



Co-Encapsulation of Docetaxel and Thymoquinone in Mpeg-DSPE-Vitamin E TPGS-Lipid Nanocapsules For Breast Cancer Therapy: Formulation Optimization and Implications on Cellular and In Vivo Toxicity

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Abstract

Rationally designed combination nanomedicines have emerged as a promising strategy for resistant breast cancer treatment. This research present the combination of Docetaxel (DTX) and Thymoquinone (THQ) co-encapsulated within long circulating sub-100 nm mPEG-DSPE-Vitamin E TPGS-Lipid nanocapsules (DxTq-LNCs). DxTq-LNCs with sufficient drug loading exhibited controlled drug release, enhanced protein binding resistance and retained the antioxidant effects of THQ. The presence of multidrug resistance (MDR) reversal agents; Vitamin E TPGS and THQ, along with the nanoencapsulation, re-sensitized the resistant triple negative breast cancer (TNBC) cells to the anticancer effects of DTX. In vivo toxicity studies indicated no substantial blood biochemical and histological changes with near normal appearance of kidney and liver tissue sections upon DxTq-LNCs treatment in contrast to free drug that showed parenchymal degeneration, areas of interstitial haemorrhage, glomerular atrophy and other histological changes. Furthermore, enhanced antitumor efficacy was observed with DxTq-LNCs treatment to mice bearing ehrlich ascites carcinoma. Thus, nanocapsules presents a simple yet effective approach for successful combination chemotherapy with reduced unwanted toxicity.

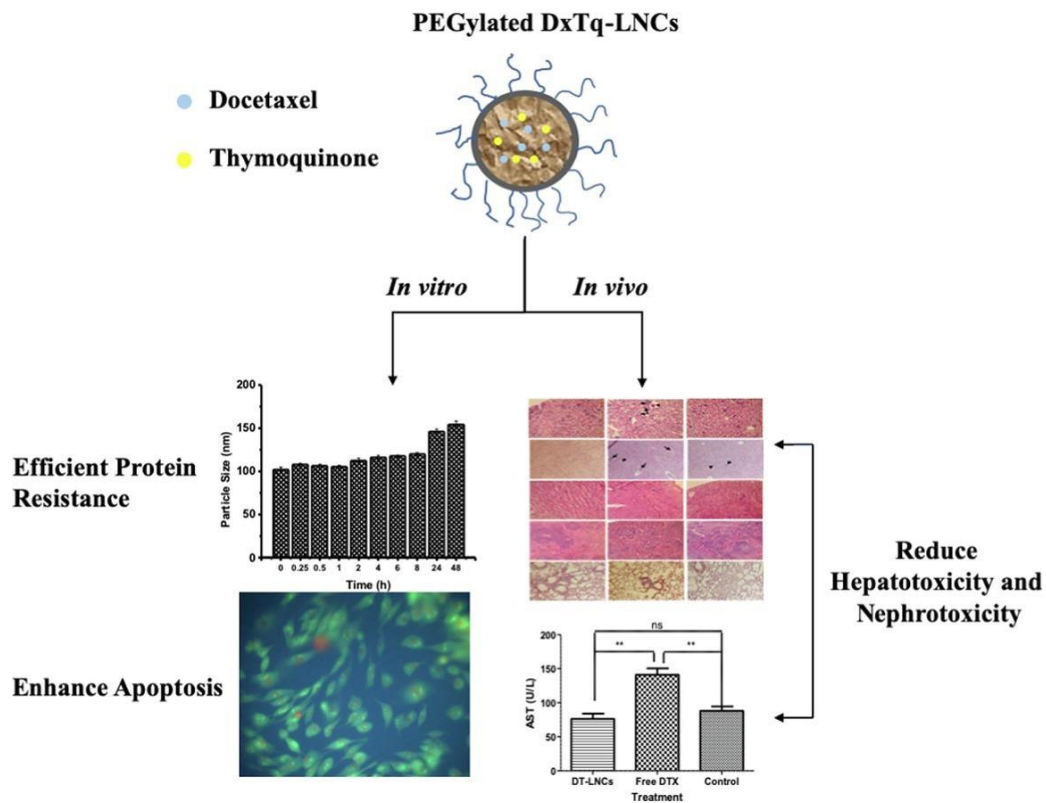


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