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DEVELOPMENT OF DOCETAXEL LOADED POLY- ϵ -CAPROLACTONE NANOPARTICLES FOR LUNG CANCER TREATMENT

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SUMMARY

Lung cancer poses one of the most significant challenges to modern medicine killing thousands every year. Novel formulation strategies are needed to develop alternative, less toxic (ethanol free) and better tolerated Tween 80-free formulations as a way to improve treatment of lung cancer which usually associate with many side effects to patients. Nanoparticles (NPs) were developed in this research using poly- ϵ -caprolactone (PCL) biodegradable polymer as nanocarrier loaded with docetaxel drug (DCX) for treatment of lung cancer. The optimized DCX loaded PCL nanoparticles formulation were developed by screening the use of different tensioactives (sorbitan monostearate, polysorbate 80, polyvinyl alcohol, sodium caproyl hyaluronate and sodium oleyl hyaluronate) in modified nanoprecipitation method. PCL nanoparticles were then characterized for their physicochemical characteristics such as size and size distribution, surface charge and morphology. Optimised DCX loaded PCL nanoparticles developed in this study gave the best results with particles size 87.84 nm and low PDI of 0.116. The surface charge of the nanoparticles was -24.1 mV. DCX loaded PCL nanoparticles were found stabled up to three-month stability in different storage conditions. The DCX loading were maximum at 20% of DCX to PCL ratio. In vitro cytotoxicity study in few cell lines and in vivo toxicity study in rats were also carried out for this formulation to compare toxicity of this new formulation with the current docetaxel drug treatment. Results from this study suggested that DCX loaded PCL nanoparticles formulation could be a new prospective nanocarrier formulation for lung cancer hydrophilic drug such as docetaxel for lung cancer treatment.