Universidad de Navarra
Facultad de Ciencias

MÁSTER EN INVESTIGACIÓN BIOMÉDICA
Research Project Proposal
Academic year 2026-2027

Project Nº 09

Title: *3D Co-culture models of mesenchymal cells in multiple myeloma response*

Department/ Laboratory *Laboratory where the project will be carried out indicating Department, Area, Faculty, CUN, CIMA etc.*
Hemato-oncology department, Translational hematology group, CIMA-CCUN-UNAV
https://cima.cun.es/investigacion/programas-investigacion/programa-investigacion-hemato-oncologia/hematologia-traslacional

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Summary Multiple myeloma (MM) is a hematologic malignancy characterized by the uncontrolled proliferation of malignant plasma cells (MM-PC). Disease progression and treatment response are shaped not only by tumor cells but also by the bone marrow (BM) microenvironment and its complex cellular interactions. Despite significant therapeutic advances, most patients eventually relapse, and a definitive cure remains lacking. This project aims to elucidate how the non-immune BM niche contributes to treatment resistance and relapse in MM by integrating single-cell and spatial transcriptomics with advanced 3D culture systems and *in vivo* models to identify novel therapeutic targets. Our preliminary data support a key role for the non-immune BM microenvironment in early disease progression. Moreover, we have shown that standard triplet therapy (bortezomib, lenalidomide, and dexamethasone) remodels the BM niche by suppressing interferon signaling, promoting adaptive responses in endothelial cells, and restoring osteogenic potential in mesenchymal cells (MSC), collectively reducing tumor permissiveness. To further dissect these mechanisms, we will apply single-cell RNA sequencing (scRNA-seq) (Aim 1) and spatial transcriptomics (Aim 2) to identify candidate niche regulators of treatment response. These candidates will be functionally validated ex vivo using 3D MSC spheroid co-culture systems that recapitulate the human BM microenvironment (Aim 3), enabling prioritization of key pathways for *in vivo* validation (Aim 4).

The candidate will focus on developing 3D co-culture systems that combine MM-PC and MSC spheroids from multiple donors. These studies will generate clinically relevant insights to inform targeted therapies and prevent disease relapse.

yes	
no	X

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