Universidad de Navarra

Facultad de Ciencias

MASTER'S DEGREE IN BIOMEDICAL RESEARCH
Research Project Proposal
Academic year 2024-2025

Project Nº08

Title: Role of denitrification in *Brucella* pathogenesis

Department/ Laboratory: Microbiology and Parasitology

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Summary

The members of the genus *Brucella* are α-2 Proteobacteria that cause brucellosis, an important disease affecting livestock and wild life as well as human beings. These bacteria follow a stealthy behavior that allows them to reach sheltered intracellular niches. To reach this intracellular niche, *Brucella* copes with different intracellular stresses such as oxidative and nitrosative stress. Once it reaches the intracellular niche, *Brucella* multiplies extensively in an ER- derived compartment. Among the adaptations that intracellular pathogens have to make in order to multiply inside vacuoles, the ability to obtain energy under conditions of low oxygen tension stands out. *Brucella* has been described as a facultative anaerobic genus capable of respiring nitrate. Although *Brucella* has the genetic capacity to carry out complete denitrification (NO_3^- → N2), it is not clear whether it carries out this type of respiration and it has been postulated that genes involved in the last steps of the process (NO → N2) may be involved in coping with nitrosative stress.

Objective/s:
• To study the nitrate respiration of *Brucella*.
• To study *Brucella* strategies to deal with nitrosative stress.
• To connect the results obtained in 1 and 2 with *Brucella* central C metabolism and virulence.
Student tasks:
• To construct mutants in the genes of interest.
• To analyze the phenotype of the mutants in different in vitro and in vivo conditions.
Student specifications:
Willingness to work under BSL3 conditions.

yes	x
no	

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