

Research Project Proposal
Academic year 2019-2020

Project Nº 47		
Title: Mucus-permeating nanoparticles as carriers for oral delivery of therapeutic proteins		
Department/ Laboratory <i>Laboratory where the project will be carried out indicating Department, Area, Faculty, CUN, CIMA etc.</i> Group of Nanomedicines and Vaccines, NANO-VAC Tecnología y Química Farmacéuticas Universidad de Navarra		
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Summary In 1982, the FDA approved the first commercially available recombinant protein for the treatment of diabetic patients. Three decades after this first approval, more than 239 different therapeutic proteins and peptides have already been approved for clinical use. All of these compounds are administered as injections by a parenteral route in spite of their inherent short half-lives, requiring frequent injections that may compromise patient compliance and, thus, restrict their therapeutic value (particularly for chronic diseases). The oral administration of proteins and peptides remains an important challenge with many problems to solve in their development. In fact, the physico-chemical properties (MW, hydrophilic character, ionic charges, etc.) and enzymatic sensitivity strongly hamper the absorption of therapeutic proteins and peptides. Consequently, their oral bioavailability is (in general) low (< 1%). The main objective of this project is the design and evaluation of mucus-permeating nanocarriers with the capability of promoting the absorption and bioavailability of therapeutic proteins (using insulin as a model). In a first step, the candidate should optimize the preparation of nanoparticles and their coating with hydrophilic excipients. The second step will be the evaluation of the mucus-permeating properties of nanocarriers by multiple particle tracking (MPT) methodology in pig mucus. The third step will be dedicated to study the capability of the selected nanocarriers to load insulin (as model of therapeutic protein) and control its release. Finally, an in vivo study of efficacy in <i>C. elegans</i> will be conducted.		
yes	<input checked="" type="checkbox"/>	Does the project include the possibility of supervised animal manipulation to complete the training for animal manipulator? The student will collaborate with Ph.D students and post-docs involved in in vivo studies with mice and rats.
no	<input type="checkbox"/>	