Universidad de Navarra
Facultad de Ciencias

MÁSTER EN INVESTIGACIÓN BIOMÉDICA
Research Project Proposal
Academic year 2022-2023

Project Nº 22

Title: *Immune system antitumor response enhanced by IL12 mRNA encapsulated into nanoparticles*

Department/ Laboratory *Laboratory of Pharmaceutical Technology, Department of Pharmaceutical technology and Chemistry, School of Pharmacy and Nutrition, University of Navarra*

Director 1 *María Jesús Garrido Cid*
Contact: *mgarrido@unav.es*
Codirector: *Sara Zalba Oteiza*
Contact: *szalbaot@unav.es*

Summary

Since the commercialization of Covid19 vaccines, nanoparticles encapsulating therapeutic genes have gained interest, and many researchers are developing nanoparticles for different therapeutic genes administration.
In oncology, tumor microenvironment is a complex tissue with many components including macrophages, which are intimately involved in tumor rejection, proliferation and metastasis. In some cases, macrophages can comprise up to 50% of tumor, and their abundance is associated with a poor clinical outcome in most cancers.
Macrophages are classified as M1 or pro-inflammatory involved in anti-tumor response and M2 or anti-inflammatory that promotes cell proliferation and angiogenesis. The M2 polarization to M1 represents a strategy to produce innate and adaptive immune cells able to eliminate tumor cells.
In this way, cytokines, in particular, IL12 has demonstrated significant antitumor response in many preclinical models, inducing the polarization of macrophages to M1. However, its toxicity has limited the clinical translation.
Therefore, this project aims to develop lipid nanocarriers encapsulating mRNA for encoding IL12 in order to promote the presence of M1 macrophages for attaining tumor shrinkage.
To address this objective, liposomes will be formulated and assayed following two steps: first, the encapsulation of luciferase mRNA will optimize for providing a standard protocol; second step, according to previous protocol, IL12 mRNA liposomes will be prepared and evaluated in in-vitro 2D and 3D cell culture platforms. In that experimental setting, the efficacy of IL12 mRNA liposomes will be assayed in a pilot study using a human cancer xenograft mouse model, where the immune system response will be carefully analyzed.

yes	X
no	

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