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Poly(sarcosine) & poly (ethylene glycol) fabricated poly (lactic-co-glycolic acid) polymeric nanoparticles for cancer drug delivery

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Abstract

The most significant advantage of polymeric nanoparticles is it's systematic and target specific drug delivery properties. These polymeric nanoparticles have the potential to sustain itself within the bloodstream for a longer period so that drugs can be infused in blood steadily. To understand such a phenomenon, in this experiment, an attempt was made to prepared Docetaxel loaded poly(sarcosine)(PSar) and polyethylene glycol (PEG) coated poly (lactic-co-glycolic acid) [PLGA] nanoparticles; which could efficiently encapsulate any hydrophobic drugs. These types of PEG-coated nanoparticles have a marked tendency to avoid reticuloendothelial opsonization process by restricting macrophage uptake, which ultimately leads to enhance bioavailability and tissue distribution of drugs. In this research work categorically, the concentration of PSar and PEG was optimized. The cellular uptake efficiency percentage and IC50 value of Docetaxel and Docetaxel loaded different polymeric nanoparticles evaluated in various human cancer cell lines (U-87 MG, HeLa. C2BBe1, HCT-116, NCI-N87, NCI-H929-Luc-mCh-Puro). The PSar-PLGA-PEG-NPs has shown sustainable retention in blood with minimum macrophage uptake as compared to PLGA-NPs and PSar-PLGA-NPs. Enhanced anti-tumour proliferative effects were shown in all the Docetaxel loaded nanoparticles as compared to native Docetaxel drug, which may be because of enhanced antiproliferative activities of nanoparticles. Thus, from the research outcomes, one thing is inevitable, i.e., the presence of PSar and PEG would increase the blood circulation time, and it can be used as a suitable carrier for any hydrophobic drug.