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

Group Name: Cell Plasticity in development and disease
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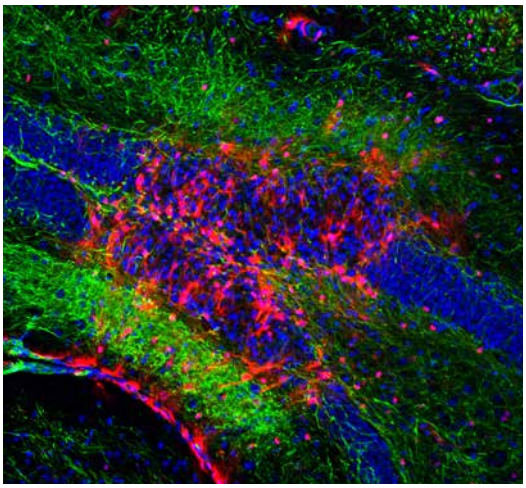
Title of the MRP:

Neural regulation of brain tumours

Summary of the MRP:



Effective treatments for brain tumours constitute an urgent unmet clinical need. Brain metastases (BM) or secondary brain tumours constitute the most frequent intracranial tumours.

Several studies have suggested that tumor cells that metastasize to the brain may harbor specific intrinsic characteristics, but the unique microenvironment of the brain greatly contributes to these differences.

Glial cells play a central role in maintaining brain homeostasis, and we have identified neuroinflammation and distinct glial populations as key regulators of BM progression and modulators of therapeutic response (Rodríguez-Baena et al., 2025, Cancer Cell, PMID: 39919736; Ballesteros et al., in preparation). However, while neurons and neuronal activity have been shown to actively regulate primary brain tumors, supporting a paradigm in which tumors become functionally integrated into neural circuits, their contribution to BM remains poorly characterized.

In this project we seek to better understand neural contribution to BMs progression and responses to therapies with the final aim of uncovering potential vulnerabilities that can be targeted alone or in combination with current treatments to improve therapeutic strategies for these patients.
Please send me an email if you have any question.

Methods and technology involved in the MRP:

The methodology to be used in this project includes (but it is not restricted) to cell and organotypic cultures: maintenance of tumour cell lines; establishment of neurons cultures from transgenic mice; culture of BMs-harboring brain slices and treatment with candidate drugs to assess BMs growth. He/She will also be trained in flow cytometry, immunofluorescence techniques or qRT-PCR among others. We also have transcriptomic data (including spatial transcriptomics) from brain metastasis available for further characterization for candidates interested in bioinformatic analysis.
The candidate will be daily supervised by experienced researchers and will have weekly meetings with the PI. The candidate will also participate in our lab meetings, having the opportunity to present her/his results and discuss relevant research articles at our “journal club”.

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