

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

Project Nº 47		
Title: Nanovectors for oncology encapsulating nucleic acid (DNA/RNA)		
Department/ Laboratory Laboratory where the project will be carried out indicating Department, Area, Faculty, CUN, CIMA etc. Pharmaceutical Technology and Chemistry (School of Pharmacy & Nutrition)		
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<p>Summary:</p> <p>Ribonucleic acid (RNA) provides instructions for making proteins that can encode interesting therapeutic proteins for different diseases. However, naked RNA molecules are easily degraded so they are short-lived after systemically administered. Free administered RNA also lack target specificity which may increase the risk of triggering immunogenic responses. According to these considerations, systemic delivery of RNA for disease treatment needs a well-designed nanocarrier system for solving most of the commented issues. In that sense, nanovaccines have been actively investigated for decades for several therapies such as cancer and others, emerging new promising formulations. An interesting and actual example is RNA nanovaccine encoding the SARS-CoV-2 spike protein, regarding COVID-19 immunization. Therefore, this project aims to achieve the RNA encapsulation into nanoliposomes in order to transfect cancer cells and express those therapeutic proteins of interest.</p> <p>To address this objective, liposomes composed by an ionizable lipid, cholesterol and polyethyleneglycol will be formulated using the ethanol-loading procedure. Luciferase DNA/mRNA will be used to develop and optimize the efficiency of encapsulation, stablishing the most adequate lipid-RNA ratio. The optimal formulation will be assayed in cancer culture cells to evaluate luciferase expression by confocal microscopy and bioluminescence. Besides, in-vivo biodistribution using tumor bearing mice will be the proof of concept to investigate where RNA liposomes can access. Afterwards, the RNA of interest will be encapsulated and the protein expression as well as the effect will be tested in-vitro and in-vivo.</p>		
yes	X	Does the project include the possibility of supervised animal manipulation to complete the training for animal manipulator?
no		