Enhanced targeting of chemotherapeutic drug to prostate cancer cells by antibody conjugated polymeric nanoparticles

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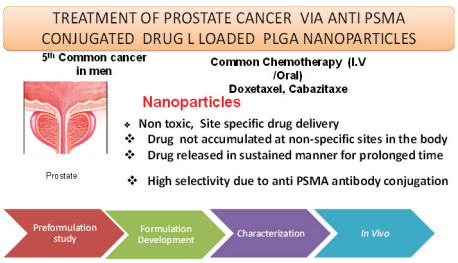

Prostate cancer has become common cause of cancer associated mortality in males across the world. Prostate cancer is not perpetually lethal, it is a heterogeneous disease ranging from asymptomatic to a rapidly fatal systemic malignancy. Although recent advancement has been made in the field of prostate cancer therapy, but low survival rates persist among patients due to metastatasis, drug toxicity/ resistance and high rates of recurrence. In recent years, polymeric nanoparticles have demonstrated marked progress in the field of oncology. Polymeric nanoparticles are widely used in tumor targeting as they possess ability to shrink and eliminate tumors without damaging healthy tissue, overcoming the lacunas of drug such as poor solubility, oral bioavailability and low therapeutic indices. An increased site specificity and internalization was obtained by conjugating specific antibody to the nanoparticles to improve the efficacy of treatment of prostate cancer and decrease the possibility of the serious side effects that cancer patients often experience. Biodegradable nanoparticles (NP) containing an anti-cancer drug was prepared and tagged with anti-PSMA monoclonal antibody as an active targeting to prostate cancer because anti-PSMA monoclonal antibody recognizes and binds with the PSMA on the surfaces of prostate. PSMA is prostate specific membrane antigen, a transmembrane receptor whose expression is largely restricted to prostatic epithelium and prostate cancer cells with its expression level increasing during the progression of malignancy, the drug was released from the nanoparticles leading to cell death. Pre-formulation studies such as drug excipient interaction studies, followed by preparation and optimization of the NP were carried out and characterized for physiochemical characterization such as particle size, zeta potential, morphology, drug loading capacity, drug encapsulation, *in vitro* drug release from NP was performed. Confirmatory studies to determine the presence of the antibody on the surface of NP was evaluated. Storage stability study was conducted. The NP and conjugated NP were utilized to evaluate its efficacy in the cellular uptake, quantification of it, cell viability, apoptosis in the prostate cancer cells (PC3, LNCaP cell lines). Biodistribution and pharmacokinetic analysis were carried. Therefore, antibody conjugated nanoparticle based therapy represents a novel approach to eliminate prostate cancer cells and is a promising potential treatment strategy and may lead to development of prostate cancer model by xenograft model in mice.

Biography

Iman Ehsan is currently pursuing her PhD in Jadavpur University, India. She is working on novel drug delivery, her current area of research is nanoformulations for site specific targeting of prostate and liver cancer. She has completed her M.Pharm from West Bengal University of Technology, Kolkata, West Bengal, India.

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