Universidad de Navarra
Facultad de Ciencias

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

Project Nº 33

Title: *Effect of endothelial NOX5 overexpression on gut microbiota modulation in a mouse model of Type II Diabetes*

Department/ Laboratory *Department of Biochemistry and Genetics, School of Sciences*
NOX group

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Summary
Cardiovascular diseases remain the leading cause of mortality, with vascular oxidative stress playing a central role in their pathogenesis, especially in patients with metabolic comorbidities such as type II diabetes. It is essential to characterize molecular mechanisms and effects for early, specific diagnosis and targeted, effective, novel treatments.
The NADPH oxidase 5 (NOX5) is a reactive oxygen species -generating enzyme whose role in vascular dysfunction is under active investigation. Data from our group indicates that it critically participates in endothelial-derived vascular dysfunction, emerging as a potential target. The effects of vascular oxidative stress on the gut microbiome are unknown.
The student will explore how NOX5-driven oxidative stress may reshape the gut microbial ecosystem in the context of diabetes, potentially uncovering new links between vascular health and intestinal bacteria. This project is part of ongoing studies characterizing the role of endothelial NOX5 overexpression in a mouse model of diet-induced type II diabetes. Fecal samples are already collected, ready for processing. The student will extract microbial DNA, perform 16S rRNA gene sequencing using the Ion Torrent platform, and apply bioinformatics tools to analyze microbial diversity. Statistical methods will be used to identify significant microbiome differences across experimental groups (human NOX5 knock in vs. control; diabetic vs. standard diet), along with the metabolic parameters of the mice.
This project offers a unique opportunity to gain hands-on experience in molecular biology, next-generation sequencing and computational analysis. It is ideal for students with a background in biochemistry and interest in systems biology and data science.

yes	X
no	

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