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Synthesis and characterization of aptamer-navigated drug loaded polymeric micro-particles for enhanced targeted delivery

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Conventional pharmaceutical delivery is often challenged by low targeting capabilities of therapeutic drugs towards malignant or tumor cells and this results in low therapeutic indices with high systemic cytotoxicity to surrounding healthy cells. Targeted drug delivery systems have gained considerable attentions since the emergence of aptamers as a new generation of targeting ligands. Aptamers are DNA or RNA oligonucleotides and can be engineered to target specific cells with high affinity, specificity and selectivity. They are capable of directing and delivering sufficient dosage of therapeutic drugs to targeted tumor cells. Regardless of the aforementioned features, the targeting capability of aptamers is limited by endonuclease attack, electrostatic repulsion and cell membrane barrier, rapid renal clearance and binding stability. This has fostered the application of bio-polymeric particles with tunable properties to create smart aptamer-mediated polymeric delivery systems to provide a sustained and controlled drug release profile with minimal cytotoxic effects. This article reports on the synthesis and biophysical characterization of a novel multifunctional and multilayered co-polymeric targeted delivery system made up of aptamer-conjugated drug-loaded PLGA-PEI (DPAP) formulation. Experimental results demonstrate the potential of the co-polymeric formulation for enhanced *in vivo* cell targeting and drug delivery.

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Dissolution enhancement of Aceclofenac tablet by solid dispersion technique

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Present study was carried out to enhace the dissolution rate of poorly water soluble drug Aceclofenac (BCS-II), by solid dispersion technique using different carrier and super disintegrant by Kneading method. Screening of carrier and super disintegrant having better dissolution effect was performed by Plackett-Burman design. Carrier that were selected for the study include Hydroxypropyl Beta Cyclodextrin (HPBCD), premix of Lactose and Maize Starch and Mannitol. Similarly, as superdisintegrant, Sodium Starch Glycolate (SSG), Croscarmellose and Crospovidone were selected. Among the carriers and superdisintegrants, Mannitol and Crospovidone showed best effect on dissolution, respectively. For optimizaton of concentration of Mannitol and Crospovidone in solid dispersion, Central Composite Design (CCD) was applied for two factor at two level which gave 13 formulations. Tablets were prepared and evaluated for physiochemical properties. Reponse surface plot and contour plot were drawn and an optimum formulation was selected, which contained 114.14 mg of Mannitol and 10.5 mg of Crospovidone. The *in vitro* dissolution studies of optimized formulation CCDF8 and the marketed product were carried out in USP Type II apparatus at different time interval of 5, 15, 30 and 45 minute at 50 rpm in phosphate buffer, pH 7.5 (0.33 M mixed). Solid dispersion was evaluated by FTIR. It showed that the drug was stable in solid dispersion. Hence, solid dispersion technique can be sucessfully used for the improvement of the dissolution profile of Aceclofenac.

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