

8th International Conference and Exhibition on

Pharmaceutics & Novel Drug Delivery Systems

March 07-09, 2016 Madrid, Spain

Polymer nanocapsules for the intracellular delivery of hydrophobic and hydrophilic anticancer drugs

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Our lab has shown that polymer nanocapsules are an attractive vehicle for the delivery of anticancer drugs. Here we describe a new prototype; hyaluronic acid (HA) nanocapsules intended to deliver drugs intracellularly. HA-NCs were formulated by a self-emulsifying method, which makes them suitable for the manipulation and formulation of very sensitive molecules. These NCs were designed to efficiently encapsulate a hydrophobic anticancer drug in the oily core, and for the association of proteins to the polymeric shell. In this work, we present the results obtained using Nile red, as a small molecular weight hydrophobic drug model, and a labelled large protein model. After the optimization of the different prototypes, empty HA-NCs showed a particle size around 130 nm and negative zeta potential. For both types of model drugs, high encapsulation efficiency values were obtained. In both cases, empty and loaded HA-NCs maintained their stability after incubation in PBS, RPMI culture medium and human blood plasma. Confocal microscopy images showed the ability of HA-NCs to transport the protein and the fluorophore to the intracellular compartment. The delivery of proteins for specific intracellular targeting is an ambitious approach where polymeric NCs appear as promising carriers for accurate delivery. The proposed system offers the additional advantage of co-delivering both drugs to reach their intracellular targets.

Biography

Dolores Torres is Associate Professor of Biopharmaceutics and Pharmaceutical Technology at the University of Santiago de Compostela (USC) since 1990. She joined the Nanobiopharmaceutics Group since its creation at the USC. She is experienced in the design and development of nanoparticulate drug delivery carriers for oral peptide delivery and cancer targeting. She has participated in more than 30 research projects with public institutions, and also 8 contracts with pharmaceutical companies (inventor of 4 patents). She is author of more than 50 scientific articles with more than 1,300 citations (H factor 19) and has supervised 10 PhD students.

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