Proposal of Master Research Project (MRP) for the Academic Year 2026-27

Group Name: Developmental and cognitive disorders
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Title of the MRP:
NALCN function in oligodendrocyte precursor cells

Summary of the MRP:

IHPRF1 is rare neurodevelopmental encephalopathy characterized by hypotonia, global developmental delay and facial dysmorphisms and caused by dysfunction of NALCN, a non-selective sodium leak channel. This project addressed the cellular pathophysiology of IHPRF1 using mice as animal models. Oligodendrocyte precursos cells (OPCs) are a the glia with the most abundant expression of NALCN in the central nervous system. Premilinary data show that NALCN protein is present in OPCs in the cerebral cortex. This master thesis will systematically characterize the expression of NALCN across the cells in the OPC lineage during key neurodevelopmental stages and brain regions. In addition, in this master thesis we will address the impact of NALCN dysfunciton onto OPC function at different biological scales, using in vivo loss-of-function approach. This work will reveal a previously enexplored cellular vulnerability in these rare channelopathies and lay the groundwork for understanding the contribution of OPC dysfunction neurodevelopmental phentoypes.

Methods and technology involved in the MRP:

Mouse genetics and molecular biology techniques
Fluorescence immunohistochemistry and widefield and confocal imaging.
Stereological quantification
3D morphological reconstruction
Mouse behavior and analysis

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