Universidad de Navarra
Facultad de Ciencias

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

Project Nº (Nº a completar por el Máster)
Title: *Evading the Immune Radar: The Role of RNA Surveillance in Tumor Progression*
Department/ Laboratory Innovation Therapeutics, RNA Aptamer Therapeutics, CIMA
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Tumors continuously evolve to survive the relentless pressure exerted by the immune system and anticancer therapies. This evolutionary process is fueled by their remarkable genomic and transcriptomic plasticity. One of the key hallmarks of cancer is immune evasion. However, as tumors accumulate new driver mutations, they also become more antigenic, potentially making them more visible to the immune system.

We hypothesize that tumors exploit RNA transcriptional rewiring and RNA surveillance mechanisms to avoid immune detection. Specifically, these mechanisms may suppress the expression of neoantigens arising from newly acquired mutations, acting as an additional layer of immune evasion.

To investigate this, we will perform integrative bioinformatic analyses of tumor mutational landscapes and transcriptomic profiles to identify RNA surveillance pathways that might prevent the expression of immunogenic neoantigens. We will explore this RNA-based immunoediting process using murine tumor models treated with standard immune checkpoint inhibitors. Immune modulation mediated by RNA surveillance will be further characterized using a wide range of in vitro and in vivo immunological assays.

This project offers a multidisciplinary environment at the interface of immunology, RNA biology, and cancer research, providing the student with comprehensive training for a future in biomedical science.

During the course of the master's project, the student will gain hands-on experience with:

Molecular biology: cloning, RNA interference (RNAi), CRISPR-Cas9, and aptamer technologies.

In vivo experimentation using murine models.

Immunological assays: ELISA, cytotoxicity, cytokine profiling.

Flow cytometry and confocal microscopy.

Bioinformatics: analysis of bulk and single-cell RNA-seq (scRNA-seq), mutation profiling, and pathway enrichment analysis.

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

yes	x
no	