

Abstract

Development and Characterization of Paclitaxel-Loaded PLGA Nanoparticles and Cytotoxicity Assessment by MTT Assay on A549 Cell Line [†]

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Abstract: Paclitaxel (PTX) is a cytotoxic agent derived from *Taxus brevifolia* used for lung cancer. Poly d,l-lactide-co-glycolide (PLGA) is an FDA-approved biodegradable polymer used for preparation of nanoparticles carrying cytotoxic drug agents. The purpose of this study was to evaluate the effect of PTX solution and paclitaxel-loaded PLGA nanoparticles (PTX-PLGA-NPs) on A549 cells. PTX-PLGA-NPs were prepared using nanoprecipitation technique as described by Fessi et al. Particle size, polydispersity index, zeta potential and encapsulation efficiency of nanoparticles were measured. Cytotoxic effects of the various concentrations of PTX and PTX-PLGA-NPs on A549 cell line were determined by MTT assay. The cells were treated with various PTX and PTX-PLGA-NPs concentrations (1–10 µg/mL) for 24 h. Particle size, polydispersity index, zeta potential values and encapsulation efficiency were found as 267 ± 14 nm, 0.29, -28 ± 3 mV and 76% respectively. According to MTT results, the cytotoxicity effect of PTX-PLGA-NPs on A549 cells significantly increased in comparison to PTX solution at all concentrations. The enhancement of cytotoxicity can be explained by the sustained release of the PTX from the PLGA nanoparticles and the increase in PTX amount inside the A549 cells. It can be concluded that PTX-PLGA-NPs can be promising systems for anticancer therapy.

Keywords: PLGA; nanoparticle; A549; MTT; cytotoxicity



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