

Abstract

Preparation and Characterization of Poly(Lactic Acid) Nanoparticles for the Encapsulation of Cytostatic Compounds [†]

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Abstract: Due to growing environmental concerns, biopolymeric nanoparticles (NPs) have gained importance in several areas as an alternative to synthetic polymeric NPs. One of the most promising biopolymers is poly(lactic acid) (PLA) due to its biocompatibility and biodegradability, allowing its use in the biomedical field for the development of drug delivery systems. In this work, PLA NPs were synthesized by combining a single-emulsion method with nanoprecipitation. The influence of several experimental parameters, namely, stirring method, PLA and poly(vinyl alcohol) (PVA) concentrations, and type of PLA, in the size and aggregation of the particles was evaluated. The use of a tip sonicator, a PLA concentration of 10 mg/mL, a PVA concentration of 2.5 mg/mL, and a low molecular weight PLA ($M_w = 5000$) were established as the best experimental conditions to obtain monodisperse PLA NPs. After the optimization step, flutamide was used as a model drug to evaluate the encapsulation capability of the PLA NPs. The obtained results showed that this cytostatic compound, used in cancer treatment, could be encapsulated in these NPs, with an efficiency of 44%. Furthermore, preliminary cell viability tests using HCT-116 cell line showed that PLA-flutamide NPs allowed cells viabilities above 70% up to a concentration of 20 mg/L. The overall results demonstrate that PLA NPs prepared by this simple approach can be used to encapsulate flutamide, representing an alternative for future cancer therapies.

Keywords: biopolymers; poly(lactic acid); nanoparticles; cytostatic compounds; flutamide

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Conflicts of Interest: