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

Ashique Al Hoque*
Jadavpur University, India

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 malignant growth tranquilizes and create novel biomedical innovations. The advantages of conventional chemotherapy are restricted by the harmfulness related with anticancer medications in sound tissues. The normal highlights of malignancy and solid cells make it hard to accomplish pharmaco selectivity of medications at the objective site. The advancement of medication conveyance frameworks that can change the bio distribution, tissue take-up and pharmacokinetics of restorative specialists is viewed as the incredible significance in biomedical exploration and the pharmaceutical business. Controlled discharge in medicate conveyance would significance be able to improve the helpful impact of a medication. A consistent convergence of a medication over an all-inclusive timeframe keeping the medication focus inside the ideal range, or a pulsatile sedate discharge in light of a natural change, can be accomplished with controlled medication conveyance frameworks [4]. In these sort of frameworks, the medication is shielded from debasement following organization, the conveyance framework can be controlled near the tumoral cells, the medication is discharged with a particular benefactor and the activity of the medication on tumoral cells can be immediate. In this way, to expand the conveyance of an offered medication to a particular objective site, focusing on ligands are conjugated to transporters. The nearness of responsive pendant gatherings in Nano gels make simple their vectorization forward explicit cell theme by authoritative of ligands. Moreover, focusing on ligands lead to macrophage acknowledgment and quicker freedom contrasted with the non-focused on nanoparticles. Various particles, that incorporate folates,transferrin, counter acting agent and immune response pieces, peptides, aptamers, little atoms, and carbohydrates, have been utilized to target Nano carriers to explicit receptors on tumoral cell surfaces. By and large, ligand-focused on nanoparticles shows better disguise 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.