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Polymeric biodegradable PEGylated nanoparticles for controlled drug delivery: An effective strategy for neurodegenerative diseases

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The main goal of this work is to present an effective approach for drug transport across the blood-brain barrier (BBB). In this sense, controlled drug delivery systems using biodegradable materials such as poly(lactic-co-glycolic acid) (PLGA) represents an interesting solution to increase drug concentration on the target tissue. Coating PLGA nanoparticles (NPs) with poly (ethylene glycol) (PEG) represents an improvement since it increases particles circulation avoiding their recognition by the reticuloendothelial system and increases their transport through the BBB. New compounds such as Rhein-huprine derivatives, which had demonstrated to be effective for Alzheimer's disease, constitute a crucial factor to clinical management of this disorder. Nevertheless, most of these hybrid molecules, which are highly hydrophobic, do not cross the BBB. The entrapment of these molecules into PLGA-PEG nanoparticles using the solvent-displacement method are aimed to increase drug delivery reducing systemic side effects after topical and oral administration being good candidates for glaucoma or Alzheimer's disease, respectively. Quality by design criteria was used in order to develop a suitable formulation. Optimized NPs exhibited a mean particle size below 200nm, monodisperse population, and negative surface charge. Drug-loaded NPs showed a sustained release profile, being able to modify drug kinetics. In addition, NPs were non-toxic in retinoblastoma cell lines and non-irritant after topical administration. Therefore, PLGA-PEG NPs towards neurodegenerative disorders treatment and are being assessed in a double transgenic mice model of Alzheimer's disease as well as for the treatment of glaucoma.

Biography

Elena Sanchez Lopez has completed her PhD entitled Controlled drug delivery systems for the treatment of neurodegenerative diseases on September 2017 (Cum Laude mention) and is currently working as Assistant Professor of the Faculty of Pharmacy and Food Science. During this time, she got two Master's (Master in research, control and drug development and Experimental Master) and she carried out two international stages, one in the University College of London and another one at the University of Tras-os-Montes e Alto Douro. She has participated in many international conferences and projects as well as published several research articles in high-impact factor journals, reviews, and book chapters.

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