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Preparation and Evaluation of siRNA Loaded Polymeric Nanoparticles

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Abstract : For Si RNA to be delivered various biodegradable polymers are trialed by many researchers. One of them is Chitosan (CS) nanoparticles which have been extensively studied for siRNA delivery but the stability and efficacy of such particles are highly dependent on the types of cross-linker used. Hence the attempts are made in this study with PGA To address this issue, three common cross-linkers; Ethylene glycol diacrylate (ED) and poly-D-glutamic acid (PGA) were used to prepare siRNA loaded CS-ED/PGA nanoparticles by ionic gelation method. The nanoparticles which were obtained were compared for its characterization in terms of its physicochemical properties i.e. particle size of the resultant particles, zeta potential, its encapsulation capacity in the polymer. Among all the formulations prepared with different crosslinker PGA siRNA had the smallest particle size (ranged from 120 ± 1.7 to 500 ± 10.9 nm) with zeta potential ranged from 22.1 ± 1.5 to +32.4 ± 0.5 mV, and high entrapment (> 91%) and binding efficiencies. Similarly, CS-ED nanoparticles showed better siRNA protection during storage at 4˚C and as determined by serum protection assay. TEM micrographs revealed the assorted morphology of CS-PGA-siRNA nanoparticles in contrast to irregular morphology displayed by CS-ED-siRNA. All siRNA loaded nanoparticles were found to give initial burst release which after some time followed by a sustained release of siRNA which were loaded inside. All the formulations showed concentration-dependent cytotoxicity with when cytotoxicity performed by HeLa and normal vero cell lines.

Keywords : chitosan, siRNA, cytotoxicity, cell line study
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