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Cellular Uptake of Drug Nanocrystals

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ABSTRACT

Systemic toxicity and poor solubility of existing chemotherapeutic drugs piqued an interest in the use of nanocrystals for chemotherapy. To increase cytotoxicity, surface coating of nanocrystals is of interest to enhance tumor targeting and reduce treatment toxicity. As such, we tested in this project various coated paclitaxel nanocrystals on cancer cells for determining the efficacy of surface coating. An IC_{50} assay was chosen to determine the cytotoxicity of surface-coated paclitaxel nanocrystals; the lower the IC_{50} value, the higher the efficacy of the drug. Using the Sulforhodamine B method, paclitaxel, paclitaxel nanocrystals, and polymer coated paclitaxel nanocrystals were tested with regard to the cytotoxicity at various concentrations. The first set of in vitro experiments compared paclitaxel and paclitaxel nanocrystals for varied incubation times. Then, the second set of experiments assessed the efficacy of five different polymer coated paclitaxel nanocrystals for a standard incubation time. Paclitaxel nanocrystals proved to have a higher cytotoxicity than the standard paclitaxel formulation (i.e., Taxol®) at all time increments tested. The data also indicated that coated paclitaxel nanocrystals have a higher cytotoxicity than the paclitaxel nanocrystals. The cytotoxicity data will contribute to the evolving research on improving the efficacy and lowering the toxicity of developing nanocrystal chemotherapeutic formulations.

KEYWORDS

Nanocrystal, paclitaxel

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