides, produced by hypothalamic neurons, are well-known for promoting wakefulness and arousal, but they also play key roles in maintaining muscular tone, initiating locomotion, and enabling skilled movements. Preliminary results from our lab suggest that orexinergic transmission is essential for certain motor improvements driven by physical rehabilitation. Additionally, recent groundbreaking studies have shown that electrical stimulation of the hypothalamus can immediately restore stepping in patients with partial SCI, further highlighting the potential benefits of enhancing this neuromodulatory system to regain motor control, which is the driving concept behind our project. This research has secured funding from the Spanish Ministry of Science and Innovation as a 4-year project under the "Generación de Conocimiento 2022" program.

Planned tasks

Our approach involves integrating pharmacological interventions with rehabilitative training in rodent models, aiming to enhance neural circuit reorganization and ultimately improve functional outcomes. As a Ph.D. candidate, you will gain hands-on experience with a wide range of cutting-edge methodologies, including:

- *In Vivo* studies: You will have the opportunity to conduct *in vivo* experiments in rodent models to investigate functional, morphological, and biochemical changes resulting from our therapeutic interventions. We manipulate neuronal activity through chemogenetics, optogenetics, and/or novel pharmacological tools, and we monitor the short- and long-term consequences of these manipulations by using genetically-encoded sensors and fiber photometry, neuronal tracing, and electromyography. These state-of-the-art techniques, together with the kinematic analysis of specific motor tasks, provide a window into the dynamic neural processes at play during motor performance and rehabilitation.
- *In Vitro* studies: Our research also includes an in-depth *in vitro* analysis of neurotransmission systems' signaling pathways. You will gain expertise in cellular and molecular techniques to uncover the intricacies of these signaling mechanisms. We employ techniques such as BRET, FRET, and NanoBiT on a daily basis to characterize the interaction between GPCRs. In this project we will delve deeper into the interaction between orexin and serotonin receptors, particularly involved in motor recovery and neuroplastic processes.



Financial Support

We expect candidates to have a competitive academic record that qualifies them to apply for predoctoral scholarships (e.g., FI, FPU) within their first year. Securing such funding will be necessary to support the full duration of the PhD thesis. To further support our candidates during the scholarship application process, we offer the possibility of temporary financial assistance through short-term contracts and/or institution-specific bridge scholarships while awaiting final decisions on competitive scholarships.

Candidate requirements

Education: Degree in Biology, Biochemistry, Biotechnology, Biomedicine, or a related field, with a grade point average of 8/10 or higher.

English proficiency: Candidates must demonstrate proficiency in English (B2 or higher).

Experience: Prior experience in laboratory techniques for cellular and molecular neuroscience and/or working with animal models is highly valued (not required). Official accreditation to work with experimentation animals is desirable.

Other desirable qualities:

- High motivation and commitment.
- Familiarity with lab software such as GraphPad, Microsoft Office, R, Fiji. Programming skills are a plus.
- Knowledge of Spanish and/or Catalan.

Submission

Please submit your application (CV, degree and master records; letter of interest is optional but valued) to África Flores (africa.flores@ub.edu).