



**Research Project Proposal**  
Academic year 2021-2022  
**Máster en Investigación Biomédica**

**Project Nº 40**

Title: **Role of denitrification in *Brucella* pathogenesis**

Department/ Laboratory Laboratory where the project will be carried out indicating Department of Microbiology and Parasitology

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The members of the genus *Brucella* are  $\alpha$ -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 ( $\text{NO}_3^- \rightarrow \text{N}_2$ ), 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 ( $\text{NO} \rightarrow \text{N}_2$ ) may be involved in coping with nitrosative stress.

The goals of this project are:

- 1) To study the nitrate respiration of *Brucella*.
- 2) To study *Brucella* strategies to deal with nitrosative stress.
- 3) To connect the results obtained in 1 and 2 with *Brucella* virulence.

To achieve these objectives, we propose to construct mutants in the genes of interest and to analyze the phenotype of the mutants in different *in vitro* and *in vivo* conditions.

yes	<input checked="" type="checkbox"/>	Does the project include the possibility of supervised animal manipulation to complete the training for animal manipulator?
no	<input type="checkbox"/>	