Targeting to Prostate Cancer Cells by using Ligand Conjugated Polymeric Nanoparticles as drug carrier

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Abstract

Presently wide-ranging research has been carried out to develop nano drug carriers, to overcome the lack of specificity of conventional chemotherapeutic agents for the treatment of prostate cancer, the second most common cancer in men. The aim of the current study is to develop and characterize PLGA nanoparticles (NPs) containing an anticancer agent, tagged with a suitable ligand for targeted delivery of the drug. Nanoparticles were prepared by a multiple emulsion solvent evaporation method. Drug excipients interaction, surface morphology, zeta potential and size distribution, cellular uptake were carried out using Fourier transform infrared spectroscopy (FTIR), Field emission scanning electron microscopy (FESEM), Zeta sizer Nano ZS90, particle size analyzer and confocal microscopy respectively. No chemical interaction was observed between the drug and the selected excipients. NPs had a smooth surface, and a nanosize range (250–380 nm) with a negative surface charge. Drug loadings of the prepared particles were 1.5±0.02% weight/weight (w/w), 2.68±0.5% w/w, 4.09±0.2% w/w, 8.50±0.58% w/w for NP1–NP4, respectively. A sustained drug release pattern was observed from the nanoparticles and they were internalized well in the PC3, LnCap, cancer cells on a concentration dependent manner. Drug loaded nanoparticles were found to be more cytotoxic than the free drug and the cellular internalization was observed in PC3, LnCap cancer cells in vitro. Further the prepared nanoparticles will be conjugated with suitable ligand for the site-specific targeting to the prostate cancer cells in vivo. Thus, the formulation might be suitable for the effective treatment of prostate cancer.

Malignancy is a gathering of maladies which cause an unusual and uncontrolled cell division combined with harmful conduct, for example, intrusion and metastasis [3]. A tumor harmful is a neoplasm portrayed by a disappointment in the guideline of tissue development. The strange expansion of tissues is brought about by changes of qualities (oncogenes that advance cell development and proliferation, and tumor silencer qualities that repress cell division and endurance). Ordinarily, changes in numerous qualities are required to change an ordinary cell into a malignant growth cell.

It is important to improve our insight into malignant growth physiopathology for compelling disease treatment, which will permit find new enemy of malignancy cell surfaces. By and large, ligand conjugated nanoparticles show better efficacy by malignant growth cells and more compelling intracellular medication conveyance than different preparations. The quest for increasingly atomic targets will propel the capacity to improve conveyance at the tumor level while diminishing harmfulness to ordinary tissue. As an outcome, moieties-focused on medicate stacked nanoparticles, looking for new tumor targets, novel ligands, new techniques for focusing on, and molecule adjustment, are commonly considered as promising contender for disease chemotherapy and we can anticipate their broad clinical assessment sooner rather than later.