Universidad de Navarra
Facultad de Ciencias

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

Project Nº 24

Title: Genome-wide CRISPR-Cas9 Screening to Identify Host Factors Controlling Intracellular Survival of *Acinetobacter baumannii* in Human Macrophages

Department/ Laboratory Department of Microbiology and Parasitology-Edificio de Investigación

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Summary

Acinetobacter baumannii is a multidrug-resistant pathogen responsible for severe hospital-acquired infections, including pneumonia, bacteremia, and wound infections. Recent studies suggest that, in addition to its extracellular lifestyle, *A. baumannii* can survive transiently within macrophages and evade immune clearance. The **goal** of this project is to identify host genes and pathways that regulate the uptake, intracellular survival, and elimination of *A. baumannii* in human macrophages.

To address this objective, a **genome-wide CRISPR-Cas9 knockout THP-1 library** will be used as a high-throughput platform to study host-pathogen interactions. THP-1-derived macrophages will be infected with fluorescently labeled *A. baumannii* under optimized experimental conditions. After infection, flow cytometry will be used to separate macrophage populations with high and low intracellular bacterial burden. Genomic DNA from these selected populations will be extracted, and sgRNA abundance will be analyzed by next-generation sequencing to identify host genes associated with bacterial persistence or enhanced clearance.

The most relevant candidate genes will be further validated through individual CRISPR knockouts, intracellular bacterial survival assays (CFU quantification), fluorescence microscopy, and cytokine analysis. This project will provide new insights into host mechanisms exploited by *A. baumannii* during infection and may identify novel targets for host-directed therapies against multidrug-resistant bacterial infections.

yes	
no	X

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