

**Group name: Development, Plasticity and Reprogramming of Sensory Circuits**

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**Group web: <http://lopezbenditolab.com>**

**Title of the MRP/TFM: Study of thalamic activity patterns in the developing brain**

Summary of the Project:

The thalamus is a central structure of the brain, primarily recognized for the relay of incoming sensory and motor information to the cerebral cortex, but also by its function in high order sensory circuits communication.

During development, the thalamus exhibits spontaneous calcium waves, patterns of activity that are essential for the formation of the sensory maps and for circuit plasticity. Results in our laboratory have revealed that by perturbing these patterns of calcium waves, thalamic nuclei are affected in function and gene expression in very early stages of development (Moreno Juan *et al.*, 2017). Moreover, cortical areas corresponding to their specific sensory nuclei are perturbed in their refinement and maturation (Moreno-Juan *et al.*, 2017; Antón-Bolaños *et al.*, 2019). All this work leads to the conclusion that thalamic waves are crucial for the specification and refinement of cortical functional maps and circuits before sensory perception. However, how these activity patterns appear in late embryonic and early postnatal stages and how they regulate the formation of the sensory cortices is not well understood.

In this project, we propose to use *ex vivo* calcium recordings in the thalamus to describe the spontaneous activity in perinatal and early postnatal stages. Hereby we can observe the specific calcium patterns in the thalamic sensory nuclei and describe their role in the construction of sensory circuits at these developmental stages.

The aims of this project for the students are:

- Becoming familiar with handling of mice and different treatment techniques.
- Become familiar with the technique for acquiring functional calcium imaging *ex vivo*.
- Learning from start to finish the sample preparation, imaging, and analysis.

**We highly recommend that the applicant has a strong proficiency in English because the project will be fully conducted in English.**

Methods and technology involved in the MRP/TFM Project:

- Mouse handling.
- Dissection and sample preparation.
- *Ex vivo* acquisitions of calcium recordings in prenatal and early neonatal mice by using confocal microscopy.
- Processing of neuronal calcium recordings and data analysis.

Member/s of the lab who will act as tutor/co-tutor of the project (if different from the group IP): Postdoctoral researcher, Dorien Vandael

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