Universidad de Navarra
Facultad de Ciencias

MÁSTER EN INVESTIGACIÓN BIOMÉDICA
Research Project Proposal
Academic year 2025-2026

Project Nº 25

Title: *High-density electrophysiological recordings for the study of the infiltration of cancerous cells into brain tissue.*

Department/ Laboratory
Physiological Monitoring & Control Lab, CIMA/University of Navarra.
Advanced Therapies for Pediatric Solid Tumors Lab, CIMA/University of Navarra.

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Summary

High-density electrophysiological recording technologies, such as Neuropixels probes, offer unprecedented opportunities to study how local neuronal activity is altered by the infiltration of cancerous cells into brain tissue. These advanced probes allow for the simultaneous recording of hundreds to thousands of neurons across cortical and subcortical structures with single-cell resolution and high temporal precision.

This capability is particularly valuable for investigating the complex neurobiological consequences of brain tumor progression and metastasis. Cancerous cells infiltrating the brain microenvironment can disrupt normal neural function by directly modulating the activity of resident neurons through the secretion of signaling molecules, changes in ion homeostasis, or physical displacement. Additionally, recent evidence suggests that glioma cells, for instance, can form functional synapses with neurons, effectively hijacking neuronal activity to promote their own growth and proliferation. These interactions could create positive feedback loops whereby increased neuronal firing enhances tumor aggressiveness, while the tumor further perturbs local circuits.

In this TFM we will use high-density neural probes in animal models to map these dynamics with spatial and temporal resolution unattainable by traditional electrophysiology or imaging methods.

Specifically, the candidate will collaborate in the development of the setup required to perform in vivo recordings in head-fixed mice and will also take part in designing the preliminary analysis framework that will support the implementation of the high-density neural recording techniques.

yes	X
no	

Does the project include the possibility of supervised animal manipulation to complete the training for animal manipulator?