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Macrophage Uptake and Cytotoxicity of Paclitaxel Nanocrystals

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ABSTRACT

Effective drug delivery remains one of the most challenging tasks in combatting cancer cells. Anti-cancer drugs such as Paclitaxel (PTX) often struggle in having a high drug effect because they are often phagocytized by macrophages in Reticuloendothelial System (RES) before reaching the cancer cells. To combat this problem, PTX was inserted in a nanocrystal, coated with non-ionic surfactant F68; it is speculated that this formulation will minimize the particle aggregation and decrease the cellular uptake in the RES, which will increase the overall efficacy of the drug in the target areas. The aim of this project was to compare the cellular uptake and the toxicity of commercially produced PTX, PTX-loaded nanocrystals and F68-PTX-loaded nanocrystals, specifically in the RES macrophages. Confocal imaging was used to visualize the cellular uptake of the nanocrystals, and SRB assay was used to measure in-vitro cytotoxicity. The imaging and the assay suggest that while both surface coated formulation and pure paclitaxel nanocrystal are uptaken by the RES macrophages, the surface coating formulation in the nanocrystal reduces the cytotoxicity in the RES. Based on the results, the formulations show the potential to improve pharmacokinetics and biodistribution of PTX. This work can be used to seek ways to reduce toxicity in RES cells and increase the drug potency in the targeting cells.

KEYWORDS

Nanocrystal, Paclitaxel