Universidad de Navarra
Facultad de Ciencias

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

Project Nº 44

Title: *Development of a gene editing strategy for the treatment of hereditary hearing loss.*

Department/ Laboratory *DNA and RNA Medicine/ Laboratory of gene therapy for congenital hearing loss and AAV engineering*

Director: *Carmen Unzu*
Contact: *cunzu@unav.es*

Summary

Gene therapy is a medical technology that allows to treat the origin of genetic diseases by supplementing a missing gene, silencing a gene that is overexpressed, or editing the genome. Whereas gene supplementation can be lost over time, gene editing strategies are expected to be long-lasting. Viral vectors are commonly used for delivering DNA payloads to the cells, among which recombinant adeno-associated viral (rAAV) vectors are the flagship vehicle for therapeutic applications. Hearing loss is the most common sensory impairment in the population, with more than half the cases having a genetic origin. Therefore, gene editing would make a positive impact in people affected by hereditary hearing loss. In this project, two different gene editing delivery systems (AAV or LNP) will be tested and compared to classic gene supplementation to the inner ear. First, WT mouse cochlear explants will be used to compare AAV-based versus LNP-based vector editing efficiency using a reporter and a therapeutic transgene. Editing efficiency and nuclease inactivation will be evaluated by sequencing, western blot and transgene immunofluorescence. Next, the most efficient delivery system will be tested in a mouse model of Connexin 26 deficiency, the most frequent cause of hereditary hearing loss. DNA will be extracted to sequence the region of interest 4 weeks later and study gene editing efficiency and the DNA insertion profile upon delivery in each condition. Additional organs and fluids will be collected for vector biodistribution and neutralization studies.

yes	X
no	

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